

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies demolition and removal of buildings, portions of buildings, utilities, other structures and debris from trash dumps shown.

1.2 RELATED WORK:

- A. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- B. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- D. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.
- E. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- D. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

1. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
 2. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- E. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Project Engineer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Project Engineer's approval.
- F. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- G. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center Property to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Project Engineer. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

- B. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. Materials that are discovered to be hazardous shall be handled as unforeseen.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Project Engineer. Clean-up shall include off the Medical Center Property disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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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: (SD055000-01, SD055000-02, SD102113-01, SD102600-01, SD123100-01 & SD123100-02)
 - 2. Frames

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. 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.
- C. Manufacturer's Certificates:
 - 1. Live load designs as specified.
- D. Design Calculations for specified live loads including dead loads.

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.

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.

D. Grout: ASTM C1107, pourable type.

2.2 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.

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.

2.3 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 members 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 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. 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 frame members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. 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. Steel and Iron: NAAMM AMP 504.
 - a. 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.

b. Shop Prime Painting:

1) Surfaces of Ferrous metal:

- a) Items not specified to have other coatings.
- b) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
- c) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
- d) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.

2.4 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 Patient Lift Rails:

- 1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.

C. Supports at Ceiling for Radiographic (x-ray) Equipment:

- 1. Fabricate hangers, braces, and track of modular channel units assembly as shown.
- 2. Fabricate steel plates for anchor to structure above.
- 3. Drill bent plates for bolting at mid height at concrete beams.

2.5 FRAMES

A. Frames for Lead Lined Doors:

- 1. Obtain accurate dimensions and templates from suppliers of lead lined doors, finish hardware, and hollow steel door frames.
- 2. Fabricate as shown for use in connection with lead lined doors.
- 3. Deliver assembled frames with removable shipping spreaders at top and bottom.
- 4. Extend angles at jambs from floor to structural slab above. At floors of interstitial spaces, terminate jamb sections and provide anchors as shown.
- 5. Continuously weld plates and reinforcements to frame members and head members of angle frames between jambs.

6. Type 15 Door Frames:
 - a. Structural steel angle frames with plate or bar full height to heads. Extend reinforcing at hinge cutouts two inches beyond cutout.
 - b. Fabricate top anchorage to beam side at mid height.
 - c. Weld clip angles to both legs of angle at top and bottom.
 - d. Drill clips and plates, at top and bottom for anchoring jamb angles with two 9 mm (3/8 inch) expansion bolts at each location.
 - e. Cut rabbet for pivot hinges and lock strike.

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. Field weld in accordance with AWS.
 1. Design and finish as specified for shop welding.
 2. Use continuous weld unless specified otherwise.
- C. 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.
- D. 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.
- E. 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.
- B. Support at Ceiling for X-ray Tube Stand and Radiographic Equipment:
 1. Bolt modular steel channel frames to hangers as shown, anchored to structure above.

2. Fasten frames with modular channel manufacturers fittings, bolts, and nuts. Space modular channel supports and hangers as shown and as required to suit equipment furnished.
3. Install closure plates in channels at ceiling where channel opening is visible. Coordinate and cut plates to fit tight against equipment anchors after equipment anchors are installed.

3.3 FRAMES FOR LEAD LINED DOORS

- A. Secure jamb angle clips and plates, at top and bottom with two, 9 mm (3/8 inch) expansion bolts to concrete.
- B. Secure 150 x 90 x 13 mm (6 x 3-1/2 x 1/2 inch) angle to steel framing for anchorage when expansion bolts to concrete is not possible.
- C. Secure clips by welding to steel.
- D. At interstitial spaces, anchor jamb angles as shown.

3.4 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. Sustainable design requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
 - 2. For composite wood products, submit documentation indicating that product contains no added urea formaldehyde.
- C. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. 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.

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 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
- 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
C1002-14.....Steel Self-Piercing Tapping Screws for the
Application of Gypsum Panel Products or Metal
Plaster Bases to Wood Studs or Metal Studs
F844-07a (R2013).....Washers, Steel, Plain (Flat) Unhardened for
General Use
- 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. U.S. Department of Commerce Product Standard (PS)
PS 1-95.....Construction and Industrial Plywood
PS 20-10.....American Softwood Lumber Standard

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. 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. 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.
- C. 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.
- D. 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.
- E. 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.

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. Provide fire retardant treated plywood

2.3 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. Adhesives:

1. 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. APA for installation of plywood or structural use panels.

B. Fasteners:

1. 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.
2. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
3. 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.

C. 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.

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SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Items specified:
 - 1. Seats and benches.
 - 2. Counter or Work Tops.

1.2 RELATED REQUIREMENTS

- A. Adhesive, Paint, and Finish VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Woodwork Finish and Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.
- D. Wood doors: Section 08 14 00, WOOD DOORS.
- E. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International:
 - 1. A36/A36M-14 - Carbon Structural Steel.
 - 2. A53/A53M-12 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
 - 3. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 4. E84-15b - Surface Burning Characteristics of Building Materials.
- C. Architectural Woodwork Institute (AWI):
 - 1. AWI-09 - Architectural Woodwork Quality Standards and Quality Certification Program.
- D. Federal Specifications (Fed. Spec.):
 - 1. A-A-1922A - Shield Expansion (Calking Anchors, Single Lead).
 - 2. A-A-1936A - Adhesive, Contact, Neoprene Rubber.
 - 3. FF-N-836E- Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding.
 - 4. FF-S-111D(1) - Screw, Wood (Notice 1 inactive for new design).
 - 5. MM-L-736C(1) - Lumber, Hardwood.
- E. National Electrical Manufacturers Association (NEMA):
 - 1. LD 3-05 - High-Pressure Decorative Laminates.
- F. U.S. Department of Commerce, Product Standard (PS):
 - 1. PS1-07 - Construction and Industrial Plywood.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Millwork items - Half full size scale for sections and details; 1:50 (1/4 inch) for elevations and plans.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.
- D. Samples:
 - 1. Plastic Laminate Finished Plywood and Particleboard: 150 mm by 300 mm (6 by 12 inches) long, each type and color.
 - 2. Approved samples may be incorporated into work.
- E. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 - 2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
 - b. Certify each composite wood and agrifiber product contains no added urea formaldehyde.
- F. Certificates: Certify products comply with specifications.
 - 1. Moisture content of materials.
- G. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Fabricator with project experience list.
 - 2. Installer with project experience list.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications:
 - 1. Regularly fabricates specified products.
 - 2. Fabricated specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Installer Qualifications:
 - 1. Regularly installs specified products.
 - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.

- a. Project Experience List: Provide contact names and addresses for completed projects.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.
- D. Store products indoors in dry, weathertight, conditioned facility.
- E. Protect products from damage during handling and construction operations.

1.7 FIELD CONDITIONS

- A. Environment:
 - 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
 - 2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
 - 3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
 - 4. 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.
- B. Field Measurements: Verify field conditions affecting fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Grading and Marking: Factory mark with grade stamp lumber and plywood of inspection agency approved by the Board of Review, American Lumber Standard Committee.

- B. Lumber:
 - 1. Sizes:
 - a. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes within manufacturing tolerances allowed by the standard under which product is produced.
 - 2. Hardwood: MM-L-736, species as specified for each item.
 - 3. Moisture Content:
 - a. 32 mm (1-1/4 inches) or less nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
 - b. Other materials: According to standards under which the products are produced.
- C. Plywood:
 - 1. Softwood Plywood: DOC PS1.
 - a. Plywood, 13 mm (1/2 inch) and thicker; minimum five ply construction, except 32 mm (1-1/4 inch) thick plywood minimum seven ply.
 - b. Plastic Laminate Plywood Cores:
 - 1) Exterior Type, and species group.
 - 2) Veneer Grade: A-C.
- D. Plastic Laminate: NEMA LD-3.
 - 1. Exposed Laminate Surfaces including Countertops: Grade HGL.
 - 2. Plastic Laminate Covered Wood Tops Backing: Grade HGP.
- E. Stainless Steel: ASTM A240, Type 302 or 304.
- F. Cast Aluminum: ASTM B26.
- G. Extruded Aluminum: ASTM B221.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer.
- C. Sustainable Construction Requirements:
 - 1. Select products with recycled content to achieve overall Project recycled content requirement.
 - 2. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.
 - b. Aerosol adhesives.
 - c. Paints and coatings.
 - d. Composite wood and agrifiber.

2.3 FABRICATION

A. General:

1. AWI Custom Grade for interior millwork.
2. Finish woodwork, free from pitch pockets.
3. Plywood, minimum 13 mm (1/2 inch), unless otherwise shown on Drawings or specified.
4. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.
5. Plastic Laminate Work:
 - a. Factory glued to a plywood core, thickness as shown on Drawings or specified.
 - b. Cover exposed edges with plastic laminate.
 - c. Provide plastic backing sheet on underside of countertops, vanity tops, thru-wall counter and sills, including back splashes and end splashes of countertops.
 - d. Use backing sheet on concealed large panel surface when decorative face does not occur.

B. Seats and Benches:

1. Fabricate from 50 mm (2 inch) stock strips of plain-sawed White Oak, or Maple.
2. Solid seats securely glued together of spliced, doweled, or double tongued and grooved wood pieces.
3. Round top edges and corners where exposed.

C. Plastic Laminate Counter or Work Tops:

1. Thickness: 32 mm (1-1/4 inch) thick core unless shown otherwise.
 - a. Edges:
 - 1) Decorative laminate for exposed edges of tops, back, and endsplash.
 - b. Assemble backsplash and end splash to counter top.
 - c. Use one piece counters for straight runs.

2.4 ACCESSORIES

A. Hardware:

1. Rough Hardware:
 - a. Provide 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.
 - b. Fasteners:

- 1) Bolts with Nuts: FF-N-836.
 - 2) Expansion Bolts: A-A-1922A.
 - 3) Screws: Fed. Spec. FF-S-111.
2. Finish Hardware:
- a. Fabricated Wall Bench Supports:
 - 1) 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.
 - 2) 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, maximum 200 mm (8 inches) on center between ends or corners.
 - B. Adhesive:
 1. Plastic Laminate: Fed. Spec. A-A-1936.
 2. Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION

- A. Installation:
 1. Prime millwork receiving transparent finish and back-paint concealed surfaces.
 2. Plumb and level items unless shown otherwise.
- B. Seats and Benches:
 1. Provide stainless steel countersunk screws to secure wood seats to brackets, angle, or pipe supports.
 2. Provide 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: Fasten wall benches on stainless steel angles, 150 mm (6 inches) near ends and maximum 900 mm (3 feet) on centers.

3.3 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed surfaces. Remove contaminants and stains.
- C. Touch up damaged factory finishes.

3.4 PROTECTION

- A. Protect finish carpentry from construction operations.
- B. Cover finish carpentry with reinforced kraft paper, and plywood or hardboard.
- C. Remove protective materials immediately before acceptance.
- D. Repair damage.

- - - E N D - - -

**SECTION 07 21 13
THERMAL INSULATION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Acoustical insulation.
 - a. Batt and blanket insulation at interior framed partitions.

1.2 RELATED REQUIREMENTS

- A. Safing Insulation: Section 07 84 00, FIRESTOPPING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 - 1. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 2. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 3. E84-15a - Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show insulation type, thickness, and R-value for each location.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
- D. Sustainable Construction Submittals:
 - 1. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.

1.5 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.

- B. Protect products from damage during handling and construction operations.

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL

- A. Insulation Thickness:
 - 1. Provide thickness required by R-value shown on drawings.
 - 2. Provide thickness indicated when R-value is not shown on drawings.
- B. Insulation Types:
 - 1. Provide one insulation type for each application.

2.2 ACOUSTICAL INSULATION

- A. Semi Rigid, Batts and Blankets:
 - 1. Widths and lengths to fit tight against framing.
 - 2. Mineral Fiber Batt or Blankets: ASTM C665 unfaced.
 - 3. Maximum Surface Burning Characteristics: ASTM E84.
 - a. Flame Spread Rating: 25.
 - b. Smoke Developed Rating: 450.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install batt and blanket insulation with joints tight. Fill framing voids completely.
- C. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

3.3 ACOUSTICAL INSULATION

- A. General:
 - 1. Install insulation without voids.

2. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.
3. Pack behind outlets, around pipes, ducts, and services encased in walls.
4. Do not compress insulation below required thickness except where embedded items prevent required thickness.

3.4 PROTECTION

- A. Protect insulation from construction operations.
- B. Repair damage.

- - 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. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Sealants and application: Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Inspector qualifications.
- E. Manufacturer's literature, data, and installation instructions for types of firestopping and smoke stopping used.
- F. List of FM, UL, or WH classification number of systems installed.
- G. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.
- H. 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.

- B. **Installer Qualifications:** A firm that has been approved by FM Global according to FM Global 4991 or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements." Submit qualification data.
- C. **Inspector Qualifications:** Contractor to engage a qualified inspector to perform inspections and final reports. The inspector to meet the criteria contained in ASTM E699 for agencies involved in quality assurance and to have a minimum of two years' experience in construction field inspections of firestopping systems, products, and assemblies. The inspector to be completely independent of, and divested from, the Contractor, the installer, the manufacturer, and the supplier of material or item being inspected. Submit inspector qualifications.

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
 E699-09.....Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components
 E814-13a.....Fire Tests of Through-Penetration Fire Stops
 E2174-14.....Standard Practice for On-Site Inspection of Installed Firestops
 E2393-10a.....Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- 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. 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.
 - 5. VOC Content: Firestopping sealants and sealant primers to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):
 - a. Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- D. 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.
- E. 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.
- F. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- G. 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.
- H. 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. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.
- C. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, 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 CERTIFICATION:

- A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.
- G. 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.

1.6 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.

1.7 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).

1.8 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.

1.9 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.

1.10 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):
 - 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.
 - C1330-02(R2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
 - 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. 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-#1 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
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 leadfaced 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.

B. 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. Color of sealants shall match adjacent surfaces, 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 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.5 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 based 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. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for first 305 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 305 m (1000 feet) of joint length thereafter or one test per each floor per elevation.
- B. 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.
- C. 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.
- D. 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.
- E. 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.

F. 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 SUMMARY

- A. Section Includes:
1. Hollow metal door frames for wood doors and borrowed lights at interior locations.

1.2 RELATED REQUIREMENTS

- A. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.
- B. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- C. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- D. Glazing: Section 08 80 00, GLAZING.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standard Institute (ANSI):
1. A250.8-2014 - Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 3. E90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- D. National Fire Protection Association (NFPA):
1. 80-16 - Fire Doors and Other Opening Protectives.
- E. UL LLC (UL):
1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
1. Description of each product.

2. Include schedule showing each door and frame requirements fire label and smoke control label for openings.
 3. Installation instructions.
- D. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer with project experience list.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.

1.6 DELIVERY

- A. Fasten temporary steel spreaders across the bottom of each door frame before shipment.
- B. Deliver products in manufacturer's original sealed packaging.
- C. Mark packaging legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight conditioned facility.
- B. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Design hollow metal doors and frames complying with specified performance:
 1. Fire Doors and Frames: UL 10C; NFPA 80 labeled.

- a. Fire Ratings: See drawings.
- 2. Smoke Control Doors and Frames: UL 1784; NFPA 80 labeled, maximum 0.15424 cu. m/s/sq. m (3.0 cfm/sf) at 24.9 Pa (0.10 inches water gage) pressure differential.

2.2 MATERIALS

- A. Sheet Steel: ASTM A1008/A1008M, cold-rolled.

2.3 PRODUCTS - GENERAL

- A. Provide hollow metal doors and frames from one manufacturer.
- B. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.

2.4 HOLLOW METAL FRAMES

- A. Hollow Metal Frames: ANSI A250.8; face welded. See drawings for sizes and designs.
 - 1. Interior Frames:
 - a. Wood Doors and Borrowed Lights: 1.59 mm (0.0625 inch) thick.
 - 2. Interior Frames for Lead Lined Doors:
 - a. Openings with Structural Steel Subframe: 1.59 mm (0.0625 inch) thick.
 - b. Lead Lining: See Section 13 49 00, RADIATION PROTECTION.
- B. Frame Materials:
 - 1. Interior Frames: Sheet steel.

2.5 FABRICATION

- A. Hardware Preparation: ANSI A250.8; for hardware specified in Section 08 71 00, DOOR HARDWARE.
- B. Hollow Metal Frame Fabrication:
 - 1. Fasten mortar guards to back of hardware reinforcements, except on lead-lined frames.
 - 2. Terminated Stops: ANSI A250.8.
 - 3. Borrowed Light Frames:
 - a. Provide integral stop on exterior, corridor, or secure side of door.
 - b. Design rabbet width and depth to receive glazing material or panel shown on drawings.
 - 4. Frame Anchors:
 - a. Floor anchors:
 - 1) Provide extension type floor anchors to compensate for depth of floor fills.

- 2) Provide 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive floor fasteners.
 - 3) Provide 50 mm by 50 mm by 9 mm (2 inch by 2 inch by 3/8 inch) clip angle for lead lined frames, drilled for floor fasteners.
- b. Jamb anchors:
- 1) Place anchors on jambs:
 - a) Near top and bottom of each frame.
 - b) At intermediate points at maximum 600 mm (24 inches) spacing.
 - 2) Form jamb anchors from steel minimum 1 mm (0.042 inch) thick.
 - 3) Anchors for stud partitions: Provide tabs for securing anchor to sides of studs. Provide one of the following:
 - a) Welded type.
 - b) Lock-in snap-in type.
 - 4) Anchors for observation windows and other continuous frames set in stud partitions.
 - a) Weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
 - b) Space maximum 600 mm (24 inches) on centers.
 - 5) Modify frame anchors to fit special frame and wall construction.
 - 6) Provide special anchors where shown on drawings and where required to suit application.

2.6 FINISHES

- A. Steel: ANSI A250.8; shop primed.
- B. Finish exposed surfaces after fabrication.

2.7 ACCESSORIES

- A. Primers: ANSI A250.8.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Clips Connecting Members and Sleeves: Match door faces.
- D. Fasteners: Galvanized steel.
 1. Metal Framing: Steel drill screws.
 2. Masonry and Concrete: Expansion bolts.
- E. Anchors: Galvanized steel.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Apply barrier coating to metal surfaces in contact with cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
 - 2. Install fire doors and frames according to NFPA 80.
 - 3. Install smoke control doors and frames according to NFPA 105.

3.3 FRAME INSTALLATION

- A. Plumb, align, and brace frames 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 when shipping spreader is removed.
 - 3. Where construction permits concealment, leave shipping spreaders in place after installation, otherwise remove spreaders when frames are set and anchored.
 - 4. Remove wood spreaders and braces when walls are built and jamb anchors are secured.
- B. Floor Anchors:
 - 1. Anchor frame jambs to floor with two expansion bolts.
 - a. Lead Lined Frames: Use 9 mm (3/8 inch) diameter bolts.
 - b. Other Frames: Use 6 mm (1/4 inch) diameter bolts.
- C. Jamb Anchors:
 - 1. Metal Framed Walls: Secure anchors to sides of studs with two fasteners through anchor tabs.
- D. Lead Lined Frames:
 - 1. Extend jambs and anchor with clip angles to structure above.
 - a. Fasteners to Concrete: Minimum two, 9 mm (3/8 inch) diameter expansion bolts.
 - b. Connection to Structural Steel: Welded.

- E. Touch up damaged factory finishes.
 - 1. Repair painted surfaces with touch up primer.

3.4 CLEANING

- A. Clean exposed door and frame surfaces. Remove contaminants and stains.

3.5 PROTECTION

- A. Protect doors and frames from traffic and construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

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**SECTION 08 14 00
INTERIOR WOOD DOORS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior flush wood doors transparent finish.
 - a. Fire rated doors.
 - b. Smoke rated doors.

1.2 RELATED REQUIREMENTS

- A. Paints and Coatings and Composite Wood and Agrifiber VOC Limits:
Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- 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, and Section 08 71 00, DOOR HARDWARE.
- D. Door Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Window and Door Manufacturers
Association (ANSI/WDMA):
 - 1. I.S. 1A-13 - Architectural Wood Flush Doors.
- C. National Fire Protection Association (NFPA):
 - 1. 80-16 - Fire Doors and Other Opening Protectives.
 - 2. 252-12 - Fire Tests of Door Assemblies.
- D. UL LLC (UL):
 - 1. 10C-09 - Positive Pressure Fire Tests of Door Assemblies.
- E. Window and Door Manufacturers Association (WDMA):
 - 1. TM 7-14 - Cycle-Slam Test.
 - 2. TM 8-14 - Hinge Loading Test.
 - 3. TM 10-14 - Screw Holding Capacity.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA,
AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Include details of glazing.

3. Indicate project specific requirements not included in Manufacturer's Literature and Data submittal.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 2. Fire rated doors showing conformance with NFPA 80.
- D. Samples:
1. Veneer sample 200 mm by 275 mm (8 inch by 11 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.
- E. Sustainable Construction Submittals:
1. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- F. Test Reports: Indicate products comply with specifications.
1. Screw Holding Capacity Test.
 2. Cycle-Slam Test.
 3. Hinge-Loading Test.
- G. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Regularly and presently manufactures specified products.
 2. Manufactures specified products with satisfactory service on five similar installations for minimum five years.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
1. Minimum 0.15 mm (6 mil) polyethylene bags or cardboard packaging to remain unbroken during delivery and storage.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, and manufacture date.
1. Identify door opening corresponding to Door Schedule.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight, conditioned facility.
1. Store doors according to ANSI/WDMA I.S. 1A.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Environment:

1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
2. Work Area Ambient Temperature Range: 21 to 27 degrees C (70 to 80 degrees F) continuously, beginning 48 hours before installation.
3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.
 - a. Comply with door manufacturer's instructions for relative humidity.

1.9 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant interior factory finished flush wood doors against material and manufacturing defects.
 1. Warranty Period: Lifetime of original installation.

PART 2 - PRODUCTS**2.1 PRODUCTS - GENERAL**

- A. Provide each product from one manufacturer.
- B. Sustainable Construction Requirements:
 1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Paints and coatings.
 - b. Composite wood and agrifiber.

2.2 FLUSH WOOD DOORS

- A. General:
 1. ANSI/WDMA I.S. 1A, Extra Heavy Duty.
 2. Adhesive: Type II.
 3. Core: Structural composite lumber, except when mineral core is required for fire rating.
 4. Thickness: 44 mm (1-3/4 inches) unless otherwise shown or specified.
- B. Faces:
 1. ANSI/WDMA I.S. 1A.
 2. One species throughout project unless scheduled or otherwise shown.
 3. Transparent Finished Faces: Premium Grade, rotary cut, red oak.

- a. AA Grade face veneer.
 - b. Door Edges: Same species as door face veneer.
 - c. In existing buildings, where doors are required to have transparent finish, use wood species, grade, and assembly of face veneers to match adjacent existing doors.
- C. Wood For Stops, Louvers, Muntins and Moldings For Flush Doors Required to Have Transparent Finish:
- 1. Solid wood of same species as face veneer, except maple is acceptable on birch doors.
 - 2. Glazing:
 - a. On non-fire-rated doors, use applied wood stops nailed tightly on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on center.
- D. Fire-Rated Wood Doors:
- 1. Fire Resistance Rating:
 - a. C Label: 3/4 hour.
 - 2. Labels:
 - a. Comply with NFPA 252, UL 10C, and labeled by qualified testing and inspection agency showing fire resistance rating.
 - b. Metal labels with raised or incised markings.
 - 3. 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: Minimum 125 mm (5 inches) by full core width.
 - d. Reinforcement blocking in compliance with labeling requirements.
 - e. Mineral material similar to core is not acceptable.
 - 4. Other Core Components: Manufacturer's standard as allowed by labeling requirements.

2.3 FABRICATION

- A. Factory machine interior wood doors to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.
 - 1. Factory fit fire rated doors according to NFPA 80.
- B. Rout doors for hardware using templates and location heights specified in Section 08 71 00, DOOR HARDWARE.
- C. Factory fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (2 inches) of door thickness; undercut where shown.

- D. Clearances between Doors and Frames and Floors:
 - 1. Fire Rated Doors: Comply with NFPA 80.
 - 2. Door Jambs, Heads, and Meeting Stiles: Maximum 3 mm (1/8 inch).
- E. Provide cutouts for glazed openings.
- F. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.
- G. Identify each door on top edge.
 - 1. Mark with stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, date of manufacture and quality.
 - 2. Mark door or provide separate certification including name of inspection organization.
 - 3. Identify door manufacturing standard, including glue type.
 - 4. Identify veneer and quality certification.
 - 5. Identification of preservative treatment for stile and rail doors.

2.4 FINISHES

- A. Factory Transparent Finish:
 - 1. Factory finish flush wood doors.
 - a. ANSI/WDMA I.S. 1A Section F-3 Finish System Descriptions for System 5, Conversion Varnish or System 7, Catalyzed Vinyl.
 - b. Use stain to produce finish to match existing wood doors.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify door frames are properly anchored.
 - 2. Verify door frames are plumb, square, in plane, and within tolerances for door installation.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. Install fire rated doors according to NFPA 80.
 - 2. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 PROTECTION

- A. After installation, place shipping container over door and tape in place.
 - 1. Do not apply tape to door faces and edges.
- B. Provide protective covering over exposed hardware in addition to covering door.
- C. Maintain covering in good condition until removal is directed by Contracting Officer's Representative.

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SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Interior aluminum sliding door units.

1.2 RELATED REQUIREMENTS

- A. Glass and Glazing: Section 08 80 00, GLAZING.
- B. Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Electrical for Sliding Door Units: 120 VAC, 50/60 cycle, single phase, dedicated 20 amp circuit required.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Welding Society (AWS):
1. D1.2/D1.2M-14 - Structural Welding Code - Aluminum.
- C. ASTM International (ASTM):
1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 2. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 3. B209M-14 - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 4. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 5. B221M 13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 6. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 7. E330/E330M-14 -Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 8. F468-15 - Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 9. F593-13a - Stainless Steel Bolts, Hex Cap Screws, and Studs.
- D. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-06 - Metal Finishes Manual.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.

1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.
 - d. Manufacturer's field representative.
 - e. Other installers responsible for adjacent and intersecting work, including Electrician.
2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings: Minimum 1 to 2 (half size) scale.
 1. Show size, configuration, and fabrication and installation details.
 2. Show anchorage and reinforcement.
 3. Show interface and relationship to adjacent work.
- C. Manufacturer's Literature and Data:
 1. Description of each product.
 2. Doors, each type.
 3. Entrance and Storefront construction.
 4. Installation instructions.
 5. Warranty.
- D. Samples:
 1. Aluminum Anodized Finish: Two sample extrusions minimum 150 mm (6 inches) long for each specified color in sets of three showing maximum color range.
- E. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- F. Test reports: Certify products comply with specifications.
- G. Certificates: Certify /products comply with specifications.
 1. Certify anodized finish thickness.
- H. Qualifications: Substantiate qualifications comply with specifications.
 1. Manufacturer with project experience list.
 2. Installer with project experience list.
- I. Operation and Maintenance Data:
 1. Care instructions for each exposed finish product.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Regularly manufactures specified products.
 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Installer Qualifications: Manufacturer authorized representative.
 1. Regularly installs specified products.
 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
- C. Welders and Welding Procedures Qualifications: AWS D1.2/D1.2M.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.
- D. Store products indoors in dry, weathertight, conditioned facility.
- E. Protect products from damage during handling and construction operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Aluminum:
 - 1. Sheet Metal: ASTM B209M (ASTM B209), minimum 1.6 mm (0.063 inch) thick.
 - 2. Extrusions: ASTM B221M (ASTM B221).
 - a. Framing: Minimum 3 mm (0.125 inch) wall thickness.
 - b. Glazing Beads, Moldings, and Trim: Minimum 1.25 mm (0.050 inch) thick.
 - 3. Alloy 6063 temper T5 for doors and door frames.
 - 4. Alloy 6061 temper T6 for guide tracks for sliding doors and other extruded structural members.
- B. Stainless Steel: ASTM A240/A240M; Type 302 or Type 304.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Interior aluminum sliding door units shall be Horton Automatics Profiler 2000B Elite Belt Drive System, or approved equal.
- B. Provide aluminum framed entrances and storefronts from one manufacturer.
- C. Sustainable Construction Requirements:
 - 1. Aluminum Recycled Content: 50 percent total recycled content, minimum.

2.3 FRAMES

- A. Framing Members: Extruded aluminum.
- B. Stops: Provide integral fixed stops and glass rebates and snap-on removable stops.
- C. Provide concealed screws, bolts and other fasteners.
- D. Secure cover boxes to frames in back of lock strike cutouts.

2.4 INTERIOR ALUMINUM SLIDING DOOR UNITS

- A. Manufactured Door Units: Shall include operator, header with roller track, carrier assemblies, framing jambs, sliding door panel, sidelite, activation, safety devices, and accessories required for complete installation.
 - 1. Configuration: Single Slide.
 - 2. Mounting Type: Perimeter mounted within rough opening with sliding panel sliding along sidelite.
 - 3. Door Type: Type 110; Slide-swing panel 'SX' shall slide along exterior side.

- B. Operator: The Electric Operating Mechanism shall be Profiler® Series 2000B Elite Belt Drive. Maximum current draw shall not exceed 3.15 amps. The operator shall be mounted and concealed within the header.
1. Operating force shall be accomplished through a 1/8 HP DC permanent magnet motor with worm gear transmission and 1800 RPM working with drive belt, attached door hangers, and idler pulley. Drive belt to be steel reinforced nylon, 1/2" (13 mm) wide. Idler pulley to be reinforced, metallic material.
 2. Master Control shall be 16 bit microprocessor controller with dual on-board seven-segment alphanumeric diagnostic display and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed. The control shall have minimum of 28 programmable parameters including the following functions as required by ANSI A156.10:
 - a. Adjustable opening and closing speeds.
 - b. Adjustable back-check and latching.
 - c. Adjustable braking.
 - d. Adjustable hold-open time between 1 to 30 seconds.
 - e. Adjustable Reversing Circuit will reopen door unit if closing path is obstructed.
 - f. Separate day and night modes of operation with security override.
 3. Finger Safety: When unit slides open, strike rail of sliding panel will stop short of adjacent sidelite; resulting opening is net slide.
 4. On/Off Key Switch shall be supplied. When switched OFF, unit reverts to free manual operation (likewise during electrical power failure).
 - a. Key the same as hookbolt latch.
 - b. Provide recore cylinder specified under Section 08 71 00, DOOR HARDWARE.
- C. Profiler® HeaderR: Shall be 4" (102mm) deep by 6" (152mm) high aluminum construction with extruded z-profile reinforcement for dead load and lateral strength. Header shall have removable face plate for service and adjustment of operator and controls. Header mounts flush to 4" framing jambs.
- D. Carrier Assemblies and Header Roller Track: Carrier assemblies shall support door panels with minimum four rollers per panel. Rollers will

- be steel, high quality ball bearing wheels 1-1/4" (32 mm) diameter. Anti-Derailing shall be accomplished by means of a continuous aluminum extrusion full length of slide panel travel. Overhead header roller track shall be continuous aluminum, nylon covered, and replaceable.
- E. Sliding Panel and Sidelite: Shall be aluminum, 1-3/4" (44 mm) deep with narrow stile rails. An intermediate, horizontal rail (muntin bar), 2 1/4" (57 mm) wide, shall be furnished for safety and division of glass. Optional bottom rail shall be 10" (254mm) tall. Sliding panels shall have concealed bottom guides to stabilize slide travel.
1. Weather-stripping to be along perimeter of sliding panel and swing-out sidelite. Weatherstripping material captured in extruded aluminum door panel. Surface applied self-adhesive weatherstripping not acceptable. Adjustable spring-loaded double astragal weatherstripping at lead edge, double mohair at interlock rails
 2. Standard glazing prep to be for 1/4" (6 mm) glass.
- F. Breakout Panel: Slide-swing panel can swing out 90° from any position of slide movement and require no more than 50 lbf. (222 N) of force applied at the lock stile to open. Slide-swing panel shall utilize spring loaded ball detent.
1. Slide-swing panel shall have torsion spring designed to re-close panel if pushed open in the direction of egress.
 2. Breakout mechanism shall provide support across full width of the door, in normal operating mode. In breakout mode, torsion assembly shall support weight of the door to minimize drop during emergency egress.
 3. Slide-swing panel shall include intermediate horizontal rail.
 4. Units with breakout feature are UL listed as an exit away and are compliant with NFPA 101.
- G. Jamb / Frame: Shall be aluminum. Jamb dimensions to be 1 3/4" (44mm) deep by 4" (102mm) wide.
- H. Threshold: Shall be aluminum, 1/2" (25 mm) tall by 4" (102 mm) wide.
- I. Hardware: ANSI A156.5, Grade 1, 2-Point Locking provided and installed in strike rail shall include:
1. Hookbolt Latch, 5/8" laminated stainless steel, latching into jamb or adjacent strike rail.
 2. 3/8" hex-bolt into breakout carrier frame.
 3. Thumbturn mounted on interior side.

4. Provide recore cylinder specified under Section 08 71 00, DOOR HARDWARE.

2.5 RELATED EQUIPMENT

- A. Basic Sensor System: Shall be 24 VDC, Class II circuit and shall be adjusted and installed in compliance with ANSI A156.10. System shall include the following:
 1. Activation Switches:
 - a. Round metal push plates shall be mounted each side of door unit for activation of door.
 - b. A push button shall be mounted at the adjacent reception desk for activation of door.
 2. Threshold Presence Sensors:
 - a. Header mounted sensors shall provide active infrared presence detection on each side of the door unit and shall remain active throughout the entire door opening and closing cycle.
 - b. Hold-open beams: Two pulsed infrared photoelectric beams to be mounted in vertical rails of sidelite or in jambs. Sender/receiver arrangement parallels door opening.

2.6 FABRICATION

- A. Form metal parts and fit and assemble joints, except joints designed to accommodate movement. Seal joints to resist air infiltration and water penetration.
- B. Prepare and reinforce doors and frames for hardware and accessories.
 1. Coordinate preparation with specified hardware. See Section 08 71 00, DOOR HARDWARE.
 2. Fabricate reinforcement from stainless steel plates.
 - a. Hinge and pivot reinforcing: Minimum 4.5 mm (0.179 inch) thick.
 - b. Lock Face, Flush Bolts, Concealed Holders, Concealed and Surface Mounted Closers Reinforcing: Minimum 2.6 mm (0.104 inch) thick.
 - c. Other Surface Mounted Hardware Reinforcing: Minimum 1.5 mm (0.059 inch) thick.
 3. Where concealed hardware is specified, provide space, cutouts, and reinforcement for installation and secure fastening.
- C. Factory assemble doors.

2.7 FINISHES

- A. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.

2.8 ACCESSORIES

- A. Dielectric Tape: Plastic, non-absorptive, with pressure sensitive adhesive; 0.18 to 0.25 mm (7 to 10 mils) thick.
- B. Barrier Coating: ASTM D1187/D1187M.
- C. Fasteners:
 1. Aluminum: ASTM F468, Alloy 2024.
 2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.
- D. Anchors: Aluminum or stainless steel; type to suit application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Apply dielectric tape or barrier coating to aluminum surfaces in contact with dissimilar metals and cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install aluminum framed entrances and storefronts plumb and true, in alignment and to lines shown on drawings.
- C. Anchor frames to adjoining construction at heads, jambs and sills.
- D. Provide concealed aluminum clips to connect adjoining frame sections.
- E. Install door hardware and hang doors. See Section 08 71 00, DOOR HARDWARE.
- F. Contractor shall install all wiring to operator on a separate circuit breaker routed into header. Contractor shall install all necessary power and low voltage wiring for proper operation of associated security systems.
- G. Adjust doors and hardware uniform clearances and proper operation.

H. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.

I. Tolerances:

1. Variation from Plumb, Level, Warp, and Bow: Maximum 3 mm in 3 m (1/8 inch in 10 feet).

2. Variation from Plane: Maximum 3 mm in 3.65 m (1/8 inch in 12 feet); 6 mm (1/4 inch) over total length.

3. Variation from Alignment: Maximum 1.5 mm (1/16 inch) in-line offset and maximum 3 mm (1/8 inch) corner offset.

4. Variation from Square: Maximum 3 mm (1/8 inch) diagonal measurement differential.

3.3 PROTECTION, CLEANING AND REPAIRING

A. Clean exposed aluminum and glass surfaces. Remove contaminants and stains.

B. Protect aluminum-framed entrances and storefronts from construction operations.

C. Remove protective materials immediately before acceptance.

D. Repair damage.

- - - 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 and Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- C. Card Readers: Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.
- D. Electrical: Division 26, ELECTRICAL.

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. Mortise 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, latchsets, 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 Project Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Project Engineer's office until all other similar items have been installed in project, at which time the Project Engineer 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.

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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 up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
 3. 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).
 4. 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).
 5. Provide heavy-weight hinges where specified.
 6. 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 DOOR CLOSING DEVICES

- A. Closing devices shall be products of one manufacturer.

2.3 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.

2.4 FLOOR CLOSERS AND FLOOR PIVOT SETS

- A. Comply with ANSI A156.4. Provide stainless steel floor plates for floor closers and floor pivots, except where metal thresholds occur. Pivots for non-labeled doors shall be cast, forged or extruded brass or bronze.

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.

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 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 not less than six pins. Cylinders for all locksets shall be removable core type. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the 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. B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets, except on designated doors in Psychiatric (Mental Health) areas, shall have lever handles fabricated from cast stainless steel. No substitute lever material shall be accepted. 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. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.
2. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.36.

3. Privacy locks in non-mental-health patient rooms shall have an inside thumbturn for privacy and an outside thumbturn for emergency entrance.

2.8 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
 B. General: Use fail-secure electric strikes at fire-rated doors.

2.9 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

2.10 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

- A. Conform to ANSI Standard A156.6.
 B. Provide protective plates 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.

2.11 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. 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.
- C. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- D. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.18 DOOR PULLS WITH PLATES

- A. Conform to ANSI A156.6. Pull Type J401, 152 mm CTC (6 inches CTC) length by 19 mm (3/4 inches) diameter minimum with plate Type J302, 90 mm by 381 mm (3-1/2 inches by 15 inches), unless otherwise specified. Provide pull with projection of 57.2 mm (2 1/4 inches) minimum and a clearance of 38.1 mm (1 1/2 inches) minimum. Cut plates of door pull plate for cylinders, or turn pieces where required.

2.19 PUSH PLATES

- A. Conform to ANSI A156.6. Metal, Type J302, 203 mm (8 inches) wide by 406.4 mm (16 inches) high. Provide metal Type J302 plates 102 mm (4 inches) wide by 406.4 mm (16 inches) high where push plates are specified for doors with stiles less than 203 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

2.20 MISCELLANEOUS HARDWARE

- A. 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.

2.21 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."
- B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.
- C. Miscellaneous Finishes:
 - 1. Hinges --interior doors: 652 or 630.
 - 2. Pivots: Match door trim.
 - 3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
 - 4. Cover plates for floor hinges and pivots: 630.
- D. 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.

2.22 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 Project Engineer for approval.
- B. 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. Centerline of door pulls to be 1016 mm (40 inches).
5. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
6. 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)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Hinges Required Per Door:

Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
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E. 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 rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

F. After locks have been installed, show in presence of Project Engineer that keys operate their respective locks in accordance with keying requirements. Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 FINAL INSPECTION

- A. Installer to provide letter to VA Project/Project Engineer 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 Project/Project Engineer 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.
- C. List of Manufacturers

<u>Item</u>	<u>Specified</u>	<u>Equal</u>
Hinges	Stanley	Hager, McKinney
Locks	Falcon	Schlage, Corbin Russwin, Best (equal locks must accept Falcon cores)
Exit Devices	Precision	Norton, Corbin Russwin, Von Duprin
Closers	Norton	LCN 4040 EDA, Stanley D4550
Overhead Stops and Pivots	Rixson	Trimco, Ives
Flat Goods and Stops	Rockwood	Trimco, Ives, McKinney
Gasketing	Pemko	Reese

- D. Hardware Sets

HARDWARE SET NO. 1 (Doors 109A, 109B, 109C, 110B, 110C, 110D)

1 ½	Pair	Hinges	CB1960R	4 ½" x 4 ½"	630
1	Each	Passage Set	LM101-DG		630

1	Each	Kick Plate			630
1	Each	Wall Stop	#403		626
HARDWARE SET NO. 2 (Door 110)					
1 ½	Pair	Hinges	CB1960R	4 ½" x 4 ½"	630
1	Each	Lockset	LM521-DG	Entrance function	630
1	Each	Electric Strike	(match existing)		
1	Each	Kick Plate			630
1	Each	Wall Stop	#403		626
- Card reader provided and installed by others					
HARDWARE SET NO. 3 (Door 109)					
2	Each	Recore Cylinders			
- Balance of hardware by aluminum door and frame supplier					
HARDWARE SET NO. 4 (Door A27A)					
1 ½	Pair	Hinges	CB1960R	4 ½" x 4 ½"	630
1	Each	Lockset	LM581-DG	Storeroom function	630
2	Each	Kick Plates			630
1	Each	Overhead Stop	Heavy-Duty 6 Series		626
HARDWARE SET NO. 5 (Door A27B)					
1 ½	Pair	Hinges	CB1960R	4 ½" x 4 ½"	630
1	Each	Lockset	LM581-DG	Storeroom function	630
1	Each	Closer	7500		689
2	Each	Kick Plates			630
1	Each	Overhead Stop	Heavy-Duty 6 Series		626
1	Set	Gasketing	S88W		
HARDWARE SET NO. 6 (Door A25)					
1 ½	Pair	Hinges	CB1960R	4 ½" x 4 ½"	630
1	Each	Privacy Set	LM321-DG		630
2	Each	Kick Plates			630
1	Each	Wall Stop	#403		626
HARDWARE SET NO. 7 (Door A24)					
1	Each	Bottom Pivot	L117		626
1	Each	Top Pivot	L180		626
1	Each	Middle Pivot	ML19		626
1	Each	Deadlock	M941		630
1	Each	Push Plate	#70	4" x 16"	630
1	Each	Pull Plate	#125 x 70B	3 ½" x 15"	630
1	Each	Closer w/ hold	7500H		689
1	Each	Kick Plate	(room side)		630

1	Each	Armor Plate (corridor side)		630
1	Each	Overhead Stop Heavy-Duty 6 Series		626
HARDWARE SET NO. 8 (Door C05)				
3	Pairs	Hinges	CB1961R 5" x 4 ½"	630
2	Each	Exit Devices	2708CD-LBR x V4908A	630
4	Each	Recore Cylinders		630
4	Each	Kick Plates		630
- Automatic door operators provided under Section 08 71 13				

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SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Automatic operators for swinging doors.

1.2 RELATED REQUIREMENTS

- A. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- B. Electric General Wiring, Connections and Equipment Requirements: Division 26, ELECTRICAL.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
- C. Builders Hardware Manufacturers Association (BHMA):
1. BHMA A156.10-11 - Power Operated Pedestrian Doors.
- D. National Fire Protection Association (NFPA):
1. 101-15 - Life Safety Code.
- E. Underwriters Laboratories (UL):
1. 325-13 - Standard for Doors, Drapery, Gate, Louver, and Window Operators and Systems.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 2. Installation instructions.
 3. Warranty.
- D. Sustainable Construction Submittals:
1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Test reports: Certify each product complies with specifications.

- F. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.
 - 2. Installer with project experience list.
- G. Operation and Maintenance Data:
 - 1. Care instructions for each exposed finish product.
 - 2. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Regularly manufactures specified products.
 - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Provide contact names and addresses for completed projects when requested by Contracting Officer's Representative.
- B. Installer's Qualifications: Experienced installer, approved by the manufacturer.

1.6 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant automatic door operators against material and manufacturing defects.
 - 1. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Comply with requirements of BHMA A156.10. Unless otherwise indicated on Drawings, provide operators that move doors from fully closed to fully opened position in three 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: Motors, starters, controls, associated devices, and interconnecting wiring required for installation. Equipment and wiring as specified in Division 26, ELECTRICAL.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Horton Automatics HD-Swing Series 4100 Surface Applied Power Door Operator.
- B. Provide door operators from one manufacturer.
- C. Provide one type of operator throughout project.
- D. Sustainable Construction Requirements:
 - 1. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 2. Aluminum Recycled Content: 80 percent total recycled content, minimum.

2.3 SWING DOOR OPERATORS

- A. General:
 - 1. Type: Institutional type.
 - 2. Size: As recommended by manufacturer for door weight and sizes.
- B. Function:
 - 1. Provide operators, enclosed in housing, permitting opening of door by energizing motor and stopped by electrically reducing voltage and stalling motor against mechanical stop.
 - 2. Door to close by means of spring energy, and closing force controlled by gear system and motor being used as dynamic brake without power, or controlled by hydraulic closer in electro-hydraulic operators.
 - 3. Opening and Closing Speeds: Field adjustable.
 - 4. Operators with checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
 - 5. Operators capable of recycling doors instantaneously to full open position from any point in closing cycle when control switch is activated.
 - 6. When automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.
- C. Connect hardware with drive arm attached to door with pin linkage rotating in a self-lubricating bearing. Prevent doors from pivoting on shaft of operator.
- D. Operator Housing:
 - 1. ASTM B209, Type 6063-T5 aluminum alloy, 112 mm (4-1/2 inches) wide by 152 mm (6 inches) high by 3.2 mm (0.125 inch) thick, aluminum extrusions with enclosed end caps for application to 50 mm (2 inches) and larger frame systems.
- E. Power Operator:

1. Completely assembled and sealed unit including gear drive transmission, mechanical spring and bearings, located in aluminum case and filled with special lubricant for extreme temperature conditions. Rubber mounted units with provisions for easy maintenance and replacement, without removing door from pivots or frame.

F. Motors:

1. Provide with interlock to prevent operation when doors are electrically locked from opening.

G. Electrical Control:

1. Self-contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator.
2. Connecting Harnesses: Interlocking plugs.

H. Accessories:

1. Metal mounting supports, brackets and other accessories necessary for installation of operators at head of door frames.

I. Microprocessor Controls:

1. Multi-function microprocessor control providing adjustable hold open time (1-30 seconds) with fully adjustable opening speed, LED indications for sensor input signals and operator status and power assist close options. Control capable of receiving activation signals from any device with normally open dry contact output.
2. Hold doors held open by low voltage applied to the continuous duty motor.
3. Controls:
 - a. Adjustable safety circuit that monitors door operation and stops opening direction of door if obstruction is sensed.
 - b. Recycle feature that reopens door if obstruction is sensed at any point during closing cycle.
 - c. Standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated on drawings.

2.4 POWER UNITS

- A. Self-contained, electric operated and independent of door operator.
1. Capacity and size of power circuits according to automatic door operator manufacturer's specifications and Division 26 - ELECTRICAL.

2.5 DOOR CONTROLS

- A. Control Devices: BHMA A156.10; control opening and closing functions.
- B. Open doors when control device is actuated; hold doors in open positions; then, close doors after an adjustable time period, unless safety device or reactivated control interrupts operation.
- C. Manual Controls:
 - 1. Push Plate Wall Switch: Recessed type, stainless steel push plate minimum 100 mm by 100 mm (4 inch by 4 inch), with 13 mm (1/2 inch) high letters "To Operate Door-Push" engraved on face of plate.

2.6 SAFETY DEVICES

- A. Swing Doors: Install presence sensor on pull side of door to detect any person standing in door swing path and prevent door from opening.
 - 1. Time delay Switches: Adjustable between 3 to 60 seconds and control closing cycle of doors.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify door opening is correctly sized and within acceptable tolerances.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Coordinate door installation with other related work.
- C. Install manual controls and power disconnect switches recessed or semi-flush mounted in partitions.
- D. Secure operator components to adjacent construction with suitable fastenings.
- E. Conceal conduits, piping, and electric equipment, in finish work.
- F. Install power units in locations shown.
 - 1. Where units are mounted on walls, provide metal supports or shelves for units.

- 2. Ensure equipment, including time delay switches, are accessible for maintenance and adjustment.
- G. Ensure operators are adjusted and function properly for type of expected traffic.
- H. Synchronize each leaf of pair doors to open and close simultaneously. Permit each door leaf to be opened manually, independent of other door leaf.
- I. Install controls at positions shown and ensuring convenience for expected traffic.
- J. Push Plate Wall Switches Mounting Height: 1000 mm (40 inches) maximum, unless otherwise approved by Contracting Officer's Representative.

3.3 DEMONSTRATION AND TRAINING

- A. Instruct VA personnel in proper automatic door operator operation and maintenance.
 - 1. Trainer: Manufacturer approved instructor.
 - 2. Training Time: 2 hours minimum.
- B. Coordinate instruction to VA personnel with VA Contracting Officer's Representative.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the following:
1. Glass.
 2. Glazing materials and accessories for both factory and field glazed assemblies.

1.2 RELATED WORK:

- A. Factory glazed by manufacturer in following units:
1. Aluminum sliding door: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
 2. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
 3. Lead glass: Section 13 49 00, RADIATION PROTECTION.

1.3 LABELS:

- A. Temporary labels:
1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
 2. Label in accordance with NFRC label requirements.
 3. Temporary labels are to remain intact until glass approved by Contracting Officer Representative (COR).
- B. Permanent labels:
1. Locate in corner for each pane.
 2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
 - a. Tempered glass.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is to withstand applied loads, thermal stresses, thermal movements, building movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; unsafe engagement of the framing system; deflections beyond specified limits; or other defects in construction.

1.5 SUBMITTALS:

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Glass, each kind required.
 - 2. Glazing gasket.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.7 PROJECT CONDITIONS:

- A. Field Measurements: Field measure openings before ordering tempered glass products to assure for proper fit of field measured products.

1.8 WARRANTY:

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

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.
- C. American National Standards Institute (ANSI):
 - Z97.1-14.....Safety Glazing Material Used in Building -
Safety Performance Specifications and Methods
of Test
- D. ASTM International (ASTM):
 - C864-05(R2011).....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers
 - C920-14a.....Elastomeric Joint Sealants
 - C1036-11(R2012).....Flat Glass
 - C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass.
- E. Code of Federal Regulations (CFR):

16 CFR 1201-10.....Safety Standard for Architectural Glazing
Materials

- F. Glass Association of North America (GANA):
2010 Edition.....GANA Glazing Manual
- G. International Code Council (ICC):
IBC.....International Building Code
- H. Safety Glazing Certification Council (SGCC) 2012:
Certified Products Directory (Issued Semi-Annually).
- I. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCT

2.1 GLASS:

- A. Provide minimum thickness stated and as additionally required to meet performance requirements.
 - 1. Provide minimum 6 mm (1/4 inch) thick glass units unless otherwise indicated.
- B. Obtain glass units from single source from single manufacturer for each glass type.
- C. Clear Glass:
 - 1. ASTM C1036, Type I, Class 1, Quality q3.

2.2 HEAT-TREATED GLASS:

- A. Roller Wave Limits for Heat-Treated Glass: Orient all roller wave distortion parallel to bottom surface of glazing, and provide units complying with the following limitations:
 - 1. Measurement Parallel to Line: Maximum peak to valley 0.203 mm (0.008 inch).
 - 2. Measurement Perpendicular to Line: Maximum 0.0254 mm (0.001 inch).
 - 3. Bow/Warp: Maximum 50 percent of bow and warp allowed by ASTM C1048.
- B. Clear Tempered Glass:
 - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.

2.12 GLAZING ACCESSORIES:

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work are to have a finish that will not corrode or stain while in service. Fire rated glazing to be installed with glazing accessories in accordance with the manufacturer's installation instructions.

B. Setting Blocks: ASTM C864:

1. Silicone type.
2. Channel shape; having 6 mm (1/4 inch) internal depth.
3. Shore A hardness of 80 to 90 Durometer.
4. Block lengths: 50 mm (2 inches).
5. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
6. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:

1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: 25 to 76 mm (1 to 3 inches).
4. Shore A hardness of 40 to 50 Durometer.

D. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.

1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
2. Designed for dry glazing.

E. Color:

1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames to match color of the finished aluminum and be nonstaining.

PART 3 - EXECUTION**3.1 EXAMINATION:****A. Verification of Conditions:**

1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer is approved shop drawings.

B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.**3.2 PREPARATION:**

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA Sealant Manual.

- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL:

- A. Install in accordance with GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, and IGMA TM-3000 unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

3.9 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT):

- A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.
- B. Place setting blocks at 1/3 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.
- E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line. Sealant type is to be compatible with glazing tape.
- F. Trim protruding tape edge.

3.5 REPLACEMENT AND CLEANING:

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.

C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.6 PROTECTION:

A. Protect finished surfaces from damage during erection, and after completion of work.

3.7 MONOLITHIC GLASS SCHEDULE:

A. Glass Type MG#1: Clear fully tempered float glass.

1. Unit Thickness: 6 mm (0.23 inch).

2. Safety glazing label required.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL**1.1 DESCRIPTION**

This section specifies subsurface preparation requirements for areas to receive the installation of applied and resinous flooring. This section includes removal of existing floor coverings, testing concrete for moisture and pH, remedial floor coating for concrete floor slabs having unsatisfactory moisture or pH conditions, and floor leveling and repair as required.

1.2 RELATED WORK

- A. Section 07 92 00, JOINT SEALANTS.
- B. Section 09 65 19, RESILIENT TILE FLOORING and Section 09 68 00, CARPETING.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.
- B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer
- C. Product Data:
 - 1. Moisture remediation system
 - 2. Underlayment Primer
 - 3. Cementitious Self-Leveling Underlayment
- D. Test Data:
 - 1. Moisture test and pH results performed by a qualified independent testing agency or warranty holding manufacturer's technical representative.

1.4 DELIVERY AND STORAGE

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):

D638(2010)	Test Method for Tensile Properties of Plastics
------------	--

D4259(2012)	Standard Practice for Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.
C109/C109M(2012)	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) Modified Air Cure Only
D7234(2012)	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
E96/E96M(2012)	Standard Test Methods for Water Vapor Transmission of Materials
F710(2011)	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
F1869(2011)	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170(2011)	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C348(2008)	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C191(2013)	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle

PART 2 - PRODUCTS

2.1 MOISTURE REMEDIATION COATING

A. System Descriptions:

1. High-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment. For use under resinous products, VCT, tile and carpet where issues caused by moisture vapor are a concern.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build-up layers and installation method. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Liquid applied coating:

- a. Resin: epoxy.
- b. Formulation Description: Multiple component high solids.
- c. Application: Per manufacturer's written installation requirements.
- d. Thickness: minimum 10 mils

- D. Material Vapor Permeance: Application shall achieve a permeance rating of less than 0.1 perm in accordance with ASTM E96/E96M.
- E. Maximum RH requirement: 100% testing in accordance with ASTM F2170.

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	SCAMD Rule 1113	25 grams per liter
Permeance	ASTM E96	0.1 perms
Tensile Modulus	ASTM D638	1.9X10 ⁵ psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufacture's Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% bond to concrete failure

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

- A. System Descriptions: High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.
- B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.
- C. System Characteristics:
1. Wearing Surface: smooth
 2. Thickness: Ranging from feathered edge to 1", per application. Applications greater than 1" require additional 3/8" aggregate to mix or as recommended by manufacturer.
- D. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.
- E. Compressive Strength: Minimum 4100 psi in 28 days in accordance with ASTM C109/C109M.
- F. Flexural Strength: Minimum 1000 psi in 28 days in accordance with ASTM C348
- G. Dry Time: Underlayment shall receive the application of moisture insensitive tile in 6 hours and floor coverings in 16 hours.

- H. Primer: compatible and as recommended by manufacturer for use over intended substrate
- I. System Components: Manufacturer's standard components that are compatible with each other and as follows:
 - 1. Primer:
 - a. Resin: copolymer
 - b. Formulation Description: single component ready to use.
 - c. Application Method: Squeegee and medium nap roller.
All puddles shall be removed, and material shall be allowed to dry, 1-2 hours at 70F/21C.
 - d. Number of Coats: (1) one.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.
- C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION

- A. Existing concrete slabs with existing floor coverings:
 - 1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
 - 2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.
- B. Concrete shall meet the requirements of ASTM F710 and be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.
- C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.
- D. Prepare concrete substrates per ASTM D4259 as follows:
 - 1. Dry abrasive blasting.
 - 2. Wet abrasive blasting.

3. Vacuum-assisted abrasive blasting.
 4. Centrifugal-shot abrasive blasting.
 5. Comply with manufacturer's written instructions.
- E. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.
 - F. Verify that concrete substrates are dry.
 - G. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate per flooring manufacturer's formal and project specific written recommendation.
 - H. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity per flooring manufacturer's formal and project specific written recommendation.
 - I. Provide a written report showing test placement and results.
 - J. Prepare joints in accordance with Section 07 92 00, JOINT SEALANTS and material manufacturer's instructions.
 - K. Alkalinity: Measure surface pH in accordance with procedures provided in ASTM F710 or as outlined by qualified testing agency or flooring manufacturer's technical representative.
 - L. Tolerances: Subsurface shall meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer. Tolerance shall also not to exceed 1/4" deviation in 10'. As required, install underlayment to achieve required tolerance.

3.3 MOISTURE REMEDIATION COATING:

- A. Where results of relative humidity testing (ASTM F2170) exceed the requirements of the specified flooring manufacturer, apply remedial coating as specified to correct excessive moisture condition.
- B. Prior to remedial floor coating installation mechanically prepare the concrete surface to provide a concrete surface profile in accordance with ASTM D4259.
- C. Mix and apply moisture remediation coating in accordance with manufacturer's instructions.

3.4 CEMENTITIOUS UNDERLAYMENT:

- A. Install cementitious self-leveling underlayment as required to correct surface defects, floor flatness or levelness to meet the tolerance requirements; address non-moving cracks or joints; provide a smooth

surface for the installation of floor covering; or meet elevation requirements detailed on drawings.

B. Mix and apply in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, tempered hardwood, or other suitable protection course

3.6 FIELD QUALITY CONTROL

A. Where specified, field sampling of products shall be conducted by a qualified, independent testing facility.

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SECTION 09 06 00
SCHEDULE FOR FINISHES

VAMC: Sioux Falls VA Health Care Systems

Location: Sioux Falls, South Dakota

Project No. and Name: 438-15-100; CT Scanner Site Prep Design

Submission: Construction Documents

Date: December 2016

**SECTION 09 06 00
SCHEDULE FOR FINISHES**

PART I - GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Provide quadruplicate samples for color approval of materials and finishes specified in this section.

PART 2- PRODUCTS

2.2 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

A. SECTION 06 20 00, FINISH CARPENTRY

COUNTERTOP AND SPLASHES		
Room No. & Name	Material	Finish/Color
XRAY A24	Plastic Laminate	As selected from manufacturer's full range of standard patterns & colors
CT A37	Plastic Laminate	As selected from manufacturer's full range of standard patterns & colors
XRAY A40	Plastic Laminate	As selected from manufacturer's full range of standard patterns & colors

SEATS AND BENCHES

Room No. & Name	Component	Finish/Color
DRESSING A19	Seat	Plain-sawn white oak or maple, transparent finish
	Support	Stainless steel or chrome finish

2.4 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and frames same color including ferrous metal louvers, and hardware attached to door	
Component	Color of Paint Type and Gloss
Frame	Semi-gloss paint to match existing hollow metal frames in Buildings B5 and B38

B. SECTION 08 14 00, WOOD DOORS

Component	Finish/Color
Doors	Stain to match existing wood doors in Buildings B5 and B38

2.5 DIVISION 09 - FINISHES

A. SECTION 09 30 13, CERAMIC TILING

FLOOR TILE, MOSAIC						
Finish Code	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.	Grout
FT-1	1" x 1"	Square	None	American Olean	A55 - Doe (to match existing)	Match existing

CERAMIC TILE						
Finish Code	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.	Grout
CT-1	4" x 4"	Square	None	American Olean	95 - Snow Mist Matte	White

B. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color and Pattern	Manufacturer	Mfg. Name/No.
AT-1	Acoustic Ceiling Tile	White Directional Fissured (to match existing)	CertainTeed	FH-157
	Metal Suspension System	White	N/A	N/A

C. SECTION 09 65 13, RESILIENT BASE AND ACCESSORIES

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
RB-1	Rubber Base (RB)	4"	Johnsonite	80 - Fawn
	Resilient Moulding		Johnsonite	80 - Fawn

D. SECTION 09 65 16, RESILIENT SHEET FLOORING, HEAT WELDED SEAMS

Finish Code	Pattern name	Manufacturer	Mfg. Color Name/No.
RSF-1	Environcare 3mm	Noraplan	2784 - Silver Crown with matching welding rods

E. SECTION 09 68 00, CARPET MODULE TILE (CPT)

Finish Code	Size	Installation	Manufacturer	Pattern	Color Name/No.
CPT-1	24" x 24"	Ashlar	Shaw Contract	Prairie Tile	Chicory 23201

F. SECTION 09 91 00, PAINT AND COATINGS

Paint Code (P)	Gloss	Mfg. Color Name/No.
P-1	Eggshell	Color to match existing walls in Building B38
P-2	Semi-Gloss	Color to match existing hollow metal frames in Building B5
P-3	Semi-Gloss	Color to match existing hollow metal frames in Building B38

Epoxy Coating Code (EC)	Gloss	Mfg. Color Name/No.
EC-1	Semi-Gloss	Color to match existing walls in Building B5
Stain Code (S)	Gloss & Transparency	Mfg. Color Name/No.
S-1	Satin & Semi	Color to match existing wood doors in Building B5
S-2	Satin & Semi	Color to match existing wood doors in Building B38

2.6 DIVISION 10 - SPECIALTIES

A. SECTION 10 14 00, INTERIOR SIGNS

Sign Type	Component	Manufacturer	Mfg. Color Name/No.
A, B, C	Text and Trim		Color to match existing
A, B, C	Plaque		Color to match existing

B. SECTION 10 26 00, WALL GUARDS AND CORNER GUARDS

Item	Material	Manufacturer	Mfg. Color Name/No.
Corner Guards	Resilient Material		Color to match existing
Wall Guards & Handrail	Resilient Material		Color to match existing

2.12 DIVISION 12- FURNISHINGS

A. SECTION 12 31 00, METAL CASEWORK

Item / Type	Finish	Manufacturer	Mfg. Color Name/No.
Cabinets	Baked Enamel		Color as selected from manufacturer's full range of standard colors

PART III EXECUTION**3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS**

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Acoustical Ceiling	AT
Carpet Module Tile	CPT
Ceramic Tile	CT
Epoxy Coating	EC
Existing	E
Floor Tile, Mosaic	FT

Gypsum Wallboard	GWB
Paint	P
Porcelain Tile	PT
Quarry Tile	QT
Rubber Base	RB
Stain	ST
Resilient Sheet Flooring (Welded Seams)	RSF
Wood	WD
Vinyl Composition Tile	VTC

3.2 FINISH SCHEDULE SYMBOLS

Symbol Definition

** Same finish as adjoining walls
 - No color required
 E Existing
 XX To match existing
 EFTR Existing finish to remain
 RM Remove

3.3 ROOM FINISH SCHEDULE

- A. Match adjoining or existing similar surface colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.
- B. ROOM FINISH SCHEDULE

ROOM FINISH SCHEDULE

NO.	DESCRIPTION	FLOOR	BASE	NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING			NOTES
				MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	HEIGHT	
C08	CORRIDOR	E-QT	E-QT	--	--	E	E	--	--	E	E	E-AT	--	NOTE 1	2, 3
108	ADJUDICATION DIVISION	E-CPT	RB-1	E	E	GWB	P-1	E	E	--	--	E-AT	--	NOTE 1	4
109	RECEPTION	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
109A	OFFICE	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
109B	OFFICE	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
109C	OFFICE	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
110	WAITING	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
110A	RECEPTION	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
110B	OFFICE	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
110C	OFFICE	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
110D	JOB LAB	CPT-1	RB-1	GWB	P-1	GWB	P-1	GWB	P-1	GWB	P-1	E-AT	--	NOTE 1	--
C03	CORRIDOR	E-PT	E-RB	--	--	GWB	EC-1	--	--	--	--	E-AT	--	NOTE 1	5, 6
C05	CORRIDOR	E-RSF	E-RB	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	E-AT	--	NOTE 1	--
C05A	CORRIDOR	E-RSF	E-RB	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	E-AT	--	NOTE 1	7
C06	CORRIDOR	E-RSF	E-RB	--	--	GWB	EC-1	--	--	GWB	EC-1	E-AT	--	NOTE 1	7
A19	DRESSING	E-VTC	E-RB	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	E-AT	--	NOTE 1	--
A20	XRAY	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A21	XRAY	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A22	DRESSING	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A23	TOILET	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A24	XRAY	RSF-1	RB-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	AT-1	--	NOTE 1	--
A25	TOILET	FT-1	CT-1	GWB	CT-1/EC-1	GWB	CT-1/EC-1	GWB	CT-1/EC-1	GWB	CT-1/EC-1	AT-1	--	NOTE 1	9
A26	JANITOR	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A27	STORAGE	RSF-1	RB-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	AT-1	--	NOTE 1	--
A37	CT	RSF-1	RB-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	AT-1	--	NOTE 1	--
A40	XRAY	RSF-1	RB-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	GWB	EC-1	AT-1	--	NOTE 1	--
A43	TOILET	--	--	--	--	--	--	--	--	--	--	--	--	--	8
A86	CONTROL	--	--	GWB	--	GWB	--	GWB	--	GWB	EC-1	AT-1	--	NOTE 1	10

NOTE: ALL OTHER ROOMS SHOWN ON FLOOR PLAN BUT NOT LISTED ON THIS SCHEDULE ARE EXISTING TO REMAIN.

ROOM FINISH SCHEDULE LEGEND

NOTE: REFER TO SCHEDULE OF FINISHES FOR ALL INTERIOR FINISHES

AT	ACOUSTICAL CEILING	P	PAINT
CPT	CARPET MODULE TILE	PT	PORCELAIN TILE
CT	CERAMIC TILE	QT	QUARRY TILE
EC	EPOXY COATING	RB	RUBBER BASE
E	EXISTING	ST	STAIN
FT	FLOOR TILE, MOSAIC	RSF	RESILIENT SHEET FLOORING
GWB	GYPSUM WALLBOARD	WD	WOOD
		VCT	VINYL COMPOSITION TILE

ROOM FINISH SCHEDULE NOTES

- FIELD VERIFY AND MATCH EXISTING CEILING HEIGHT.
- PATCH EXISTING QUARRY TILE FLOOR AND BASE TO MATCH EXISTING AT NEW DOOR LOCATIONS.
- PROTECT EXISTING VINYL WALLCOVERING TO REMAIN AT NEW DOOR LOCATIONS.
- PROVIDE RESILIENT BASE AT NEW WALL.
- PATCH EXISTING PORCELAIN TILE FLOOR AND RESILIENT BASE TO MATCH EXISTING AT INFILLED DOOR LOCATION.
- PAINT NEW GYPSUM BOARD AT INFILLED DOOR LOCATION TO MATCH ADJACENT WALL.
- PATCH EXISTING RESILIENT SHEET VINYL FLOOR AND RESILIENT BASE TO MATCH EXISTING AT INFILLED DOOR LOCATIONS.
- NO WORK.
- PROVIDE CERAMIC TILE WAINSCOT TO 48" AFF.
- PAINT PATCHED WALLS TO MATCH ADJACENT EXISTING.

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

A. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Studs, runners and accessories.
 2. Furring channels.
 3. Screws, clips and other fasteners.
- C. Shop Drawings:
1. Typical metal stud and furring construction system including details around openings and corner details.
- D. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C754.

1.6 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 For Testing And Materials (ASTM)
- A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire
- A653/653M-11.....Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
- C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems
- C645-09.....Non-Structural Steel Framing Members
- C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

PART 2 - PRODUCTS**2.1 PROTECTIVE COATING**

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
1. Use C 645 steel, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
 2. Runners same thickness as studs.
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

2.3 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. "Z" Furring Channels:
1. Not less than 0.45 mm (0.0179-inch)-thick base metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.

2. Web furring depth to suit thickness of insulation.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.
- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Attachments for Wall Furring:
 - 1. Manufacturer's standard items fabricated from zinc-coated (galvanized) steel sheet.
- F. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 400 mm (16 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated partitions.
- F. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.

2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.

G. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall Furring-Stud System:
 1. Framed with 63 mm (2-1/2 inch) or narrower studs, 400 mm (16 inches) on center.
 2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
 3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)

- - - E N D - - -

**SECTION 09 29 00
GYPSUM BOARD**

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

- A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Acoustical insulation: Section 07 21 13, THERMAL INSULATION.
- C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Lead lined wallboard: Section 13 49 00, RADIATION PROTECTION.

1.3 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.
- C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Cornerbead and edge trim.
 - 2. Finishing materials.
 - 3. Laminating adhesive.
 - 4. Gypsum board, each type.
- C. Test Results:
 - 1. Fire rating test, each fire rating required for each assembly.
- D. Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

In accordance with the requirements of ASTM C840.

1.7 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 for Testing And Materials (ASTM):
- C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems
- C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board
- C840-08.....Application and Finishing of Gypsum Board
- C919-08.....Sealants in Acoustical Applications
- C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) 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
- C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base
- C1658-06.....Glass Mat Gypsum Panels
- C1396-06.....Gypsum Board
- E84-08.....Surface Burning Characteristics of Building Materials
- C. Underwriters Laboratories Inc. (UL):
- Latest Edition.....Fire Resistance Directory
- D. Inchcape Testing Services (ITS):
- Latest Editions.....Certification Listings

PART 2 - PRODUCTS**2.1 GYPSUM BOARD**

- A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- B. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.
- C. Gypsum cores shall contain maximum percentage of post industrial recycled gypsum content available in the area (a minimum of 95 percent post industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

2.3 ACCESSORIES

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet.
- B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.4 FASTENERS

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire rated construction, type and size same as used in fire rating test.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION**3.1 GYPSUM BOARD HEIGHTS**

- A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:
 - 1. Two sides of partitions:
 - a. Fire rated partitions.
 - b. Smoke partitions.
 - c. Sound rated partitions.
 - d. Full height partitions shown (FHP).
 - e. Corridor partitions.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
- D. Use gypsum boards in maximum practical lengths to minimize number of end joints.

- E. Bring gypsum board into contact, but do not force into place.
- F. Walls (Except Shaft Walls):
1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
 2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
 3. Stagger screws on abutting edges or ends.
 4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 6. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
 7. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 9000 mm (30 feet).
 - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- H. Acoustical or Sound Rated Partitions, Fire and Smoke Partitions:
1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
 2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
 3. For sound rated partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes. STC minimum values as shown.
- I. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
 - d. Where shown.

3.5 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non decorated smoke barrier, fire rated and sound rated gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and sound rated construction. Sanding is not required of non-decorated surfaces.

3.6 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

- - - E N D - - -

SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies interior ceramic, porcelain and quarry tile, marble thresholds and window stools, terrazzo divider strips, waterproofing membranes for thin-set applications, crack isolation membranes, and tile backer board.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.
- C. Color, Texture, Pattern, and Size of Field Tile and Trim Shapes, and Color of Grout Specified: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Samples:
1. Base tile, each type, each color, each size.
 2. Mosaic floor tile panels, 228 by 228 mm (9 by 9 inches), each type, color, size and pattern.
 3. Wall (or wainscot) tile, each color, size and pattern.
 4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
- D. Product Data:
1. Ceramic and porcelain tile, marked to show each type, size, and shape required.
 2. Leveling compound.
 3. Latex-portland cement mortar and grout.
- E. Certification:
1. Master grade certificate, ANSI A137.1.
 2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Latex-portland cement mortar and grout.

b. Leveling compound.

F. Installer Qualifications:

1. Submit letter stating installer's experience.

1.4 DELIVERY AND STORAGE:

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.

B. Store material to prevent damage or contamination.

1.5 QUALITY ASSURANCE:

A. Installers to be from a company specializing in performing installation of products specified and have a minimum of three (3) years' experience.

B. Each type and color of tile to be provided from a single source.

C. Each type and color of mortar, adhesive, and grout to be provided from the same source.

1.6 WARRANTY:

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

1.7 APPLICABLE PUBLICATIONS:

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

B. American National Standards Institute (ANSI):

A10.20-06(R2011).....Safe Operating Practices for Tile, Terrazzo and Marble Work
A108/A118/A136-14 Installation of Ceramic Tile

A108.01-13.....Subsurfaces and Preparations by Other Trades

A108.02-13.....Materials, Environmental, and Workmanship

A108.1B-10.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar

A108.1C-10.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar

A108.6-10.....Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy

A108.10-10.....Grout in Tilework

- A118.3-13.....Chemical Resistant, Water Cleanable Tile-
Setting and Grouting Epoxy and Water Cleanable
Tile-Setting Epoxy Adhesive
- A118.4-12.....Latex-Portland Cement Mortar
- A118.7-10.....High Performance Cement Grouts for Tile
Installation
- A137.1-12.....American National Standard Specifications for
Ceramic Tile
- C. ASTM International (ASTM):
- C109/C109M-13.....Standard Test Method for Compressive Strength
of Hydraulic Cement Mortars (Using 2 inch. or
[50-mm] Cube Specimens)
- C348-14.....Standard Test Method for Flexural Strength of
Hydraulic-Cement Mortars
- C627-10.....Evaluating Ceramic Floor Tile Installation
Systems Using the Robinson-Type Floor Tester
- C1027-09.....Test Method for Determining Visible Abrasion
Resistance of Glazed Ceramic Tile
- C1178/C1178M-13.....Standard Specification for Coated Glass Mat
Water-Resistant Gypsum Backing Panel
- D. Code of Federal Regulation (CFR):
- 40 CFR 59.....Determination of Volatile Matter Content, Water
Content, Density Volume Solids, and Weight
Solids of Surface Coating
- E. Marble Institute of America (MIA): Design Manual III-2007
- F. Tile Council of North America, Inc. (TCNA):
- Handbook for Ceramic Tile Installation (2014)
- DCOF AcuTest-2012.....Dynamic Coefficient of Friction Test

PART 2 - PRODUCTS

2.1 TILE:

- A. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
 2. Abrasion Resistance Classification:
 - a. Tested in accordance with values listed in Table 1, ASTM C1027.
 - b. Class V, 12000 revolutions for floors in Corridors, Kitchens,
Storage including Refrigerated Rooms
 - c. Class IV, 6000 revolutions for remaining areas.

3. Slip Resistant Tile for Floors:
 - a. Coefficient of friction, when tested in accordance with ANSI A137.1 and measured per the TCNA DCOF AcuTest.
 - 1) Equal to or greater than .42 for level interior tile floors that will be walked on when wet.
4. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
5. Factory-Applied Temporary Protective Coating:
 - a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of hot applied petroleum paraffin wax.
 - b. Do not coat unexposed tile surfaces.
 - c. Pre-wax tiles set or grouted with epoxy or latex modified mortars.
- B. Unglazed Ceramic Mosaic Tile: Nominal 6 mm (1/4 inch) thick with cushion edges.
- C. Glazed Wall Tile: Cushion edges, glazing.
- D. Trim Shapes:
 1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed on construction documents or specified otherwise.
3. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use cove shapes.
 - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
 - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
 - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
 - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
 - h. For unglazed ceramic mosaic and glazed wall tile installed in latex-portland cement mortar, use cove and surface bullnose shapes as applicable.

2.2 BACKER UNITS:

- A. Glass Mat Water Resistant Backing Board:
 - 1. Use in showers or wet areas.
 - 2. Conform to ASTM C1178/C1178M.
 - 3. Use in maximum lengths available to minimize end to end butt joints.

2.3 SETTING MATERIALS OR BOND COATS:

- A. Conform to TCNA Handbook for Ceramic Tile Installation.
- B. Latex-Portland Cement Mortar: ANSI A118.4.
 - 1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.
 - 2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

2.4 GROUTING MATERIALS:

- A. Coloring Pigments:
 - 1. Pure mineral pigments, lime proof and nonfading, complying with ASTM C979/C979M.
 - 2. Coloring pigments may only be added to grout by the manufacturer.
 - 3. Job colored grout is not acceptable.
- B. High Performance Tile Grout: ANSI A118.7 with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).
 - 1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
 - 2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

2.5 PATCHING AND LEVELING COMPOUND:

- A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Provide a patching and leveling compound with the following minimum physical properties:
 - 1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
 - 2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
 - 3. Tensile strength - 4.1 MPa (600 psi) per ANSI 118.7.
 - 4. Density - 1.9.

- C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 101 mm (4 inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.
- D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.
- E. Ready for use in 48 hours after application.

2.6 WATER:

- A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.7 CLEANING COMPOUNDS:

- A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- B. Materials containing acid or caustic materials are not acceptable.

PART 3 - EXECUTION**3.1 ENVIRONMENTAL REQUIREMENTS:**

- A. Maintain ambient temperature of work areas at not less than 16 degrees C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three (3) days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after third day of completion of tile work.

3.2 ALLOWABLE TOLERANCE:

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
 - 1. Not more than 3 mm in 3048 mm (1/8 inch in 10 feet) where dry-set portland cement, latex-portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:

1. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where dry-set or latex-portland cement mortar or organic adhesive setting materials is used.

3.3 SURFACE PREPARATION:

A. Patching and Leveling:

1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
 - a. Thickness of compound as required to bring finish tile system to elevation shown on construction documents.
 - b. Float finish.

B. Walls:

1. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

C. Existing Floors and Walls:

1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.

3.4 GLASS MAT WATER-RESISTANT BACKING BOARD:

- A. Install in accordance with manufacturer's instructions and TCNA Systems W245-1.
- B. Treat joints with tape and latex-portland cement mortar or adhesive.

3.5 CERAMIC TILE - GENERAL:

- A. Comply with ANSI A108/A118/A136 series of tile installation standards applicable to methods of installation and TCNA Installation Guidelines.
- B. Workmanship:
 1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
 2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise on construction documents.

3. Form intersections and returns accurately.
4. Cut and drill tile neatly without marring surface.
5. Cut edges of tile abutting penetrations, finish, or built-in items:
 - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
 - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work is to be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
 - a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where indicated in construction documents.
9. Walls:
 - a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights as indicated in construction documents with tile.
 - b. Finish reveals of openings with tile, except where other finish materials are indicated in construction documents.
 - c. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.
10. Joints:
 - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise on construction documents.
 - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.

3.6 THIN SET CERAMIC TILE INSTALLED WITH LATEX-PORTLAND CEMENT MORTAR:

- A. Installation of Tile: ANSI A108.1B, except as specified otherwise.

3.7 GROUTING:

- A. Grout Type and Location:

1. Grout for glazed wall and base tile, paver tile and unglazed mosaic tile: Latex-portland cement grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. High Performance Grout: ANSI A118.7.

3.8 CLEANING:

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy, furan and commercial portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.9 PROTECTION:

- A. Keep traffic off tile floor, until grout and setting material is fully set and cured.
- B. Where traffic occurs over tile floor is unavoidable, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Acoustical units.
 2. Metal ceiling suspension system for acoustical ceilings.
 3. Adhesive application.

1.2 RELATED REQUIREMENTS

- A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
 2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
 3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 4. C634-13 - Terminology Relating to Environmental Acoustics.
 5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 7. D1779-98(2011) - Adhesive for Acoustical Materials.
 8. E84-15b - Surface Burning Characteristics of Building Materials.
 9. E119-16 - Fire Tests of Building Construction and Materials.
 10. E413-16 - Classification for Rating Sound Insulation.
 11. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
 12. E1264-14 - Classification for Acoustical Ceiling Products.
- C. International Organization for Standardization (ISO):
1. ISO 14644-1 - Classification of Air Cleanliness.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Ceiling suspension system indicating manufacturer recommendation for each application.
 - 3. Installation instructions.
 - 4. Warranty.
- D. Samples:
 - 1. Acoustical units, 150 mm (6 inches) in size, each type, including units specified to match existing.
 - 2. Suspension system, trim and molding, 300 mm (12 inches) long.
 - 3. Colored markers for access service.
 - 4. Approved samples may be incorporated into work.
- E. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 - 2. Biobased Content:
 - a. Show type and quantity for each product.
 - b. Show volatile organic compound types and quantities.
- F. Certificates: Certify products comply with specifications.
 - 1. Acoustical units, each type.
- G. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.
- H. Operation and Maintenance Data:
 - 1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Regularly manufactures specified products.
 - 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight, conditioned facility.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Environment:
 - 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
 - 2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
 - 3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.9 WARRANTY

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

PART 2 - PRODUCTS**2.1 SYSTEM DESCRIPTION**

- A. Ceiling System: Acoustical ceilings units on exposed concealed grid suspension systems.

2.2 SYSTEM PERFORMANCE

- A. Design product complying with specified performance:
 - 1. Maximum Deflection: 1/360 of span, maximum.
- B. Surface Burning Characteristics: When tested according to ASTM E84.
 - 1. Flame Spread Rating: 25 maximum.
 - 2. Smoke Developed Rating: 450 maximum.

2.3 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

- B. Provide acoustical units from one manufacturer.
 - 1. Provide each product exposed to view from one production run.
- C. Provide suspension system from same manufacturer.
- D. Sustainable Construction Requirements:
 - 1. Mineral Base Recycled Content: 50 percent recycled content minimum.
 - 2. Steel Recycled Content: 30 percent total recycled content, minimum.
 - 3. Biobased Content: 37 percent by weight biobased material, minimum.
 - 4. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-flooring adhesives and sealants.

2.4 ACOUSTICAL UNITS

- A. General:
 - 1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
 - a. Mineral Fiber: 3.6 kg/sq. m (0.70 psf) weight, minimum.
 - 2. Classification: Provide type and form as follows:
 - a. Type III Units - Mineral base with water-based painted finish maximum 10 g/l VOC; Form 2 - Water felted, minimum 16 mm (5/8 inch) thick.
 - b. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.55.
 - c. CAC (Ceiling Attenuation Class): ASTM E413, 35-40 range.
 - d. LR (Light Reflectance): Minimum 0.75.
 - e. Lay-in panels: 24 by 24 inch, with square edges or reveal edges, as indicated in Section 09 06 00, SCHEDULE FOR FINISHES. Edge and Joint Detail: Square edges and joints as required to suit suspension and access system.

2.5 METAL SUSPENSION SYSTEM

- A. General: ASTM C635, heavy-duty system, except as otherwise specified.
 - 1. Suspension System: Provide the following:
 - a. Galvanized cold-rolled steel, bonderized.
 - 2. Main and Cross Runner: Use same construction. Do not use lighter-duty sections for cross runners.
- B. Exposed Grid Suspension System: Support of lay-in panels.
 - 1. Grid Width: 15/16 inch.
 - 2. Molding: Fabricate from the same material with same exposed width and finish.

3. Finish: Baked-on enamel flat texture finish.
 - a. Color: To match adjacent acoustical units.
- C. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.
 1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).
 - a. Flush ceiling insert type:
 - 1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
 - 2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
 - 3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.
- D. Clips: Galvanized steel, designed to secure framing member in place.
- E. Wire: ASTM A641.
 1. Size:
 - a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
 - b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

2.6 ACCESSORIES

- A. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.
- B. Perimeter Seal: Vinyl, polyethylene or polyurethane open cell sponge material, density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
 1. Thickness: As required to fill voids between back of wall molding and finish wall.
 2. Size: Minimum 9 mm (3/8 inch) wide strip.
- C. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.
 1. Color Code: Provide the following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water

Color	Service
Orange	Ductwork: Fire Dampers
Blue	Ductwork: Dampers and Controls
Black	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. In Building 5, remove existing acoustical panels and suspension system to permit new installation. Dispose of removed materials.
- D. In Building 38, remove existing acoustical panels and suspension system to permit new installation.
 - 1. Retain existing acoustical panels and suspension system for reuse.
 - 2. Provide additional new acoustical panels and suspension system to match existing as required for a complete installation.
 - 3. Dispose of other removed materials.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 ACOUSTICAL UNIT INSTALLATION

- A. Applications:
 - 1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
- B. Layout acoustical unit symmetrically, with minimum number of joints.
- C. Installation:
 - 1. Install acoustic tiles after wet finishes have been installed and solvents have cured.
 - 2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
 - a. Install tile to lay level and in full contact with exposed grid.
 - b. Replace cracked, broken, stained, dirty, or tile.
 - 3. Markers:

- a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
 - b. Attach colored markers to exposed grid on opposite sides of the units providing access.
- D. Touch up damaged factory finishes.
1. Repair painted surfaces with touch up primer.

3.4 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General: Install according to ASTM C636.
1. Use direct or indirect hung suspension system or combination of both.
 2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
 3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
 4. Provide additional hangers located at each corner of support components.
 5. Provide minimum 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.
 6. Provide main runners minimum 1200 mm (48 inches) in length.
 7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Direct Hung Suspension System: ASTM C635.
1. Support main runners by hanger wires attached directly to the structure overhead.
 2. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.
- C. Anchorage to Structure:
1. Concrete:
 - a. Install hanger inserts and wire loops required for support of hanger and bracing wire. Install hanger wires with looped ends through steel deck when steel deck does not have attachment device.
 - b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and

bracing wire. Install in sides of concrete beams or joists at mid height.

2. Steel:

- a. Install carrying channels for attachment of hanger wires.
 - 1) Size and space carrying channels to support load within performance limit.
 - 2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
- b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.
- c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

3.5 CEILING TREATMENT

A. Moldings:

- 1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.

B. Perimeter Seal:

- 1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
- 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

C. Existing ceiling:

- 1. Where extension of existing ceilings occurs, match existing.
- 2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
- 3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.6 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed surfaces. Remove contaminants and stains.

- - - E N D - - -

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base (RB) adhered to interior walls and partitions.
2. Resilient mouldings for edges and transitions of flooring materials specified.

1.2 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. F1861-08(2012)e1 - Resilient Wall Base.
2. D4259-88(2012) - Abrading Concrete.

C. International Concrete Repair Institute (ICRI):

1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.3 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Description of each product.
2. Adhesives and primers indicating manufacturer's recommendation for each application.
3. Installation instructions.

C. Samples:

1. Resilient Base: 150 mm (6 inches) long, each type and color.
2. Resilient Moulding: 150 mm (6 inches) long, each type and color.

D. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.

E. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.4 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.5 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage when handling and during construction operations.

1.6 FIELD CONDITIONS

- A. Environment:
 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
 2. Work Area Ambient Temperature Range: 21 to 27 degrees C (70 to 80 degrees F) continuously, beginning 48 hours before installation.
 3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide each product from one manufacturer and from one production run.
- C. Sustainable Construction Requirements:
 1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Flooring Adhesives and Sealants.

2.2 RESILIENT BASE

- A. Resilient Base: 3 mm (1/8 inch) thick, 100 mm (4 inches) high.
 1. Type: Rubber or vinyl; use one type throughout.
 2. ASTM F1861, Type TP thermoplastic rubber or Type TV thermoplastic vinyl, Group 2 - layered.
- B. Applications:
 1. Carpet Flooring Locations: Style A - Straight.

2. Other Locations: Style B - Cove.

2.3 RESILIENT MOULDINGS

- A. Provide tapered mouldings of rubber and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

2.4 PRIMER (FOR CONCRETE FLOORS)

- A. Primer: Type recommended by adhesive manufacturer.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Leveling Compound: Provide products mixed with latex or polyvinyl acetate resins.

2.6 ADHESIVES

- A. Adhesives: Low pollutant-emitting, water based type recommended by adhered product manufacturer for each application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove existing base to permit new installation.
 - 1. Dispose of removed materials.
- D. Correct substrate deficiencies.
 - 1. Fill cracks, pits, and depressions with leveling compound.
 - 2. Remove protrusions; grind high spots.
 - 3. Apply leveling compound to achieve 3 mm (1/8 inch) in 3 m (10 feet) maximum surface variation.
- E. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
 - 1. Mechanically clean concrete floor substrate according to ASTM D4259.
 - 2. Surface Profile: ICRI Guideline No. 310.2R.
- F. Allow substrate to dry and cure.
- G. Perform flooring manufacturer's recommended bond, substrate moisture content, and pH tests.

3.2 INSTALLATION GENERAL

- A. Install products according to manufacturer's instructions.

1. When instructions deviate from specifications, submit proposed resolution for Contracting Officer consideration.

3.3 RESILIENT BASE INSTALLATION

- A. Applications:
 1. Install resilient base in rooms scheduled on Drawings.
 2. Install resilient base on casework, locker toe spaces, and other curb supported fixed equipment.
 3. Extend resilient base into closets, alcoves, and cabinet knee spaces, and around columns within scheduled room.
- B. Lay out resilient base with minimum number of joints.
 1. Length: 600 mm (24 inches) minimum, each piece.
 2. Locate joints 150 mm (6 inches) minimum from corners and intersection of adjacent materials.
- C. Installation:
 1. Apply adhesive uniformly for full contact between resilient base and substrate.
 2. Set resilient base with hairline butted joints aligned along top edge.
- D. Field form corners and end stops.
 1. V-groove back of outside corner.
 2. V-groove face of inside corner and notch cove for miter joint.
- E. Roll resilient base ensuring complete adhesion.

3.4 PLACING MOULDING

- A. Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Secure moulding with adhesive as recommended by the manufacturer. Prepare and apply adhesives in accordance with manufacturer's printed directions.

3.5 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed resilient base surfaces. Remove contaminants and stains.
 1. Clean with mild detergent. Leave surfaces free of detergent residue.
- C. Polish exposed resilient base to gloss sheen.

3.6 PROTECTION

- A. Protect products from construction traffic and operations.

1. Maintain protection until directed by Contracting Officer's Representative.
- B. Replace damaged products and re-clean.
1. Damaged Products include cut, gouged, scraped, torn, and unbonded products.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Welded seam sheet flooring (WSF) with heat welded seams.

1.2 RELATED REQUIREMENTS

- A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, Pattern and Texture: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Resilient Base over Base of Lockers, Equipment and Casework: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- D. Resilient Mouldings for edges and transitions of flooring materials specified: Section 09 65 13, RESILIENT BASE AND ACCESSORIES

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. D4259-88(2012) - Abrading Concrete.
 2. E648-15e1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 3. E662-15a - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 4. F1303-04(2014) - Sheet Vinyl Floor Covering with Backing.
 5. F1860-14 - Rubber Sheet Floor Covering With Backing.
 6. F1913-04(2014) - Vinyl Sheet Floor Covering Without Backing.
- C. International Concrete Repair Institute (ICRI):
1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair.
- D. SCS Global Services (SCS):
1. FloorScore.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
1. Show size, configuration, and fabrication and installation details.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Installation instructions.

3. Warranty.

C. Samples:

1. Sheet material, 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with welded seam using specified welding rod.
2. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
3. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.
4. Primer: Pint container, each type.

D. Sustainable Construction Submittals:

1. Low Pollutant-Emitting Materials:
 - a. Sheet Flooring: Submit FloorScore label.
 - b. Identify volatile organic compound types and quantities.

E. Certificates: Certify products comply with specifications.

1. Heat welded seaming is manufacturer's prescribed method of installation.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer.
2. Installer with project experience list.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

B. Installer Qualifications:

1. Regularly installs specified products and is approved by the manufacturer.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight, conditioned facility.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

A. Environment:

1. Work Area Ambient Temperature Range: Minimum 18 to 38 degrees C (65 to 100 degrees F) continuously, beginning 48 hours before installation. Maintain room temperature above 18 degrees C (65 degrees F) after installation.
2. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.9 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant resilient sheet flooring against material and manufacturing defects.
 1. Warranty Period: 2 years.

PART 2 - PRODUCTS**2.1 SYSTEM PERFORMANCE**

- A. Sheet Flooring:
 1. Critical Radiant Flux: ASTM E648; 0.45 watts per sq.cm or more, Class I.
 2. Smoke Density: ASTM E662; less than 450.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Provide vinyl sheet color and pattern from one production run.
- C. Sustainable Construction Requirements:
 1. Low Pollutant-Emitting Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Flooring Adhesives and Sealants.
 - b. Vinyl Sheet Flooring.

2.3 WELDED SEAM SHEET FLOORING

- A. Welded Seam Sheet Flooring (WSF): ASTM F1860; Type I rubber, with backing.
 1. Wear Surface: Smooth.
 2. Wear Layer Thickness: Minimum 1.0 mm (0.040 inches).
 3. Total Thickness: 2 mm (0.080 inches).

- B. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
 1. Minimum Width: 1200 mm (48 inches).

2.4 ACCESSORIES

- A. Welding Rod: Flooring manufacturer's standard, in color matching field color of sheet flooring.
- B. Adhesives: Water resistant type recommended by flooring manufacturer to suit application.
- C. Leveling Compound:
 1. Provide cementitious type with latex or polyvinyl acetate resins additive.
- D. Primer:
 1. Type recommended by adhesive or flooring manufacturer.
- E. Sealant:
 1. As specified in Section 07 92 00, JOINT SEALANTS.
 2. Compatible with flooring.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Remove existing sheet flooring to permit new installation.
 1. Do not use solvents for removing adhesives.
 2. Dispose of removed materials.
- D. Ensure interior finish work such as plastering, drywall finishing, concrete, terrazzo, ceiling work, and painting work is complete and dry before installation.
 1. Complete mechanical, electrical, and other work above ceiling line.
 2. Ensure heating, ventilating, and air conditioning systems are installed and operating in order to maintain temperature and humidity requirements.
- E. Correct substrate deficiencies.
 1. Fill cracks, pits, and dents with leveling compound.
 2. Grind, sand, or cut away protrusions. Grind high spots.
 3. Level flooring substrate to 3 mm (1/8 inch) maximum variation.
- F. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
 1. Mechanically clean concrete floor substrate according to ASTM D4259.

2. Surface Profile: ICRI 310.2R CSP 3 to CSP 4.
- G. Perform flooring manufacturer's recommended bond, substrate moisture content, and pH tests.
- H. Broom or vacuum clean substrates immediately before flooring installation.
- I. Primer: Apply primer according to manufacturer's instructions.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 INSTALLATION OF FLOORING

- A. Flooring Layout:
 1. Arrange pattern in one direction with side and end joints pattern matched.
 2. Extend flooring wall-to-wall, under cabinets, casework, laboratory and pharmacy furniture, and other equipment for seamless flooring installation.
 3. Arrange sheets to minimize seams.
 4. Locate seams in inconspicuous and low traffic areas, minimum 150 mm (6 inches) away from parallel joints in flooring substrates.
- B. Match edges of flooring for color shading and pattern at seams.
- C. Install flooring flush with adjacent floor finishes.
- D. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- E. Install flooring fully adhered to substrate.
 1. Air pockets or loose edges are not acceptable.
 2. Trim sheet materials tight to flooring penetrations; seal joints at pipe with waterproof sealant specified in Section 07 92 00, JOINT SEALANTS.
- F. Butt joints tight, without gaps and bulges.

3.4 HEAT WELDING

- A. Heat weld joints of flooring using welding rod.
- B. Rout joint, insert welding rod into routed space, and fuse flooring and welding rods for seamless, watertight installation.
 1. Fuse joints for seamless weld.
- C. Finish joints flush, free from voids, and recessed or raised areas.

3.5 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean materials.
- C. Vacuum floor thoroughly.
- D. Perform initial maintenance according to flooring manufacturer's instructions.
 - 1. Delay washing flooring until adhesive is fully set and welded joints can contain wash water.

3.6 PROTECTION

- A. Protect flooring from traffic and construction operations.
- B. Keep traffic off sheet flooring for minimum 24 hours after installation.
- C. Cover flooring with reinforced kraft paper, and plywood or hardboard.
- D. Remove protective materials immediately before acceptance.
- E. Repair damage.
- F. Buff flooring to uniform sheen.

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**SECTION 09 68 00
CARPETING**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies carpet, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Manufacturer, Color and Style of Carpet and Edge Strip: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Resilient Wall Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- D. Testing of Concrete Floors Before Installation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: A company specializing in carpet installation with a minimum three (3) years' experience and employing experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program, and a valid OSHA 10 certification.
 - 1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
 - a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
 - b. Career long training.
 - c. Manufacturer endorsed training.
 - d. Fundamental journeyman skills certification.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Product Data:
 - 1. Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading and flame resistance characteristics for each type of carpet material and installation accessory.

2. Manufacturer's printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.

D. Samples:

1. Carpet: "Production Quality" samples 305 x 305 mm (12 x 12 inches) of carpets, showing quality, pattern and color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Floor Edge Strip (Molding): 152 mm (6 inches) long of each color and type specified.

E. Maintenance Data: Carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.

F. Installer's Qualifications.

G. Manufacturer's warranty.

1.5 DELIVERY AND STORAGE:

- A. Deliver carpet in manufacturer's original wrappings and packages clearly labeled with manufacturer's brand name, size, dye lot number and related information. Transport carpet to job site in a manner that prevents damage and distortion that might render it unusable.
- B. Deliver adhesives in containers clearly labeled with manufacturer's brand name, number, installation instructions, safety instructions and flash points.
- C. Store in a clean, dry, well-ventilated area, protected from damage and soiling. Before installation, acclimate carpet to the atmospheric conditions of the areas in which it will be installed for 2 days prior to installation

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain areas in which carpeting is to be installed at a temperature between 18 - 35 degrees C (65 - 95 degrees F) with a maximum relative humidity of 65 percent for two (2) days before installation, during installation and for three (3) days after installation.
- B. Minimum Substrate Surface Temperature: 18 degrees C (65 degrees F) at time of installation.
- C. Three (3) days after installation, maintain minimum temperature of 10 degrees C (50 degrees F) for the duration of the contract.

1.7 WARRANTY:

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

- B. Manufacturer Warranty: Manufacturer shall warranty their carpet for a minimum of ten (10) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

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 National Standards Institute (ANSI):
ANSI/NSF 140-10.....Sustainable Carpet Assessment Standard
- C. American Association of Textile Chemists and Colorists (AATCC):
16-04.....Colorfastness to Light
134-11.....Electric Static Propensity of Carpets
165-08.....Colorfastness to Crocking: Textile Floor Coverings-AATCC Crockmeter Method
174-11.....Antimicrobial Activity Assessment of New Carpets
- D. ASTM International (ASTM):
D1335-12.....Tuft Bind of Pile Yarn Floor Coverings
D3278-96(R2011).....Flash Point of Liquids by Small Scale Closed-Cup Apparatus
D5116-10.....Determinations of Organic Emissions from Indoor Materials/Products
D5252-11.....Operation of the Hexapod Tumble Drum Tester
D5417-11.....Operation of the Vettermann Drum Tester
E648-14c.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E. Code of Federal Regulation (CFR):
40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- F. The Carpet and Rug Institute (CRI):
CIS.....Carpet Installation Standard
- G. International Standards and Training Alliance (INSTALL)
- H. International Organization for Standardization (ISO):
2551-81.....Machine-Made Textile Floor Coverings
- I. U.S. Consumer Product and Safety Commission (CPSC):
16 CFR 1630.....Surface Flammability of Carpets and Rugs

PART 2 - PRODUCTS**2.1 CARPET:**

A. Physical Characteristics:

1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Type:
 - a. Carpet Type: Modular tile 610 by 610 mm square (24 by 24 inch square) with 0.15 percent growth/shrink rate in accordance with ISO 2551.
 - b. Pile Type: Multilevel loop. Pile type and thickness must conform to ADA requirements.
 - c. Pile Fiber: Commercial 100 percent branded (federally registered trademark), nylon continuous filament.
3. Static Control: Provide static control to permanently regulate static buildup to less than 3.50 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Backing Materials: Provide backing for release adhesive for modular tile installations
 - a. Modular Tile:
 - 1) Primary Backing: Manufacturer's standard composite materials.
 - 2) Secondary Backing: Manufacturer's standard material.
5. Appearance Retention Rating (ARR): Carpet to be tested and have the minimum 3.5 - 4.0 severe ARR when tested in accordance with either the ASTM D5252 (Hexapod) or ASTM D5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified in the ASTM standard.
6. Tuft Bind: Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 36 N (8 pound) average force for modular carpet tile.
7. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
8. Colorfastness to Light (AATCC 16, Option 3): Color change between the exposed and unexposed carpet areas equivalent to a minimum of Grade 4 on the Gray Scale for Color Change after an exposure of 40 AFU (AATCC fading units) for all specified colors.

9. Delamination Strength: Minimum of 440 N/m (2.5 lb./inch) between secondary backing.
10. Flammability and Critical Radiant Flux Requirements:
 - a. Comply with 16 CFR 1630.
 - b. Test Carpet in accordance with ASTM E648.
 - c. Class I: Minimum critical radiant flux of 0.45 watts per square centimeter (2.9 watts per square inch).
11. Average Pile Yarn Density (APYD):
 - a. Corridors, lobbies, entrances, common areas or multipurpose rooms, open offices, waiting areas and dining areas: Minimum APYD 6000.
12. VOC Limits: Use carpet that complies with the following limits for VOC content when tested according to ASTM D5116:
 - a. Carpet, Total VOCs: 0.5 mg/sq.m x hr.
 - b. Carpet, 4-PC (4-Phenylcyclohexene): 0.05 mg/sq.m x hr.
 - c. Carpet, Formaldehyde: 0.05 mg/sq.m x hr.
 - d. Carpet, Styrene: 0.4 mg/sq.m x hr.

2.2 ADHESIVE AND CONCRETE PRIMER:

- A. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 60 degrees C (140 degrees F) in accordance with ASTM D3278. Materials are to have a VOC maximum of 50 g/L when calculated according to 40 CFR 59, (EPA Method 24).

2.4 EDGE STRIPS (MOLDING):

- A. Vinyl Edge Strip:
 1. Beveled floor flange minimum 50 mm (2 inches) wide.
 2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.
 3. Color as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

- A. Contractor to prepare and test surfaces to receive carpet and adhesives as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

3.2 GENERAL INSTALLATION:

- A. Isolate area of installation from rest of building.

- B. Perform all work by manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI CIS.
- C. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions.
- D. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least three (3) days following installation.
- E. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation.
- F. Complete other work which would damage the carpet prior to installation of carpet.
- G. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- H. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations. Use additional adhesive to secure carpets around pipes and other vertical projections.

3.3 MODULAR TILE INSTALLATION:

- A. Install per CRI CIS, Adhesive Application.
- B. Lay carpet modules with pile in same direction unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Install carpet modules so that cleaning methods and solutions do not cause dislocation of modules.
- D. Lay carpet modules uniformly to provide tight flush joints free from movement when subject to traffic.

3.4 EDGE STRIPS INSTALLATION

- A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.
- B. Anchor vinyl edge strip to floor with adhesive. Apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.5 PROTECTION AND CLEANING:

- A. Once a carpet installation is complete, clean up scrap materials and debris, and vacuum the area, using manufacturer-approved equipment. Inspect seams carefully for evenness and protruding backing yarns, and inspect the perimeter of the installation for an acceptable finished appearance.

- B. Protect installed carpet if furniture is being moved, by laying plywood, fiberboard or porous non-staining sheeting material for minimum time practical. Based on manufacturer guidelines, protect carpet from rolling or foot traffic. Protect against other materials or renovation or construction activities, including dust, debris, paint, and contractor traffic, until it is ready for its final use.
- C. Do not move furniture or equipment on unprotected carpeted surfaces.
- D. Just before final acceptance of work, remove protection and vacuum carpet clean.

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SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, but not limited to, the following:

1. Prime coats which may be applied in shop under other sections.
2. Prime painting unprimed surfaces to be painted under this Section.
3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
4. Painting ferrous metal (except stainless steel) exposed to view.
5. Painting galvanized ferrous metals exposed to view.
6. Painting gypsum drywall exposed to view.
7. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
8. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
9. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
10. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
11. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
12. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 RELATED WORK:

A. Activity Hazard Analysis: Section 01 35 26, SAFETY REQUIREMENTS.

- B. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
- C. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS; Division 21 - FIRE SUPPRESSION; Division 22 - PLUMBING; Division 23 - HEATING; VENTILATION AND AIR-CONDITIONING; Division 26 - ELECTRICAL; Division 27 - COMMUNICATIONS; and Division 28 - ELECTRONIC SAFETY AND SECURITY sections.
- D. Prefinished flush doors with transparent finishes: Section 08 14 00, WOOD DOORS.
- E. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Painter qualifications.
- D. Manufacturer's Literature and Data:
 - 1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data. The current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one (1) list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- E. Sample Panels:
 - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
 - 2. Panels to Show Color: Composition board, 100 x 250 mm (4 x 10 inch).
 - 3. Attach labels to panel stating the following:
 - a. Federal Specification Number or manufacturer's name and product number of paints used.

- b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- c. Product type and color.
- d. Name of project.
- 4. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- F. Sample of identity markers if used.
- G. Manufacturers' Certificates indicating compliance with specified requirements:
 - 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
 - 2. Epoxy coating.

1.4 DELIVERY AND STORAGE:

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
 - 1. Name of manufacturer.
 - 2. Product type.
 - 3. Batch number.
 - 4. Instructions for use.
 - 5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
 - 1. Federal Specification Number, where applicable, and name of material.
 - 2. Surface upon which material is to be applied.
 - 3. Specify Coat Types: Prime; body; finish; etc.
- C. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

1.5 QUALITY ASSURANCE:

- A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.
- B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which

prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Contracting Officer Representative (COR) in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

1.6 REGULATORY REQUIREMENTS:

- A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
 - 1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
 - 2. Lead-Base Paint:
 - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
 - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
 - c. Do not use coatings having a lead content over 0.06 percent by weight of non-volatile content.
 - 3. Asbestos: Provide materials that do not contain asbestos.
 - 4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
 - 5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
 - 6. Use high performance acrylic paints in place of alkyd paints.

1.7 SAFETY AND HEALTH

- A. Apply paint materials using safety methods and equipment in accordance with the following:
 - 1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA is to include analyses of the potential impact of painting

operations on painting personnel and on others involved in and adjacent to the work zone.

- B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.
- C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
 1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
 2. 29 CFR 1910.1000.
 3. ACHIH-BKLT and ACGIH-DOC, threshold limit values.

1.8 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):
 - ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
 - ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. ASME International (ASME):
 - A13.1-07(R2013).....Scheme for the Identification of Piping Systems
- D. Code of Federal Regulation (CFR):
 - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- E. Master Painters Institute (MPI):
 - 36.....Knot Sealer
 - 45.....Interior Primer Sealer
 - 46.....Interior Enamel Undercoat
 - 47.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
 - 50.....Interior Latex Primer Sealer
 - 52.....Interior Latex, MPI Gloss Level 3
 - 91.....Wood Filler Paste
 - 94.....Exterior Alkyd, Semi-Gloss
 - 95.....Fast Drying Metal Primer
 - 139.....Interior High Performance Latex, MPI Gloss Level 3
- F. Society for Protective Coatings (SSPC):

- SSPC SP 1-82 (R2004).....Solvent Cleaning
- SSPC SP 2-82 (R2004).....Hand Tool Cleaning
- SSPC SP 3-28 (R2004).....Power Tool Cleaning
- SSPC PA Guide 10.....Guide to Safety and Health Requirements

G. U.S. National Archives and Records Administration (NARA):

- 29 CFR 1910.1000.....Air Contaminants

H. Underwriter's Laboratory (UL)

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

2.2 PAINT PROPERTIES:

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.
- C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.
- D. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings to comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Non-flat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
- E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual.

2.3 BIOBASED CONTENT:

- A. Paint products shall comply with following bio-based standards for biobased materials:

Material Type	Percent by Weight
Interior Paint	20 percent biobased material
Interior Paint- Oil Based and Solvent Alkyd	67 percent biobased material

- B. The minimum-content standards are based on the weight (not the volume) of the material.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.

- B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
 - a. Less than 3 degrees C (5 degrees F) above dew point.
 - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.
 - c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
2. Maintain interior temperatures until paint dries hard.
3. Apply only on clean, dry and frost free surfaces.

3.2 INSPECTION:

- A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

- A. Application may be by brush or roller.

- B. Furnish to the COR a painting schedule indicating when the respective coats of paint for the various areas and surfaces will be completed. This schedule is to be kept current as the job progresses.
- C. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.
- D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in-place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.
- E. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- F. Materials are to be applied under adequate illumination, evenly spread and flowed-on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- G. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Government.
- H. All coats are to be dry to manufacturer's recommendations before applying succeeding coats.

3.4 SURFACE PREPARATION:

- A. General:
 - 1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
 - 2. See other sections of specifications for specified surface conditions and prime coat.

3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
 5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Wood: 15 percent.
 - b. Gypsum Board: 12 percent.
- B. Wood:
1. Sand to a smooth even surface and then dust off.
 2. Sand surfaces showing raised grain smooth between each coat.
 3. Wipe surface with a tack rag prior to applying finish.
 4. Surface painted with an opaque finish:
 - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
 - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
 5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
 6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
- C. Ferrous Metals:
1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
 2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish

- with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
- a. Fill flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
 5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.
- D. Gypsum Plaster and Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
 2. Remove dust, dirt, and other deterrents to paint adhesion.
 3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.5 PAINT PREPARATION:

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two (2) component and two (2) part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 APPLICATION:

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.

- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.
- E. Apply by brush or roller.
- F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.7 PRIME PAINTING:

- A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required.
- D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.
- E. Wood and Wood Particleboard:
 - 1. Use same kind of primer specified for exposed face surface.
 - a. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
- F. Metals except boilers, incinerator stacks, and engine exhaust pipes:
 - 1. Steel and iron: MPI 95 (Fast Drying Metal Primer).
 - 2. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
- G. Gypsum Board:
 - 1. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) in shower and bathrooms.

3.9 INTERIOR FINISHES:

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
 - 1. Apply to exposed surfaces.
 - 2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
 - 3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
 - a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) unless specified otherwise.
- C. Gypsum Board:

1. Two (2) coats of MPI 52 (Interior Latex, MPI Gloss Level 3).
2. In showers and bathrooms, two (2) coats of MPI 139 (Interior High Performance Latex, MPI Gloss level 3).

D. Wood:

1. Sanding:

- a. Use 220-grit sandpaper.
- b. Sand sealers and varnish between coats.
- c. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.

2. Paint Finish:

- a. One (1) coat of MPI 46 (Interior Enamel Undercoat) plus one (1) coat of MPI 47 (Interior Alkyd, Semi-Gloss).

E. Miscellaneous:

1. Apply where specified in Section 09 06 00, SCHEDULE FOR FINISHES.

3.10 REFINISHING EXISTING PAINTED SURFACES:

- A. Clean, patch and repair existing surfaces as specified under "Surface Preparation". No "telegraphing" of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, sand smooth and re-finish until surface meets with COR's approval.
- B. Remove and reinstall items as specified under "General Workmanship Requirements".
- C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- G. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.
- H. Sand or dull glossy surfaces prior to painting.
- I. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.11 PAINT COLOR:

- A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. For additional requirements regarding color see Articles, "REFINISHING EXISTING PAINTED SURFACE" and "MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE".
- C. Coat Colors:
 - 1. Color of priming coat: Lighter than body coat.
 - 2. Color of body coat: Lighter than finish coat.
 - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
 - 1. Paint to match color of casework where casework has a paint finish.
 - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.12 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE:

- A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.
- B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified below.
- C. Paint various systems specified in Division 02 - EXISTING CONDITIONS, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY.
- D. Paint after tests have been completed.
- E. Omit prime coat from factory prime-coated items.
- F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.
- G. Omit field painting of items specified in "BUILDING AND STRUCTURAL WORK FIELD PAINTING"; "Building and Structural Work not Painted".
- H. Color:

1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
 2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
 - a. White: Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
 - b. Gray: Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
 - c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
 - d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conduits containing fire alarm control wiring, and fire alarm equipment.
 - e. Federal Safety Orange: Entire lengths of electrical conduits containing feeders 600 volts or more.
- I. Apply paint systems on properly prepared and primed surface as follows:
1. Interior Locations:
 - a. Apply two (2) coats of MPI 47 (Interior Alkyd, Semi-Gloss) to following items:
 - 1) Metal under 94 degrees C (201 degrees F) of items such as bare piping, fittings, hangers and supports.
 - 2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
 - 3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
 - b. Paint electrical conduits containing cables rated 600 volts or more using two (2) coats of MPI 94 (Exterior Alkyd, Semi-gloss) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

3.13 BUILDING AND STRUCTURAL WORK FIELD PAINTING:

- A. Painting and finishing of interior and exterior work except as specified here-in-after.
 - 1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
 - 3. Painting of ferrous metal and galvanized metal.
 - 4. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
 - 1. Prefinished items:
 - a. Casework, doors, metal panels, wall covering, and similar items specified factory finished under other sections.
 - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
 - 2. Finished surfaces:
 - a. Hardware, except ferrous metal.
 - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
 - c. Signs, fixtures, and other similar items integrally finished.
 - 3. Concealed surfaces:
 - a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
 - b. Inside walls or other spaces behind access doors or panels.
 - c. Surfaces concealed behind permanently installed casework and equipment.
 - 4. Moving and operating parts:
 - a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
 - b. Tracks for overhead or coiling doors, shutters, and grilles.
 - 5. Labels:
 - a. Code required labels, such as Underwriters Laboratories Inc., Intertek Testing Service or Factory Mutual Research Corporation.
 - b. Identification plates, instruction plates, performance rating, and nomenclature.
 - 6. Galvanized metal:

- a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
- b. Gas Storage Racks.
- c. Except where specifically specified to be painted.
- 7. Ceilings, walls, columns in interstitial spaces.
- 8. Ceilings, walls, and columns in pipe basements.

3.14 IDENTITY PAINTING SCHEDULE:

- A. Identify designated service in new buildings or projects with extensive remodeling in accordance with ASME A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels. For existing spaces where work is minor match existing.
 - 1. Legend may be identified using snap-on coil plastic markers or by paint stencil applications.
 - 2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12.2 M (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
 - 3. Locate Legends clearly visible from operating position.
 - 4. Use arrow to indicate direction of flow using black stencil paint.
 - 5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on construction documents where asterisk appears for High, Medium, and Low Pressure designations as follows:
 - a. High Pressure - 414 kPa (60 psig) and above.
 - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
 - c. Low Pressure - 103 kPa (14 psig) and below.
 - d. Add Fuel oil grade numbers.
 - 6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS
Blow-off		Green	White	Blow-off
Boiler Feedwater		Green	White	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Blue	White	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Green	White	H.P. _____*
High Pressure Condensate Return		Green	White	H.P. Ret _____*
Medium Pressure Steam		Green	White	M. P. Stm _____*
Medium Pressure Condensate Return		Green	White	M.P. Ret _____*
Low Pressure Steam		Green	White	L.P. Stm _____*
Low Pressure Condensate Return		Green	White	L.P. Ret _____*
High Temperature Water Supply		Green	White	H. Temp Wtr Sup
High Temperature Water Return		Green	White	H. Temp Wtr Ret
Hot Water Heating Supply		Green	White	H. W. Htg Sup
Hot Water Heating Return		Green	White	H. W. Htg Ret
Gravity Condensate Return		Green	White	Gravity Cond Ret
Pumped Condensate Return		Green	White	Pumped Cond Ret
Vacuum Condensate Return		Green	White	Vac Cond Ret
Fuel Oil - Grade Boiler Water Sampling		Brown	White	Fuel Oil-Grade Sample
Chemical Feed		Green	White	Chem Feed
Continuous Blow-Down Pumped Condensate		Green	White	Cont. B D Pump Cond
Pump Recirculating		Green	White	Pump-Recirc.
Vent Line		Green	White	Vent
Alkali		Orange	Black	Alk
Bleach		Orange	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom

Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Orange	Black	Acid Waste
Vent		Orange	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6096 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000, 15000, or 25000.
8. See Sections for methods of identification, legends, and abbreviations of the following:
 - a. Regular compressed air lines: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
 - e. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
 - f. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
 2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.
 3. Locate not more than 6096 mm (20 feet) on center on corridor sides of partitions, and with a least one (1) message per room on room side of partition.
 4. Use semi-gloss paint of color that contrasts with color of substrate.
- C. Identify columns in pipe basements and interstitial space:
1. Apply stenciled number and letters to correspond with grid numbering and lettering indicated on construction documents.
 2. Paint numbers and letters 101 mm (4 inches) high, locate 45 mm (18 inches) below overhead structural slab.
 3. Apply on four (4) sides of interior columns and on inside face only of exterior wall columns.
 4. Color:
 - a. Use black on concrete columns.
 - b. Use white or contrasting color on steel columns.

3.15 PROTECTION CLEAN UP, AND TOUCH-UP:

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

3.16 INTERIOR PAINT TABLES:

FERROUS METAL AND ALUMINUM ITEMS (INTERIOR METAL DOORS, FRAMES, SHOP-PRIMED STEEL, ETC.)

1 coat; 2.0-4.0 mils DFT	PITT-TECH Plus 90-912 Series Int/Ext DTM Industrial Primer
2 coats; 2.0-4.0 mils DFT each	PITT-TECH Plus 90-1210 Series Int/Ext Semi-Gloss Industrial Enamel

GWB WALLS (EXCEPT AS NOTED BELOW)

1 coat; 1.0-1.3 mils DFT	PPG 6-2 Series SPEEDHIDE Interior Latex Sealer
2 coats; 1.5-1.7 mils DFT each	PPG 6-411 Series SPEEDHIDE Interior Enamel Latex Eggshell

GWB WALLS SCHEDULED TO RECEIVE EPOXY COATING

1 coat; 1.0-1.3 mils DFT	PPG 6-2 Series SPEEDHIDE Interior Latex Sealer
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2 coats; 1.5-1.7 mils DFT each PPG 16-510 Series PITT-GLAZE WB1 Interior
Semi-Gloss Pre-Catalyzed Water-Borne Acrylic
Epoxy

WOOD FOR PAINTED FINISH

1 coat; 1.5 mils DFT PPG 17-921 Series SEAL GRIP Int/Ext Acrylic
Universal Primer/Sealer

2 coats; 1.5-1.7 mils DFT each PPG 6-411 Series SPEEDHIDE Interior Enamel
Latex Eggshell

HARDWOOD FOR TRANSPARENT (STAIN) FINISH

1 coat OLYMPIC Premium Interior Oil Based Wood
Stain

2 coats OLYMPIC Premium Interior Water Based
Polyurethane Clear, Satin

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SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies interior signage for room numbers, directional signs exterior signage, code required signs and temporary signs.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Lighted EXIT signs for egress purposes are specified under Division 26, ELECTRICAL.
- C. Color and Finish of Interior Signs: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Provide signage that is the product of one manufacturer, who has provided signage as specified for a minimum of three (3) years. Submit manufacturer's qualifications.
- B. Installer's Qualifications: Minimum three (3) years' experience in the installation of signage of the type as specified in this Section. Submit installer's qualifications.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Interior Sign Samples: Sign panels with letters and symbols, for each sign type.
 - 1. Sign Panel, 203 x 254 mm (8 x 10 inches), with letters.
 - 2. Color samples of each color, 152 x 152 mm (6 x 6 inches). Show anticipated range of color and texture.
 - 3. Sample of typeface, arrow and symbols in a typical full size layout.
- D. Manufacturer's Literature:
 - 1. Showing the methods and procedures proposed for the anchorage of the signage system to each surface type.
 - 2. Manufacturer's printed specifications and maintenance instructions.
- E. Sign Location Plan, showing location, type and total number of signs required.

- F. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
- G. Manufacturer's qualifications.
- H. Installer's qualifications.

1.5 DELIVERY AND STORAGE:

- A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.
- B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.
- C. Deliver signs only when the site and mounting services are ready for installation work to proceed.
- D. Store products in dry condition inside enclosed facilities.

1.6 WARRANTY:

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

1.7 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 National Standards Institute (ANSI):
A117.1-09.....Accessible and Usable Buildings and Facilities
- C. ASTM International (ASTM):
D1003-13.....Test Method for Haze and Luminous Transmittance
of Transparent Plastics
D4802-10.....Poly(Methyl Methacrylate) Acrylic Plastic Sheet
- D. Code of Federal Regulation (CFR):
40 CFR 59.....Determination of Volatile Matter Content, Water
Content, Density Volume Solids, and Weight
Solids of Surface Coating
- E. Federal Specifications (Fed Spec):
MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified.
MIL-P-46144C.....Plastic Sheet, Polycarbonate

PART 2 - PRODUCTS

2.1 SIGNAGE GENERAL:

- A. Provide signs of type, size and design shown on the construction documents.

- B. Provide signs complete with lettering, framing and related components for a complete installation.
- C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- D. Do not scale construction documents for dimensions. Verify dimensions and coordinate with field conditions. Notify Contracting Officer Representative (COR) of discrepancies or changes needed to satisfy the requirements of the construction documents.

2.2 INTERIOR SIGN MATERIALS:

- A. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic shall not be acceptable.
- B. Polycarbonate: MIL-P-46144C; Type I, class 1.
- C. Typography: Comply with VA Signage Design Guide.
 - 1. Type Style: Helvetica Medium and Helvetica Medium Condensed. Initial caps or all caps, as indicated in Sign Message Schedule.
 - 2. Letter spacing: Comply with graphic standards in construction documents.
 - 3. Provide text, arrows, and symbols in size, colors, typefaces and letter spacing shown in construction documents. Text shall be a true, clean, accurate reproduction of typeface(s). Text shown in construction documents is for layout purposes only; final text for signs is listed in Sign Message Schedule.

2.3 INTERIOR SIGN TYPES:

- A. Basis of Design: Sign system shall be as manufactured by ASI-Modulex, 3860 W. Northwest Highway, Suite 350, Dallas, TX 75220, (800)-274-7732, to match sign types shown on the Drawings. Other manufacturers with similar systems include 2/90 Sign Systems, Best Sign Systems, or equal.
- B. Signs shall match existing.
- C. Standard Room Signs: Signs shall be InTouch ADA-Ready Signs by ASI-Modulex. Signs shall consist of a core of acrylic plastic 0.080 inch thickness minimum, matte finish, meeting ASTM D635. Tactile graphics, text and Grade 2 Braille shall be raised 1/32 inch minimum from plaque first surface by manufacturer's photopolymer bonded process. Sign face shall be 0.125 inch thickness photopolymer material with integral tactile characters and Braille. Adhesive-fixed characters are not acceptable. Provide lettering and graphics precisely formed and

uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors. Computerized translation of sign copy to be responsibility of the manufacturer.

- D. Mounting: Signs shall be mounted with 1/16 inch thick vinyl foam tape fabricated from materials that are not corrosive to sign material and mounting surfaces.

2.4 FABRICATION:

- A. Design interior signage components to allow for expansion and contraction for a minimum material temperature range of 38 degrees C (100 degrees F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Form work to required shapes and sizes, with true curve lines and angles.
- C. Signs: Fabricate with fine, even texture to be flat and sound.
 - 1. Maintain lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern.
 - 2. Plane surfaces to be smooth, flat and without oil-canning, free of rack and twist.
 - 3. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches).
- D. Do not manufacture signs until final sign message schedule and location review has been completed by the COR and forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Locate signs as shown on the construction documents.
- B. Conform to the VA Signage Design Guide for installation requirements.
- C. Refer to Sign Message Schedule for mounting method. Mount signs in proper alignment, level and plumb according to the Sign Location Plan and the dimensions given on elevation and Sign Location Plans. When exact position, angle, height or location is not clear, contact COR for resolution.
- D. At completion of sign installation, clean exposed sign surfaces. Clean and repair adjoining or adjacent surfaces that became soiled or damaged as a result of installation of signs.

- - - END - - -

**SECTION 10 26 00
WALL AND DOOR PROTECTION**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies handrail/wall guard combinations, corner guards and high impact wall covering.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.
- C. Color and texture of resilient material: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Manufacturer with a minimum of three (3) years' experience in providing items of type specified.
- B. Installer's Qualifications: Installers are to have a minimum of three (3) years' experience in the installation of units required for this project.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in PART 2 - PRODUCTS.
- C. Shop Drawings: Show design and installation details.
- D. Manufacturer's Literature and Data:
 - 1. Handrail/Wall Guard Combinations.
 - 2. Corner Guards.
 - 3. High Impact Wall Covering.
- E. Test Report: Showing that resilient material complies with specified fire and safety code requirements.
- F. Manufacturer's qualifications.
- G. Installer's qualifications.
- H. Manufacturer's warranty.

1.5 DELIVERY AND STORAGE:

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.

- B. Protect from damage from handling and construction operations before, during and after installation.
- C. Store in a dry environment of approximately 21 degrees C (70 degrees F) for at least 48 hours prior to installation.

1.6 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their wall and door protection for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.7 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):
 - B221-14.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 - D256-10.....Impact Resistance of Plastics
 - D635-10.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
 - E84-14.....Surface Burning Characteristics of Building Materials
- C. Code of Federal Regulation (CFR):
 - 40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating
- D. SAE International (SAE):
 - J 1545-05(R2014).....Instrumental Color Difference Measurement for Exterior Finishes.
- E. Underwriters Laboratories Inc. (UL):
 - Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum Extruded: ASTM B221M (B221), Alloy 6063, Temper T5 or T6.
- B. Resilient Material:

1. Provide resilient material consisting of high impact resistant extruded acrylic vinyl, polyvinyl chloride, or injection molded thermal plastic conforming to the following:
 - a. Minimum impact resistance of 960.8 N-m/m (18 ft.-lbs./sq. inch) when tested in accordance with ASTM D256 (Izod impact, ft.-lbs. per inch notched).
 - b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
 - c. Rated self-extinguishing when tested in accordance with ASTM D635.
 - d. Provide material labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
 - e. Provide integral color with colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

2.2 CORNER GUARDS:

- A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type.
 1. Snap-on corner guard formed from resilient material, minimum 1.98 mm (0.078-inch) thick, free floating on a continuous 1.52 mm (0.060-inch) thick extruded aluminum retainer. Provide appropriate mounting hardware, cushions and base plates as required.
 2. Profile: Minimum 76 mm (3 inch) long leg and 6 mm (1/4 inch) corner radius.
 3. Height: 1.22 m (4 feet).
 4. Retainer Clips: Provide manufacturer's standard impact-absorbing clips.
 5. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.

2.3 WALL GUARDS AND HANDRAILS:

- A. Resilient Wall Guards and Handrails:
 1. Handrail/Wall Guard Combination:
 - a. Snap-on covers of resilient material, minimum 2 mm (0.078-inch) thick.
 - b. Free-floating on a continuous, extruded aluminum retainer, minimum 1.82 mm (0.072-inch) thick.
 - c. Anchor to wall at maximum 762 mm (30 inches) on center.

2. Provide handrails and wall guards with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories as required. End caps and corners to be field adjustable to assure close alignment with handrails and wall guards. Screw or bolt closure caps to aluminum retainer in a concealed manner.
3. Provide handrail/wall guard combination to match existing profile.

2.4 HIGH IMPACT WALL COVERING:

- A. Provide wall covering/panels consisting of high impact rigid acrylic vinyl or polyvinyl chloride resilient material.
- B. Submit fire rating and extinguishing test results for resilient material.
- C. Submit statements attesting that the items comply with specified fire and safety code requirements.
- D. Rigid Vinyl Acrylic Wall Covering: Wall covering thickness to be 1.52 mm (0.060 inch).
- E. Provide adhesive as recommended by the wall covering manufacturer. Provide adhesive with VOC content of 250 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

2.5 FASTENERS AND ANCHORS:

- A. Provide fasteners and anchors as required for each specific type of installation.
- B. Where type, size, spacing or method of fastening is not shown or specified in construction documents, submit shop drawings showing proposed installation details.

2.6 FINISH:

- A. Resilient Material: Embossed textures and color in accordance with SAE J1545.

PART 3 - INSTALLATION**3.1 RESILIENT CORNER GUARDS:**

- A. Install corner guards on walls in accordance with manufacturer's instructions.

3.2 RESILIENT WALL GUARD HANDRAIL COMBINATION

- A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions.

3.3 HIGH IMPACT WALL COVERING

- A. Surfaces to receive protection to be clean, smooth and free of obstructions.

B. Apply with adhesive in controlled environment according to manufacturer's recommendations.

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. SUMMARY:

1. Section Includes: Toilet and bath accessories at dressing rooms, toilets, baths, locker rooms and other areas indicated on drawings.

1.2 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

1. B18.6.4-98(R2005) - Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws inch.

C. American Welding Society (AWS):

1. D10.4-86(2000) - Welding Austenitic Chromium-Nickle Stainless Steel Piping and Tubing.

D. ASTM International (ASTM):

1. A269/A269M-15 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
2. A312/A312M-15b - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
3. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
5. A1011/A1011M-14 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
6. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
7. C1036-11e1 - Flat Glass.
8. C1048-12e1 - Heat-Strengthened and Fully Tempered Flat Glass.
9. D635-14 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
10. F446-85(2009) - Grab Bars and Accessories Installed in the Bathing Area.

E. Federal Specifications (Fed. Spec.):

1. A-A-3002 - Mirror, Glass.

2. FF-S-107C(2) - Screws, Tapping and Drive.
3. WW-P-541/8B(1) - Plumbing Fixtures (Accessories, Land Use).

F. National Architectural Metal Manufacturers (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

1.3 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication, anchorage and installation details.
2. Show mounting locations and heights.

C. Manufacturer's Literature and Data:

1. Description of each product.
2. Installation instructions.

D. Samples:

1. Full sized, complete assembly of each product specified.
2. Approved samples may be incorporated into project.

E. Certificates: Certify each product complies with specifications.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer.

G. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

1.7 WARRANTY

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

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Stainless Steel:
 - 1. Plate Or Sheet: ASTM A666, Type 304, 0.8 mm (0.031 inch) thick unless otherwise specified.
 - 2. Tubing: ASTM A269/A269M, Grade TP 304, seamless or welded.
 - 3. Pipe: ASTM A312/A312M; Grade TP 304.
- B. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.
- C. Chrome Plating (Service Condition Number SC 2): ASTM B456.
- D. Glass:
 - 1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors, and for mirror doors in medicine cabinets.

2.2 PRODUCTS - GENERAL

- A. Basis of Design: See SCHEDULE OF ACCESSORIES at the end of this Section.
- B. Provide each product from one manufacturer.

2.3 PAPER TOWEL DISPENSERS

- A. Provide automated paper towel dispenser, battery operated, surface mounted, designed to dispense 10" wide x 800' long high capacity roll towel.

2.4 TOILET TISSUE DISPENSERS

- A. Provide compact, double roll, side-by-side coreless bathroom tissue dispenser delivering 3000 sheets of 2-ply tissue.

2.5 GRAB BARS

- A. Fed. Spec. WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and complying with ASTM F446.
- B. Fabricate from stainless steel.
- C. Mounting:
 - 1. Other Types and Locations: Concealed type.
- D. Bars:
 - 1. Fabricate to 38 mm (1-1/2 inch) outside diameter.

- a. Stainless steel, minimum 1.2 mm (0.05 inch) thick.
 - 2. Fabricate in one continuous piece with ends turned toward walls.
 - 3. Continuously weld intermediate support to grab bar.
- E. Flange for Concealed Mounting:
- 1. Minimum 2.65 mm (0.1 inch) thick, maximum 79 mm (3-1/8 inch) diameter by 13 mm (1/2 inch) deep, with minimum three set screws for securing flange to back plate.
 - 2. Insert grab bar through center of flange and continuously weld perimeter of grab bar flush to back side of flange.
 - 3. In lieu of providing flange for concealed mounting, and back plate as specified, grab bar may be welded to back plate covered with flange.
- F. Back Plates:
- 1. Minimum 2.65 mm (0.1046 inch) thick metal.
 - 2. Fabricate in one piece, maximum 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.

2.6 CLOTHES HOOKS, ROBE OR COAT

- A. Fabricate hook units from chromium plated brass with satin finish, or stainless steel, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to thickness of metal, or 3 mm (1/8 inch) minimum radius.
- B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to wall flange, provided with concealed fastenings.

2.7 METAL FRAMED MIRRORS

- A. Fed. Spec. A-A-3002 metal frame; stainless steel.
- B. Mirror Glass:
 - 1. Minimum 6 mm (1/4 inch) thick.
 - 2. Set mirror in a protective vinyl glazing tape.
- C. Frames:
 - 1. Channel or angle shaped section with face of frame minimum 9 mm (3/8 inch) wide. Fabricate with square corners.
 - 2. Metal Thickness 0.9 mm (0.035 inch).
 - 3. Filler:

- a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers contoured to conceal void between back of mirror and wall surface.
 - b. Fabricate fillers from same material and finish as mirror frame.
- D. Back Plate:
- 1. Fabricate backplate for concealed wall hanging from zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame.
 - 2. Provide set screw type theft resistant concealed fastening system for mounting mirrors.
- E. Mounting Bracket:
- 1. Designed to support mirror tight to wall.
 - 2. Designed to retain mirror with concealed set screw fastenings.

2.8 STAINLESS STEEL SHELVES (TYPES 45)

- A. Fabricate shelves and brackets to design shown of 1.2 mm (0.05 inch) thick stainless steel.
- B. Round and finish smooth projecting corners of shelves and edge corners of brackets. Drill brackets for 6 mm (1/4 inch) anchor bolts.
- C. Screw or weld brackets to shelves.

2.9 FOLDING SEAT

- A. One piece, 5/16" thick, ivory colored solid phenolic seat. Frame, support lets, flanges and bracket shall be type 304 satin finish stainless steel. Folding seat shall include a self-locking mechanism. Folding seat shall measure 18" wide and shall project 16" from wall.

2.10 FABRICATION - GENERAL

- A. Welding, AWS D10.4.
- B. Grind, dress, and finish welded joints to match finish of adjacent surface.
- C. Form exposed surfaces from one sheet of stock, free of joints.
- D. Provide steel anchors and components required for secure installation.
- E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
- F. Hot-dip galvanized steel or stainless steel, anchors and fastening devices.
- G. Shop assemble accessories and package with components, anchors, fittings, fasteners and keys.
- H. Key items alike.

- I. Provide templates and rough-in measurements.
- J. Round and deburr edges of sheets to remove sharp edges.

2.11 FINISH

- A. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.
- B. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.12 ACCESSORIES

- A. Fasteners:
 - 1. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
 - 2. Concealed Fasteners:
 - a. Shower, Bath Tubs, and High Moisture Areas: Stainless steel.
 - b. Other Locations: Steel, hot-dipped galvanized.
 - 3. Toggle Bolts: For use in hollow masonry or frame construction.
 - 4. Sex bolts: For through bolting on thin panels.
 - 5. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
 - 6. Screws:
 - a. ASME B18.6.4.
 - b. Fed. Spec. FF-S-107, Stainless steel Type A.
- B. Adhesive: As recommended by manufacturer to suit application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify blocking to support accessories is installed and located correctly.
- B. Verify location of accessories with Contracting Officer's Representative.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install grab bars according to ASTM F446.

- C. Set work accurately, in alignment and where indicated, parallel or perpendicular as required to line and plane of surface. Install accessories plumb, level, free of rack and twist.
- D. Toggle bolt to steel anchorage plates in frame partitions and hollow masonry. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.
- E. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- F. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 CLEANING

- A. After installation, clean toilet accessories according to manufacturer's instructions.

3.4 PROTECTION

- A. Protect accessories from damage until project completion.

3.5 SCHEDULE OF ACCESSORIES

- A. Toilet Accessories listed below use American Specialties, Inc. (ASI) as the basis of design. Equal products by Bobrick or Bradley Corporation are acceptable

Item	Description	Mounting	Material
PTD-1	Georgia-Pacific enMotion Automated Paper Towel Dispenser #59540	Surface	Splash Blue water-resistant plastic case
TTD-1	Georgia-Pacific Side-by-Side Double Roll Bathroom Tissue Dispenser #56783	Surface	Splash Blue plastic case
GB-1	ASI 3800 Series 36" Grab Bar	Concealed	Stainless steel
GB-2	ASI 3800 Series 42" Grab Bar	Concealed	Stainless steel
GB-3	ASI 3800 Series 18" Grab Bar	Concealed	Stainless steel
RH-1	ASI Double Robe Hook #7345	Surface	Stainless steel

Item	Description	Mounting	Material
M-1	ASI 24" x 36" Angle Frame Mirror #0600	Surface	Stainless steel
S-1	ASI 6" x 18" Shelf #0690	Surface	Stainless steel
FS-1	ASI 18" wide x 16" deep Compact Folding Seat #8203	Surface	Solid phenolic seat with stainless steel understructure
SD-1	Soap dispenser provided and installed by Owner	Surface	Plastic

- - E N D - -

**SECTION 12 31 00
MANUFACTURED METAL CASEWORK**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies metal casework, VA standard cabinets and related accessories, including base cabinets, wall cabinets, and full height cabinets.

1.2 RELATED WORK:

- A. Plastic Laminate Counter or Work Tops: Section 06 20 00, FINISH CARPENTRY.
- B. Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Color of Casework Finish: Section 09 06 00, SCHEDULE OF FINISHES.
- D. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- E. Backing Plates for Wall Mounted Casework: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

1.3 QUALITY ASSURANCE:

- A. Approval by Contracting Officer Representative (COR) is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's Qualifications:
1. Manufacturer is regularly engaged in design and manufacture of metal of scope and type similar to requirements of this project for a period of not less than five (5) years.
 2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to requirements of this project.
 3. Submit manufacturer's qualifications and list of projects.
- C. Installer Qualifications:
1. Installer has completed at least three (3) projects in least five (5) years in which these products were installed.
 2. Submit installer qualifications.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
1. Manufacturer's Certificate of qualifications specified.
 2. Certificate of installer's qualifications specified.

C. Manufacturer's Literature and Data:

- 1. Brochures showing name and address of manufacturer, and catalog or model number of each item incorporated into the work.
- 2. Manufacturer's illustration and detailed description.
- 3. List of deviations from contract specifications.
- 4. Locks, each kind.

D. Shop Drawings (1/2 Full Scale):

- 1. Showing details of casework construction, including kinds of materials and finish, hardware, accessories and relation to finish of adjacent construction, including specially fabricated items or components.
- 2. Fastenings and method of installation.
- 3. Location of service connections and access.

E. Samples:

- 1. Metal plate, 152 mm (6 inch) square, showing chemical resistant finish, in each color.

F. Manufacturer's warranty.

1.5 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their metal casework for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.6 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):
 - A36/A36M-14.....Carbon Structural Steel
 - A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - A283/A283M-13.....Low and Intermediate Tensile Strength Carbon Steel Plates
 - A568/A568M-14.....Steel, Sheet, Carbon and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements

- A794/A794M-12.....Standard Specification for Commercial Steel
(CS), Sheet, Carbon (0.16% Maximum to 0.25%
Maximum) Cold Rolled
- B456-11.....Electrodeposited Coatings of Copper Plus Nickel
Plus Chromium and Nickel Plus Chromium
- C1036-11 (R2012).....Flat Glass
- C1036-12e1.....Heat-Strengthened and Fully Tempered Flat Glass
- C. American National Standard Institute:
Z97.1-09 (R2010).....Safety Glazing Material used In Buildings
- D. Builders Hardware Manufacturers Association (BHMA):
A156.1-13.....Butts and Hinges
A156.9-10.....Cabinet Hardware
A156.5-14.....Auxiliary Locks and Associated Products
A156.11-14.....Cabinet Locks
A156.16-13.....Auxiliary Hardware
- E. American Welding Society (AWS):
D1.1/D1.1M-10.....Structural Welding Code Steel
D1.3/D1.3M-05 (R2008)....Structural Welding Code Sheet Steel
- F. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual
- G. Underwriters Laboratories Inc. (UL):
325-06 (R2013).....Door, Drapery, Gate, Louver, and Window
Operators and Systems
437-08 (R2013).....Key Locks
- H. Federal Specifications (Fed. Spec.):
A-A-55615.....Shield, Expansion; Nail Expansion (Wood Screw
and Lag Bolt Self-Threading Anchors)

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Sheet Steel:
1. ASTM A794/A794M, cold rolled, Class 1 finish, stretcher leveled.
 2. Other types of cold rolled steel meeting requirements of
ASTM A568/A568M are acceptable for concealed parts.
- B. Structural Steel: ASTM A283/A283M or ASTM A36/A36M.
- C. Stainless Steel: ASTM A240/A240M, Type 302B.
- D. Glass:
1. ASTM C1048 Kind FT Type I, Class 1, Quality q3.
 2. For Doors: 6 mm (1/4 inch) thick.

E. Glazing Cushions:

1. Channel shaped, of rubber, vinyl or polyethylene plastic, with vertical flanges not less than 2 mm (3/32 inch) thick and horizontal web 3 mm (1/8 inch) thick.
2. Flanges may have bulbous terminals above the glazing beads or terminate flush with top of beads.

F. Fasteners:

1. Exposed to View: Chrome plated steel or stainless steel, or finished to match adjacent surface.
2. Provide round head or countersunk fasteners where exposed in cabinets.
3. Expansion Bolts: Fed Spec. A-A-55615. Do not provide lead or plastic shields.
4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
5. Sex Bolts: Capable of supporting twice the load.

2.2 MANUFACTURED PRODUCTS:

- A. When two (2) or more units are required, use products of one (1) manufacturer.
- B. Manufacturer of casework assemblies is to assume complete responsibility for the final assembled unit.
- C. Provide products of a single manufacturer for parts which are alike.

2.3 CASEWORK FABRICATION:

A. General:

1. Welding: Comply with AWS Standards D1.1/D1.1M and D1.3/D1.3M.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.
3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

0.89 mm (0.035 inch) (20 gage)	Drawer fronts, backs, bodies, closure plates or scribe and filler strips less than 75 mm (3 inches) wide, sloping top, shelf reinforcement channel and shelves. Toe space or casework soffits and ceilings under sloping tops.
--------------------------------------	--

1.20 mm (0.047 inch) (18 gage)	Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (3 inches) or more. Reinforcement for drawers with locks. Tables legs, spreaders and stretchers, when fabricated of cold rolled tubing. Metal for desks; except legs and aprons. Door exterior and interior panels, flush or glazed. Cross rails of base units. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets.
1.49 mm (0.059 inch) (16 gage)	Aprons, apron division, reinforcing gussets, table legs, desk legs and aprons, spreaders and stretchers when formed without welding. Toe base gussets, drawer slides, and other metal work. Front top rails and back rails except top back rails may be 1.2 mm (0.047 inch) (18 gage) thick.
1.88 mm (0.074 inch) (14 gage)	Drawer runners door tracks.
2.64 mm (0.104 inch) (12 gage)	Base unit bottom corner gussets and leg sockets.
3 mm (0.12 inch) (11 gage)	Reinforcement for hinge reinforcement inside doors and cabinets.

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front. Include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile, 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of wall units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets, including drawer units.
7. Provide finish panel on exposed cabinet backs.
8. Do not install screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, removable panels, and where casework is required to be fastened, end to end or back to back.
9. Fabricate casework, except benches, and desks with finished end panels.

10. Close flush exposed soffits of wall hung shelving, knee spaces in counters, and toe spaces at bases.
11. In base units with doors provide removable backs.
12. Provide reinforcing for hardware.
13. Size Dimensions:
 - a. Use dimensions shown on construction documents or within tolerances specified.
 - b. Tolerance:

	Depth	Nominal Dim (mm (inch))	Plus Tolerance (mm (inch))	Minus Tolerance (mm (inch))
	Depth	305 (12)	25 (1)	0 (0)
	Width	- -	0 (0)	25 (1)
Wall Hung Cabinet	Height	- -	25 (1)	25 (1)
Counter Mounted Cabinet	Height	- -	25 (1)	25 (1)
Floor Standing Cabinet	Height	- -	25 (1)	0 (0)

- c. Manufacturer's Tolerance for the same Length, Depth or Height of Cabinet: Not to exceed 1.58 mm (0.0625 inches).

D. Base Pedestals:

1. Provide adjustable leveling bolts accessible through stainless steel plugs, or notch in the base concealed when resilient base is applied.
2. Except where flush metal base is shown on construction documents, provide toe space at front recessed 76 mm (3 inches).

E. Doors:

1. Hollow metal type, flush and glazed doors not less than 16 mm (5/8 inch) thick.
2. Fabricate flush metal doors of two (2) panels formed into pans with corners welded and ground smooth. Provide flush doors with a sound deadening core.

3. Fabricate glazed metal doors with reinforced frame and construct either from one (1) piece of steel, or have separate stiles and rails mitered and welded at corners, and welds ground smooth.
 - a. Secure removable glazing members with screws to back of doors.
 - b. Install glass in rubber or plastic glazing channels.
4. Provide sheet steel hinge reinforcement inside doors.
5. Sliding doors: Provide stops to prevent bypass.
6. Doors removable without use of tools except where equipped with locks.

F. Drawers:

1. Drawer fronts to be flush hollow metal type not less than 16 mm (5/8 inch) thick with sound deadening core. Fabricate of two (2) panels formed into pans. Weld and grind smooth corners of drawer fronts.
2. Form bodies from one (1) piece of steel, weld to drawer front.
3. Provide reinforcement for locks and provide rubber bumpers at both sides of drawer head to cushion closing.
4. Equip with roller suspension guides.

G. Sloping Tops:

1. Provide sloping tops for casework where shown on construction documents.
2. Provide exposed ends of sloping tops with flush closures.
3. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.

H. Shelves:

1. Capable of supporting an evenly distributed minimum load of 122 kg per square meter (25 pounds per square foot) without visible distortion.
2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
3. For shelves over 1067 mm (42 inches) in length and over 305 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1 1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
4. Weld shelves to metal back and ends unless shown on construction documents as adjustable.

5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.

2.4 ACCESSORIES:

- A. Card or Label Holders for Shelves:
 1. Fabricate of 0.6 mm (0.0239 inch) thick steel approximately 125 mm (5 inches) long, or continuous where shown on construction documents, having top and bottom edges bent over on face and welded to shelf.
 2. Finish exposed surfaces in same color as shelf.

2.5 HARDWARE:

- A. Factory installed.
- B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.
- C. Cabinet Locks:
 1. Where locks are shown on construction documents.
 2. Locked pair of hinged door over 915 mm (36 inches) high:
 - a. ANSI/BHMA A156.5, similar to E0261, Key one (1) side.
 - b. On active leaf use three (3) point locking device, consisting of two (2) steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
 - c. On inactive leaf provide dummy lever of same design.
 - d. Provide keeper holes for locking device rods and cam.
 3. Door and Drawer: ANSI/BHMA A156.11 cam locks. Provide one (1) type for each condition as follows:
 - a. Drawer and Hinged Door up to 915 mm (36 inches) high: E07261.
 - b. Drawer and Hinged Door: Pin-tumbler, cylinder type lock with not less than four (4) pins or a UL 437 rated wafer lock with brass working parts and case.
 - c. Sliding Door: E07161.
 4. Key locks differently for each type casework and master key to existing system.
 - a. Furnish two (2) keys per lock.
 5. Marking of Locks and Keys:
 - a. Name of manufacturer, or trademark which can readily be identified legibly marked on each lock and key change number marked on exposed face of lock.
 - b. Key change numbers stamped on keys.

- c. Key change numbers to provide sufficient information for manufacturer to replace key.
- D. Cabinet Hardware: ANSI BHMA A156.9.
- 1. Door/Drawer Pulls: B02011.
 - a. One (1) for drawers up to 584 mm (23 inches) wide.
 - b. Two (2) for drawers over 584 mm (23 inches) wide.
 - c. Sliding door flush pull, each door: B02201.
 - d. Provide drawer and door pulls of a design that can be operated with a force of 22.2 N (5 pounds) or less, with one (1) hand and not require tight grasping, pinching or twisting of the wrist.
 - 2. Cabinet Door Catch:
 - a. Install at bottom of wall cabinets, top of base cabinets and top and bottom of full height cabinet doors over 1220 mm (48 inches).
 - b. Omit on doors with locks.
 - 3. Drawer Slides:
 - a. Provide B05051 for drawers over 152 mm (6 inches) deep.
 - b. Provide B05052 for drawers 76 to 152 mm (3 to 6 inches) deep.
 - c. Provide B05053 for drawers less than 76 mm (3 inches) deep.
 - 4. Butt Hinges:
 - a. B01351, minimum 1.8 mm (0.072 inch) thick chrome plated steel leaves.
 - b. Minimum 3.5 mm (0.139 inch) diameter stainless steel pins.
 - c. Full mortise type, five (5) knuckle design with 63 mm (2 1/2 inch) high leaves and hospital type tips.
 - d. Two (2) hinges per door except use three (3) hinges on doors 1220 mm (48 inches) and more in height. Use stainless steel leaves for tilting bin doors.
 - e. Do not weld hinges to doors or cabinets.
 - 5. Pivot hinges: ANSI/BHMA A156.1 A875B.
 - 6. Shelf Supports:
 - a. Install in casework where adjustable shelves are noted on construction documents.
 - b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
 - c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.
 - 7. Sliding Doors:
 - a. Doors supported by two (2) ball bearing bronze or nylon rollers or sheaves riding on a stainless steel track.

- b. Sliding Door Tracks: B07093. Plastic tracks not acceptable.
- c. Doors restrained by a nylon, polyvinylchloride, or stainless steel guide at opposite end.
- 8. Auxiliary Hardware: ANSI A156.16.
- 9. Door silencers: L03011 or L03031.
 - a. Install two (2) rubber bumpers each door.
 - b. Silencers set near top and bottom of jamb.

2.6 METAL FINISHES:

- A. Comply with NAAMM AMP 500 series and as specified.
- B. Steel Cabinets including Closures and Filler Strips:
 - 1. Acid resisting finish except hardware and stainless steel.
 - 2. After fabrication of cabinet submerge in a degreasing bath, and thoroughly rinse to remove dirt and grease, and other foreign matter.
 - 3. Apply non-metallic phosphate coating, then finish with baked-on acid resisting enamel not less than 1 mil (0.001 inch) thick.
 - 4. Finish resistant to action of the following reagents when 0.5 cm³ (10 drops) are applied to the surface and left open to the atmosphere for period of one (1) hour.

Hydrochloric Acid 37 percent	Ethyl Alcohol
Phosphoric Acid 75 percent	Methylethyl Keytone
Sulfuric Acid 25 percent	Acetone
Glacial Acetic Acid	Ethyl Acetate
Sodium Hydroxide 10 percent	Ethyl Ether
Sodium Hydroxide (concentrated)	Carbon Tetrachloride
Hydrogen Peroxide 5 percent	Xylene
Formaldehyde 37 percent	Phenol 85 Percent

- 5. Color of finish is specified in Section 09 06 00, SCHEDULE FOR FINISHES.

- C. Brass:
 - 1. U.S. Standard Finish No. 26 for hardware items.
 - 2. Other brass items: ASTM B456, chromium plated finish meeting requirements for Service Condition SCI.
- D. Aluminum: Chemically etched medium matte, clear anodic coating, Class II, Architectural, 0.4 mils (0.0004 inches) thick.
- E. Stainless Steel: Mechanical finish No. 4 on sheet except No. 7 on tubing.

2.8 PRODUCTS OF OTHER COMPONENTS DIRECTLY RELATED TO CASEWORK:

- A. Refer to Section 06 20 00, FINISH CARPENTRY for plastic laminate counter or work tops.
- B. Refer to Section 07 92 00, JOINT SEALANTS for work related to sealants used in conjunction with joints of countertops, casework systems, and adjacent materials.
- B. Refer to Section 09 65 13, RESILIENT BASE AND ACCESSORIES for work related to rubber base adhered to casework systems.
- C. Refer to Section 09 22 16, NON-STRUCTURAL METAL FRAMING for backing plates used in conjunction with wall assemblies for the attachment of casework systems.

PART 3 - EXECUTION**3.1 COORDINATION:**

- A. Begin only after work of other trades is complete, including wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected, and area free of trash and debris.
- B. Verify reinforcement of walls and partitions for support and anchorage of casework.
- C. Coordinate with other Divisions and Sections of the specification for work related to installation of casework systems to avoid interference and completion of service connections.

3.2 INSTALLATION:

- A. Install casework in accordance with manufacturer's written instructions.
 - 1. Install in available space; arranged for safe and convenient operation and maintenance.
 - 2. Align cabinets for flush joints except where shown otherwise on construction documents.
 - 3. Install with bottom of wall cabinets in alignment and tops of base cabinets aligned level, plumb, true, and straight to a tolerance of 3.2 mm in 2438 mm (1/8 inch in 96 inches).
- B. Support Rails:
 - 1. Install true to horizontal at heights shown on construction documents; maximum tolerance for uneven floors is plus or minus 13 mm (1/2 inch).
 - 2. Shim as necessary to accommodate variations in wall surface not exceeding 5 mm (3/16 inch) at fastener.
- C. Wall Strips:

1. Install true to vertical and spaced as shown on construction documents.
 2. Align slots to assure that hanging units will be level.
- D. Plug Buttons:
1. Install plug buttons in predrilled or prepunched perforations not used.
 2. Use chromium plate plug buttons or buttons finished to match adjacent surfaces.
- E. Seal junctures of casework systems with mildew-resistant silicone sealants as specified in Section 07 92 00, JOINT SEALANTS.

3.3. CLOSURES AND FILLER PLATES:

- A. Close openings larger than 6 mm (1/4 inch) wide between cabinets and adjacent walls with flat, steel closure strips, scribed to required contours, or machined formed steel fillers with returns, and secured with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.
- C. Secure filler plates to casework top members, unless shown otherwise on construction documents.
- D. Secure filler plates more than 152 mm (6 inches) in width top edge to a continuous 25 x 25 mm (1 x 1 inch) 0.889 mm (1/16 inch) thick steel formed steel angle with screws.
- E. Anchor angle to ceiling with toggle bolts.
- F. Install closure strips at exposed ends of pipe space and offset opening into concealed space.
- G. Finish closure strips and fillers with same finishes as cabinets.

3.4 FASTENINGS AND ANCHORAGE:

- A. Do not anchor to wood ground strips.
- B. Provide hat shape metal spacers where fasteners span gaps or spaces.
- C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.
- D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.
- E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to wood blocking for concealed fasteners.
- F. Use not less than No. 12 or 14 wood screws with not less than 38 mm (1 1/2 inch) penetration into wood blocking.

- G. Space fastening devices 305 mm (12 inches) on center with minimum of three (3) fasteners in 915 or 1219 mm (3 or 4 foot) unit width.
- H. Anchor floor mounted cabinets with a minimum of four (4) bolts through corner gussets. Anchor bolts may be combined with or separate from leveling device.
- I. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
- J. Where units abut end to end, anchor together at top and bottom of sides at front and back. Where units are back to back, anchor backs together at corners with hex bolts placed inconspicuously inside casework.
- K. Where type, size, or spacing of fastenings is not shown or specified on construction documents, show on shop drawings proposed fastenings and method of installation.

3.5 ADJUSTMENTS:

- A. Adjust equipment to insure proper alignment and operation.
- B. Replace or repair damaged or improperly operating materials, components or equipment.

3.6 CLEANING:

- A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.
- B. Remove from job site trash, debris and packing materials resulting from work of this section.
- C. Leave installed areas clean of dust and debris resulting from work of this section.

3.7 INSTRUCTIONS:

- A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -

**SECTION 13 49 00
RADIATION PROTECTION**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Radiation protection with lead materials and lead lined products where indicated on drawings.

1.2 RELATED REQUIREMENTS

- A. Structural Steel Door Frames: Section 05 50 00, METAL FABRICATIONS.
- B. Steel Door Frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- C. Wood Doors: Section 08 14 00, INTERIOR WOOD DOORS.
- D. Hardware for Doors: Section 08 71 00, DOOR HARDWARE.
- E. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, INTERIOR WOOD DOORS, and Section 08 71 00, DOOR HARDWARE.
- F. Joint treatment of Lead-Lined Gypsum Board: Section 09 29 00, GYPSUM BOARD.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 1. A240/A240M-15b - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 2. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 3. C1396/C1396M-14a - Gypsum Board.
 4. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
- C. Federal Specifications (Fed. Spec.):
 1. QQ-L-201F(2)-65 - Lead Sheet.
- D. National Council on Radiation Protection & Measurements (NCRP):
 1. Report No. 102-89 - Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies Up to 50 MeV (Equipment Design, Performance and Use).
 2. Report No. 147-04 - Structural Shielding Design for Medical X-Ray Imaging Facilities.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting minimum 30 days before beginning Work of this section.
 - 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Contractor.
 - c. Installer.
 - d. Manufacturer's field representative.
 - e. Other installers responsible for adjacent and intersecting work.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Show type, location, and thickness of radiation protection.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.
 - 3. Warranty.
- D. Samples:
 - 1. Gypsum Wallboard: 300 mm (12 inches) square.
 - 2. Bottom corner section of lead lined door: 300 mm (12 inches) square showing bottom and side edge strips.
- E. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 - 2. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- F. Test Reports: Certify each product complies with specifications.
 - 1. Lead control windows.
 - 2. Lead lined wood doors.
 - 3. Hardware.
 - 4. Lead lined door frames.
- G. Qualifications: Substantiate qualifications comply with specifications.
 - 1. Manufacturer with project experience list.
- H. Delegated Design Drawings and Calculations: Signed and sealed by responsible design professional.
- I. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Regularly manufactures specified products.
 2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
 3. Approval by Contracting Officer is required for product or service of proposed manufacturer and suppliers, and will be based upon submission by Contractor of certification that:
 4. Manufacturer regularly and presently manufactures lead radiation shielding as specified as one of its principal products.

1.7 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant lead lined doors against material and manufacturing defects.
 1. Defects Include: Warp or twist exceeding 6 mm (1/4 inch) in any face dimension of door (including full diagonal), measured minimum six months after doors have been hung and finished.
 2. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lead Sheet: Fed. Spec. QQ-L-201, Grade C, thickness 2.15 mm.
- B. Lead Lined Gypsum Wallboard:
 1. Gypsum Wallboard: ASTM C1396/C1396M, Type X, 16 mm (5/8 inch) thick.
 2. Factory bond sheet lead to one side of wallboard.
 3. Apply sheet lead in 2.15 mm thickness, unpierced and in one piece.
- C. Fasteners:
 1. Standard Steel Drill Screws: ASTM C1002, with lead washers for application of lead lined sheet materials to metal studs.
- D. Lead Disc Thickness: Equal protection of fastener penetrated lead shielding, diameter 25 mm (1 inch) larger than fastener.

2.2 PRODUCTS - GENERAL

- A. Sustainable Construction Requirements:

1. Low Pollutant-Emitting Materials: Materials: Comply with VOC limits specified in Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for the following products:
 - a. Non-Flooring Adhesives and Sealants.
- B. Radiation Shielding Products: Conform to applicable requirements of NCRP Report No. 147 and NCRP Report No. 102.
- C. General: Provide lead lining for items occurring within partitions matching radiation protection equivalent to adjacent partitions including:
 1. Doors and door frames.
 2. Lead control windows.
- D. Lead Glass: Clear, thickness as required for equivalent lead protection.
- E. Lead Control Windows: Cast lead, rigid, single unit type without joints, and with lead stop beads and lead glass.
- F. Signs: As scheduled in this section.
 1. Heavy white paper or cardboard.
 2. Height of lettering and number minimum 3 mm (1/8 inch).
 3. Fill in blank spaces on signs with millimeter thickness of lead as installed and total mm thickness of lead equivalent (determined by VA Physicist) and height of radiation protection above finished floor where required.
 4. Provide manufacturer's standard stainless steel frame with clear acrylic plastic cover, 3 mm (1/8 inch) thick over sign, to hold card size 100 mm by 150 mm (4 inches by 6 inches).
- G. Lead Lined Wood Doors:
 1. Refer to Section 08 14 00, INTERIOR WOOD DOORS for quality standards, finishing, installation and related requirements.
 2. Flush veneered construction.
 3. Construct doors of two separate solid wood cores with a single sheet of lead lining through center.
 4. Construct doors with filler strips, crossbanding, face veneers and hardwood edge strips, bonded under heavy pressure.
 5. Extend sheet lead lining to door edges.
 6. Fasten wood cores together with countersunk steel bolts through lead with bolt heads and nuts covered with poured lead, or with poured lead dowels.

7. Locate bolts or dowels 38 mm (1-1/2 inches) from door edges, and maximum 200 mm (8 inches) on center in both directions over door area.
 8. Finish face of dowels and lead covering of bolt heads and nuts flush with wood cores.
 9. Edge Strips:
 - a. Same species of wood as face veneer.
 - b. Minimum 38 mm (1-1/2 inches) at top edge and 63 mm (2-1/2 inches) at bottom edge.
 - c. Glue strips to cores before face veneer is applied.
 - d. Extend vertical edge strips full height of door and bevel 3 mm (1/8 inch) for each 50 mm (2 inches) of door thickness.
 - e. Coat top and bottom edges of doors to receive transparent finish with two coats of water resistant sealer before shipment.
 10. Crossbanding of Hardwood:
 - a. 2 mm (0.08 inch) thick minimum with minimum of 1 mm (0.04 inch) thick face veneer, after sanding.
 11. Face Veneers and Finish: Refer to Section 08 14 00, INTERIOR WOOD DOORS.
 12. Clearance between Doors and Frames and Floors:
 - a. Jambs and Heads: A maximum 3 mm (1/8 inch) clearance.
 - b. Bottom of door to finish floor: Maximum 19 mm (3/4 inch) clearance.
- H. Hardware:
1. Hardware for doors is specified in Section 08 71 00, DOOR HARDWARE.
 2. Stagger bolts to door pulls on plates which penetrate lead lining relative to opposite plate and recess on side of door opposite pull.
 3. Provide lead plugs or discs over recessed nut ends of bolts, unless otherwise shown.
 4. Countersink nut ends of bolts for surface applied hinges and door closers, and cover with lead lined 1.5 mm (0.06 inch) stainless steel pans.
 5. Provide round head screws with dull chromium plated finish to secure stainless steel pans.
 6. Provide mortises for floor hinge arms and top pivots with sheet lead on both sides. Enclose floor boxes of floor hinges with sheet lead at sides and bottom.

7. Recess lock and latch cases at mill and line with lead butted tightly to lead in door.
8. Protection and installation of doors and hardware as specified in Section 08 14 00, INTERIOR WOOD DOORS and 08 71 00, DOOR HARDWARE.

I. Lead Lining of Frames:

1. Line or cover steel frames, stops for doors, and corner type control windows with sheet lead free of waves, lumps and wrinkles with as few joints as possible.
2. Fabricate joints in sheet lead to obtain radiation protection equivalent to adjacent sheet lead. Finish joints smooth and neat.
3. Structural steel frames and metal door frames for lead lined doors are specified in Section 05 50 00, METAL FABRICATIONS and Section 08 11 13, HOLLOW METAL DOORS AND FRAMES respectively.

2.3 ACCESSORIES

- A. Asphalt Emulsion: ASTM D1187/D1187M.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.

3.2 INSTALLATION OF LEAD LINED GYPSUM WALLBOARD PANELS

- A. Apply lead lined gypsum wallboard to metal studs as indicated on drawings.
- B. Predrill or drill pilot holes for screws necessary to prevent deforming fastener and lead shielding and to prevent distorting wallboard.
- C. Apply wallboard vertically with lead linings placed next to supports.
- D. Install sheet lead strips behind joints in same thickness used for wallboard.
 1. Lead Strips: 45 mm (1-3/4 inches) wide.
 2. Lead Angles at Corners: 45 mm by 45 mm (1-3/4 by 1-3/4 inch).
 3. Secure the lead strips to supports at outer edges of strips.
- E. Wallboard:
 1. Fasten to supports using screws and lead washers or discs at maximum 250 mm (10 inches) on centers.
 2. Make provisions for connection with lead lined door frames and for cutouts for vision panels.
 3. Joint treatment of lead lined gypsum board panels and fastening depressions as specified in Section 09 29 00, GYPSUM BOARD.

3.3 INSTALLATION OF SUPPLEMENTAL LEAD SHIELDING

- A. Line or cover penetrations of wall lead, pipe chases, columns fasteners and other interruptions with sheet lead.
1. Install sheet lead free of waves, lumps and wrinkles and with as few joints as possible.
 2. Joints in sheet lead to provide radiation protection equivalent to adjacent sheet lead.
 3. Finish joints smooth and neat.
- B. Provide lead shielding for spaces around outlet boxes, junction boxes, film illuminators, and pipes, to achieve radiation protection equaling radiation protection specified for adjacent wall surface.

3.4 FIELD QUALITY CONTROL

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
1. Lead radiation shielding will be tested after radiation producing equipment is installed.
 2. Additional testing required due to correction and replacement of defective work will be done by Government at Contractor's expense.

3.5 SIGNAGE SCHEDULE

- A. Install signs on each wall of each room, maximum 300 mm (12 inches) above accessible ceilings, centered along length of each wall.
1. Space signs maximum 6000 mm (20 feet) on center.
 2. Fasten signs with screws at each corner of sign.
- B. Radiographic and Fluoroscopic Room protected with sheet lead and lettered as follows:

SURFACES OF THIS ROOM HAVE BEEN PROTECTED WITH SHEET LEAD OF THE FOLLOWING THICKNESS FULL HEIGHT OF THE WALL:		
COMPONENT	TOTAL LEAD	
	LEAD THICKNESS	EQUIVALENT PROTECTION
DOORS AND FRAMES	2.15 mm	2.15 mm
PARTITIONS	2.15 mm	2.15 mm

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