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.

B. This section specifies exterior signage.

1.2 RELATED WORK:

A. Electrical Work: Division 26, ELECTRICAL.

B. Lighted EXIT signs for egress purposes are specified under Division 26, ELECTRICAL.

C. Color and Finish of Interior Signs: see EL-series drawings for fixture types.

D. Structural Steel Supports: Section 05 12 00, STRUCTURAL STEEL FRAMING.

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 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

C. Interior Sign Samples: Sign panels and frames, 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. Exterior Sign Samples: 152 x 152 mm (6 x 6 inches) samples of each color and material.

E. 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.

F. Sign Location Plan, showing location, type and total number of signs required.

G. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.

H. Full size layout patterns for dimensional letters.

I. Manufacturer’s qualifications.

J. 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 Architectural Manufacturers Association (AAMA):

611-14.....Anodized Architectural Aluminum

2603-13.....Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

C. American National Standards Institute (ANSI):

A117.1-09.....Accessible and Usable Buildings and Facilities

D. ASTM International (ASTM):

A36/A36M-14.....Carbon Structural Steel

A240/A240M-15.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A666-10.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

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

B36/B36M-13.....Brass Plate, Sheet, Strip, and Rolled Bar

B152/B152M-13.....Copper Sheet, Strip, Plate, and Rolled Bar

B209-14.....Aluminum and Aluminum-Alloy Sheet and Plate

B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

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)

C1036-11(R2012).....Flat Glass

C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

C1349-10.....Architectural Flat Glass Clad Polycarbonate

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

F. National Fire Protection Association (NFPA):

70-14.....National Electrical Code

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.

2.3 INTERIOR SIGN MATERIALS: MATCH EXISTING MARION SITE STANDARD OR EQUAL TO IT.

A. Aluminum:

1. Sheet and Plate: ASTM B209M (B209).
2. Extrusions and Tubing: ASTM B221M (B221).

B. 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.

C. Polycarbonate: MIL-P-46144C; Type I, class 1.

D. Vinyl: Premium grade 0.1 mm (0.004 inch) thick machine cut, having a pressure sensitive adhesive and integral colors.

E. Adhesives:

1. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by signage manufacturer.

F. 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. Arrow: Comply with graphic standards in construction documents.
3. Letter spacing: Comply with graphic standards in construction documents.
4. Letter spacing: Comply with graphic standards in construction documents.
5. 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

2.5 INTERIOR SIGN TYPES:

A. Conform to the VA Signage Design Guide.

B. Provide sliding rail frame insert and frame component system.

C. Component System Signs:

1. Provide interior sign system as follows:

a. Interchangeable system that allows for changes of graphic components of the installed sign, without changing sign in its entirety.

b. Provide sign system comprised of following primary components:

1) Rail Back: Horizontal rails, spaced to allow for uniform, modular sizing of sign types.

2) Rail Insert: Mount to back of Copy Panels to allow for attachment to Rail Back.

3) Copy Panels: Fabricate of ABS phopolymer acrylic aluminum materials to allow for different graphic needs to match existing Marion VA standards.

4) End Caps: Interlock to Rail Back to enclose and secure changeable Copy Panels.

5) Joiners and Accent Joiners: To connect separate Rail Backs together.

6) Top Accent Bars: To provide decorative trim cap that encloses the top of sign.

c. Provide rail back, rail insert and end caps in anodized extruded aluminum.

d. Provide signs in system that are convertible in the field to allow for enlargement from one (1) size to another in height and width through use of joiners or accent joiners, which connect rail back panels together blindly, providing a butt joint between copy panels. Connect accent joiners to rail backs with a visible 3 mm (1/8") horizontal rib, flush to the adjacent copy insert surfaces.

e. Provide sign configurations as indicated on construction documents that vary in width from 228 mm (9 inches) to 2032 mm (80 inches), and have height dimensions of 50 mm (2 inches), 76

mm (3 inches), 152 mm (6 inches), 228 mm (9 inches) and 305 mm (12 inches). Height that can be increased beyond 305 mm (12 inches), by repeating height module in full or in part.

2. Provide rail back functions as internal structural member of sign. Fabricate of 6063T5-extruded aluminum,anodized black.
   a. Fabricate to accept an extruded aluminum or plastic insert on either side, depending upon sign type.
   b. Provide components that are convertible in field to allow for connection to other rail back panels.
   c. Provide mounting devices including wall mounting with pressure sensitive tape and other mounting devices as needed.
3. Provide rail insert functions as mounting device for copy panels on to the rail back. The rail insert mounts to the back of the copy panel with adhesive suitable for attaching particular copy insert material.
   a. Provide copy panels that slide or snap into the horizontal rail back.
4. Provide copy panels that accept various forms of copy and graphics, and attach to the rail back with the rail insert. Provide copy panels fabricated of ABS plastic with integral color or an acrylic lacquer finish acrylic.
   a. Provide copy panels that are interchangeable by sliding horizontally from either side of sign, and to other signs in system of equal or greater width or height.
   b. Provide materials that are cleanable without use of special chemicals or cleaning solutions.
   c. Copy Panel Materials.
      1) ABS Inserts: 2.3 mm (.090 inches) extruded ABS plastic core with .07 mm (.003 inches) acrylic cap bonded during extrusion/texturing process.
         a) Pressure bonded to extruded rail insert with adhesive.
         b) Background Color: Integral or painted in acrylic lacquer.
         c) Finished: Texture pattern.
      2) Photopolymer Inserts: 3.2 mm (.125 inches) phenolic photo polymer with raised copy etched to 2.3 mm (.0937 inches), bonded to an ABS plastic or extruded aluminum insert with adhesive.

a) Background Color: Painted, acrylic enamel.

3) Changeable Paper/ Insert Holder: Extruded insert holder with integral rail insert for connection with structural back panel in 6063T5 aluminum with a black anodized finish.
   a) Inserts into holder are paper with a clear 0.76 mm (.030 inches) textured cover.
   b) Background Color: Painted, acrylic lacquer.
4) Acrylic - 2 mm (.080 inches) non-glare acrylic.
   a) Pressure bonded to extruded rail insert using adhesive.
   b) Background Color: Painted in acrylic lacquer or acrylic enamel.
5) Extruded 6063T5 aluminum with a black anodized finish insert holder with integral rail insert for connection with structural back panel to hold 0.76 mm (.030 inches) textured polycarbonate insert and a sliding tile which mounts in the inset holder and slides horizontally.

5. End Caps: Extruded using 6063T5 aluminum with a black anodized finish. End caps interlock with rail back with clips to form an integral unit, enclosing and securing the changeable copy panels, without requiring tools for assembly.
   a. Interchangeable to each end of sign and to other signs in signage system of equal height.
   b. Provide mechanical fasteners that can be added to the end caps that will secure it to rail back to make sign tamper resistant.
6. Joiners: Extruded using 6063T5 aluminum with a black anodized finish. Rail joiners connect rail backs together blindly, providing a butt joint between copy inserts.
7. Accent Joiners: Extruded using 6063T5 aluminum with a mirror polished finish. Connect joiner and rail backs together with a visible 3 mm (.125 inches) horizontal rib, flush to the adjacent copy panel surfaces.
8. Top Accent Rail: Extruded rail using 6063T5 aluminum with a mirror polished finish that provides a 3.2 mm (.125 inches) high decorative trim cap. Cap butts flush to adjacent copy panel and encloses top of rail back and copy panel.
9. Typography:
   a. Vinyl First Surface Copy (non-tactile): Applied vinyl copy.

b. Subsurface Copy Inserts: Textured 1 mm (.030 inches) clear polycarbonate face with subsurface applied vinyl copy.
   1) Spray face back with paint and laminated to extruded aluminum carrier insert.
c. Integral Tactile Copy Inserts: Phenolic photopolymer etched with 2.3 mm (.0937 inches) raised copy.
d. Silk-screened First Surface Copy (non-tactile): Injection molded or extruded ABS plastic and Aluminuminsert with first surface applied enamel silk-screened copy.

D. Tactile Sign:
1. Tactile sign made from a material that provides for letters, numbers and Braille to be integral with sign. Photopolymer etched metal, sandblasted phenolic or embossed material. Do not apply letters, numbers and Braille with adhesive.
2. Numbers, letters and Braille to be raised 0.8 mm (1/32 inches) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
3. Braille Dots: Conform with ANSI A117.1 for Braille position and layout; (a) Dot base diameter: 1.5 mm (.059 inches) (b) Inter-dot spacing: 2.3 mm (.090 inches) (c) Horizontal separation between cells: 6.0 mm (.241 inches) (d) Vertical separation between cells: 10.0 mm (.395 inches)
4. Paint assembly specified color. After painting, apply white or other specified color to surface of the numbers and letters. Apply protective clear coat sealant to entire sign.
5. Finish: Eggshell, 11 to 19 degree on a 60 degree glossmeter.

E. Provide cork or felt on bottom or mounting bracket when sign is mounted on counter or desk.

F. For ceiling mounted signs, provide mounting hardware on the sign that allows for sign disconnection, removal, reinstallation, and reconnection.

G. Glass Door and Side Light Graphics:
1. Provide text and graphics as first surface applied stylus cut vinyl.
2. Provide typeface, color, and spacing, with each message or message group on a single quick release backing sheet.

H. Dimensional Letters: as shown on elevations

1. Provide dimensional letters that are mill or laser cut acrylic in size and thickness indicated in construction documents.
2. Provide draft of letters perpendicular to letters face.
3. Fabricate letters with square corners, such as where a letter stem and bar intersect.
4. Paint letters with acrylic polyurethane.

J. Temporary Interior Signs:

1. Fabricated from 50 kg (110 pound) matte finished white paper cut to 101 mm (4 inch) wide by 305 mm (12 inch) long.
   a. Punched 3.2 mm (.125 inch) hole with edge of hole spaced 13 mm (.5 inch) in from edge and centered on 101 mm (4 inch) side.
   b. Reinforce hole on both sides with suitable material that prevents tie from pulling through hole.
   c. Ties: Steel wire 0.3 mm (0.120 inch) thick attached to tag with twist leaving 152 mm (6 inch) long free ends.
2. Mark architectural room number on sign, with broad felt marker in clearly legible numbers or letters that identify room, corridor or space as shown on construction documents.
3. Install temporary signs to rooms that have a room, corridor or space number. Attach to door frame, door knob or door pull.
   a. Doors that do not require signs are: corridor doors in corridor with same number, folding doors or partitions, toilet doors, bathroom doors within and between rooms, closet doors within rooms, communicating doors in partitions between rooms with corridor entrance doors.
   b. Replace and missing, damaged or illegible signs.

2.6 EXTERIOR SIGN TYPES:

A. General:

1. Fabricate signs that comply with VA Signage Design Guide.

B. Text and Graphics:

2. Non-illuminated Signs: Provide surface applied reflective white opaque vinyl graphics.

P. Non-illuminated Single Post Traffic Regulatory Sign:

1. Construct sign of extruded aluminum square post with aluminum plate sign panel.

2. Sign Panel: 3.2 mm (0.125 inch) aluminum plate with surface applied reflective vinyl traffic regulatory decals. Mechanically fasten to support post with tamper resistant fasteners.
3. Posts: Aluminum with minimum 3.2 mm (0.125 inch) wall thickness. Post caps to be welded or mechanically attached with concealed fasteners.
4. Provide reflective traffic control symbols complying to Department of Transportation, Manual for Uniform Traffic Control Devices in color, shape, proportions, text and symbols.

R. Non-illuminated Single Post Street Sign:
1. Provide sign constructed of extruded aluminum square post.
2. Posts: Extruded aluminum with minimum 3.2 mm (0.125 inch) wall thickness.

2.7 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. Provide necessary rebates, lugs and brackets for assembly of units. Provide concealed fasteners wherever possible.
C. Shop fabricate so far as practicable. Fasten joints flush to conceal reinforcement, or weld joints, where thickness or section permits.
D. Level and assemble contract surfaces of connected members so joints will be tight and practically unnoticeable, without applying filling compound.
E. 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). Restore texture to filed or cut areas.
F. Finish extruded members to be free from extrusion marks. Fabricate square turns, sharp corners, and true curves.

G. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Mitere edge joints to give appearance of solid material.

H. Do not manufacture signs until final sign message schedule and location review has been completed by the COR and forwarded to contractor.

I. Drill holes for bolts and screws. Mill smooth exposed ends and edges with corners slightly rounded.

J. Form joints exposed to weather to exclude water.

K. Movable Parts, Including Hardware: Cleaned and adjusted to operate as designed without binding or deformation of members. Center doors and covers in opening or frame.

1. Align contact surfaces fit tight and even without forcing or warping components.

L. Pre-assemble items in shop to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

M. Prime painted surfaces as required. Apply finish coating of paint for complete coverage with no light or thin applications allowing substrate or primer to show.

1. Finish surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.

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. At each sign location there are no utility lines behind each sign location that will be affected by installation of signs.

1. Correct and repair damage done to utilities during installation of signs at no additional cost to Government.

D. Provide inserts and anchoring devices which must be set in concrete or other material for installation of signs. Submit setting drawings, templates, instructions and directions for installation of anchorage devices, which may involve other trades.

E. 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.

F. When signs are installed on glass, provide blank glass back up to be placed on opposite side of glass exactly behind sign being installed. Provide blank glass back that is the same size as sign being installed.

G. Touch up exposed fasteners and connecting hardware to match color and finish of surrounding surface.

H. 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.

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SECTION 10 21 23
CUBICLE CURTAIN TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies cubicle curtain track (C.C.T.).

1.2 RELATED WORK:

A. Steel shapes for suspending track assembly: Section 05 50 00, METAL FABRICATIONS.

B. Acoustical ceiling tile and suspension systems Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS:

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

B. Samples:

1. 305 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop.
2. Clip anchor for fastening track to grid system of acoustical ceilings.
4. Curtain carrier for attaching curtain to track.

C. Shop Drawings: Showing layout of tracks and method of anchorage.

D. Manufacturer's Literature and Data:

1. Cubicle curtain track.
2. Intravenous support assembly.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location. Store so as to not bend or warp the tracks.

C. Do not open packages until contents are needed for installation, unless verification inspection is required.

1.5 WARRANTY:

A. Construction Warranty: Cubicle curtain tracks are subject to the terms of the Article “Warranty of Construction,” FAR clause 52.246-21.

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. 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)

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

C. Aluminum Association (AA):

DAF 45-09.....Designation System for Aluminum Finishes

D. American Architectural Manufacturers Association (AAMA):

2603-13.....Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

E. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS:

A. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221M (B221), alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.

D. Curtain Carriers: Nylon carriers, with nylon wheels on metal or nylon axles.

1. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain
2. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel.
3. Provide 2.2 carriers for every 305 mm (1 foot) of each section of each track length, plus one (1) additional carrier.

E. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.

F. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.

G. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Provide operating mechanism shall be removable with common tools.

2.4 FASTENERS:

A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.

B. Concealed Fasteners, Screws and Bolts: Stainless steel.

C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel.

1. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

2.5 FINISHES:

A. Aluminum: Finish numbers for aluminum specified are in accordance with AA DAF 45. AA-C22A31 finish, chemically etched medium matte with clear anodic coating, Class II Architectural, .01 mm (0.4 mils) thick.

B. Chrome/Nickel Plating: Satin or polished finish, ASTM B546, minimum thickness of chromium plate as follows:

1. 0.005 mm (0.2 mil) on copper alloys.
2. 0.01 mm (0.4 mil) on steel.

C. Stainless Steel: No. 4 in accordance with NAAMM AMP 500.

D. Baked Enamel or Powder Coat Finish: AAMA 2603.

2.6 FABRICATION:

A. Weld and grind smooth joints of fabricated components.

B. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4877 mm (16 feet) without joints. Form corner bend on a 305 mm (12 inch) radius.

C. Provide steel anchor plates, supports, and anchors for securing components to building construction.

D. Form flat surface without distortion.

E. Shop assemble components and package complete with anchors and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install tracks after finish painting and ceiling finishing operations are complete.

B. Install track level and hangers plumb and securely anchor to the ceiling to form a rigid installation.

C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 610 mm (24 inches) on center.

D. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 3 mm (1/8-inch) diameter fastenings or concealed clips spaced not more than 914 mm (3 feet) on center.

E. Install suspended track 2210 mm (87 inches) above the finished floor, with hangers spaced no more than 1219 mm (4 feet) on center. At ceiling line, provide flange fittings secured to hangers with set screws. Secure track to walls with flanged fittings and to hangers with special fittings.

F. Fasten end stop caps to prevent them from being forced out by the striking weight of carriers.

H. Remove damaged or defective components and replace with new components or repair to the original condition.

I. Install track rigid, plumb, level and true, and securely anchored to the overhead construction.

J. Verify that carrier units operate smoothly and easily over the full range of travel.

- - - E N D - - -

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies wall guards, handrail/wall guard combinations, corner guards and door/door frame protectors.

1.2 RELATED WORK:

B. Structural Steel Corner Guards: Section 05 50 00, METAL FABRICATIONS.

C. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.

D. Color and texture of aluminum and resilient material: See material schedule on sheet A800.

1.3 QUALITY ASSURANCE:

A. Manufacturer’s Qualifications: Manufacturer with a minimum of three (3) years’ experience in providing items of type specified.

1. Obtain wall and door protection from single manufacturer.

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.

C. Shop Drawings: Show design and installation details.

D. Manufacturer's Literature and Data:

1. Handrail/Wall Guard Combinations.
2. Wall Guards.
3. Corner Guards.
4. Door/Door Frame Protectors.

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: 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):

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

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. Aluminum Association (AA):

DAF 45-09.....Designation System for Aluminum Finishes

D. American Architectural Manufacturers Association (AAMA):

611-14.....Anodized Architectural Aluminum

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 National Association of Architectural Metal Manufacturers (NAAMM):

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

G. National Fire Protection Association (NFPA):

80-13.....Standard for Fire Doors and Windows

H. SAE International (SAE):

J 1545-05(R2014).....Instrumental Color Difference Measurement for Exterior Finishes.

I. Underwriters Laboratories Inc. (UL):

Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Stainless Steel: A240/A240M, Type 304.

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

C. 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 resilient material for protection on fire rated doors and frames assemblies that is listed by the testing laboratory performing the tests.
   f. Provide resilient material installed on fire rated wood/steel door and frame assemblies that have been tested on similar type assemblies. Test results of material tested on any other combination of door and frame assembly are not acceptable.
   g. 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.

B. Fabricate stainless steel corner guards of 1.27 mm (.05 inch) thick material conforming to ASTM A240/A240M, Type 304. Install corner guards from floor to ceiling Unless otherwiseindicated on construction documents.

2.3 WALL GUARDS AND HANDRAILS: TO MATCH MARION VA STANDARD OR EQUAL.

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. Wall Guards:
   a. Snap-on covers of resilient material, minimum 2.54 mm (0.100-inch) thick. free-floated over a continuous extruded aluminum retainer, minimum 2.03 mm (0.080-inch) thick anchored to wall at maximum 610 mm (24 inches) on center
3. 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.

B. Aluminum Wall Guards: Extruded aluminum, closed tubular bumper assembly mounted on wall brackets.

1. Provide wall bumper with factory fabricated end closure caps, and inside and outside corner assemblies, concealed splice plates, and other accessories standard with the manufacturer.
2. Fabricate tubular wall guards from material with a nominal wall thickness of 6.35 mm (0.250-inch), form grooves for and provide two (2) strips of continuous polyvinyl chloride cushion bumper inserts.
3. Fabricate adjustable wall brackets from aluminum having a nominal wall thickness of 5.08 mm (0.20-inch). Fasten bumper to brackets

with 6.35 mm (1/4-inch) diameter aluminum or stainless steel bolts with locknuts.

C. Stainless Steel Wall Guards: Construct wall guard, including brackets, of minimum 4.76 mm (0.1875-inch) thick stainless steel.

2.4 DOOR AND DOOR FRAME PROTECTION: SEE HDWR SCHEDULE AND SPEC SECTION 087100

2.6 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.

2.7 FINISH:

B. Aluminum: In accordance with AA DAF-45.

1. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

C. Stainless Steel: In accordance with NAAMM AMP 500 finish Number 4.

D. 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 STAINLESS STEEL CORNER GUARDS:

A. Mount guards on external corners of interior walls, partitions and columns as shown on construction documents.

B. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow curing undisturbed for 24 hours.

3.3 RESILIENT HANDRAILS

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

3.4 ALUMINUM WALL GUARDS

A. Secure brackets to walls with fasteners, spaced in accordance with manufacturer's installation instructions.

3.5 STAINLESS STEEL WALL GUARDS

A. Space brackets at not more than 914 mm (3 feet) on centers and anchor to the wall in accordance with manufacturer's installation instructions.

3.6 DOOR, DOOR FRAME PROTECTION AND HIGH IMPACT WALL COVERING

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

B. Install protectors after frames are in place but preceding installation of doors in accordance with approved shop drawings and manufacturer’s specific instructions.

C. Apply with adhesive in controlled environment according to manufacturer’s recommendations.

D. Protection installed on fire rated doors and frames to be installed according to NFPA 80 and installation procedures listed in UL Building Materials Directory; or, equal listing by other approved independent testing laboratory establishing the procedures.

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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 RELATED REQUIREMENTS

A. Color of finishes: See A-Series drawings on enlarged plans for schedule of accessories.

1.3 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. B30-14a - Copper Alloys in Ingot Form.
7. B75/B75M-11 - Seamless Copper Tube.
8. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

9. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
10. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
11. B824-14 - General Requirements for Copper Alloy Castings.
12. C1036-11e1 - Flat Glass.
13. C1048-12e1 - Heat-Strengthened and Fully Tempered Flat Glass.
14. D635-14 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
15. 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.

1.4 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.
1. Soap dispensers: Certify soap dispensers are fabricated of material that will not be affected by liquid soap, aseptic detergents, and hexachlorophene solutions.

F. Qualifications: Substantiate qualifications comply with specifications.

G. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Regularly manufactures specified products.

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 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 MATERIALS

A. Aluminum: ASTM B221M (ASTM B221), Alloy 6063-T5 and Alloy 6463-T5.
B. 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.
C. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.
D. Chrome Plating (Service Condition Number SC 2): ASTM B456.
E. Brass Castings: ASTM B30.
F. Copper:
   1. Tubing: ASTM B75/B75M.
   2. Castings: ASTM B824.
G. Glass:

1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors, and for mirror doors in medicine cabinets.
2. ASTM C1036, Type 1 Class 1 Quality q3, for shelves in medicine cabinets.
3. ASTM C1048, Kind FT, Condition A, Type 1, Class 1 for glass and mirrors in Mental Health and Behavior Patient Care Units, and Security Examination Rooms.

2.2 PRODUCTS - GENERAL

A. Basis of Design: See A-series drawings enlarge plans for more info.

B. Provide each product from one manufacturer.

C. Products Used Within Mental Health and Behavioral Patient Care Units:
   1. Provide accessories free of anchor points.
   2. Design accessories for attachment with tamper resistant hardware.

2.3 COMBINATION PAPER TOWEL DISPENSER AND DISPOSAL UNITS

A. semi-recessedtype.

B. Dispensing capacity for 400 sheets of any type of paper toweling.

C. Fabricate of stainless steel.

D. Form face frames, from one piece.

E. Provide each door with continuous stainless steel piano hinge and tumbler lock, keyed alike.

F. Provide removable waste receptacle approximately 40 L (10.5 gal.) capacity, fabricated of 0.45 mm (0.02 inch) thick stainless steel.

2.4 TOILET TISSUE DISPENSERS

A. Double roll surface mounted type.

B. Mount on continuous backplate.

C. Removable spindle ABS plastic or chrome plated plastic.

D. Wood rollers are not acceptable.

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 or nylon coated steel, use one type throughout project:
   1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.

2. Nylon Coated Steel: Grab bars and flanges complete with mounting plates and fasteners. SCHEDULE FOR FINISHES.See or equal fixture schedule on drawings.

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.
      b. Nylon coated bars, minimum 1.5 mm (0.06 inch) thick.
   2. Fabricate in one continuous piece with ends turned toward walls.
      a. Swing up grab bars and grab bars continuous around three sides of showers may be fabricated in two sections, with concealed slip joint between.
   3. Continuously weld intermediate support to grab bar.
   4. Swing Up Bars: Manually operated; designed to prevent bar from falling when in raised position.

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. Flange for Exposed Mounting:
   1. Minimum 5 mm (3/16 inch) thick, maximum 79 mm (3-1/8 inch) diameter.
   2. Insert grab bar through flange and continuously weld perimeter of grab bar flush to backside of flange.
   3. Where mounted on toilet partitions, provide three equally spaced, countersunk holes, sized to accommodate 5 mm (3/16 inch) diameter bolts.

G. 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.
3. Provide spreaders, through bolt fasteners, and cap nuts, where grab bars are mounted on partitions.
4.

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.

C. Clothes Hooks Used In Mental Health And Behavioral Patient Care Units: Provide units free of anchor points and secured to the wall using tamper resistant hardware.

2.7 METAL FRAMED MIRRORS

A. Fed. Spec. A-A-3002 metal frame; anodized aluminum, or stainless steel. All restroom accessories are to be of the same finish.

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.
   4. Attached Shelf for Mirrors:
      a. Fabricate shelf of same material and finish as mirror frame.
      b. Make shelf maximum 150 mm (6 inches) in depth, and extend full width of mirror.

c. Close ends and front edge of shelf to same thickness as mirror frame width.

d. Form shelf for aluminum framed mirror as integral part of bottom frame member.

e. Form stainless steel shelf with concealed brackets to attach to 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.

F. Metal Framed Mirrors used in Mental Health and Behavioral Patient Care Units: Provide shatter proof glass or polished stainless steel units.

2.8 SOAP DISHES

A. Fed. Spec. WW-P-541/8B, Type VI, Holder.

B. Class 1, Soap, Surface Mounted:

1. One piece with provisions for exposed fasteners.
2. Fabricate from chromium plated brass approximately 115 by 95 mm (4 1/2 by 3-3/4 inches) overall size with drainage openings at bottom.

C. Soap, Recessed:

1. One piece seamless shell and flange with provisions for concealed fasteners.
2. Fabricate from 0.8 mm (0.031 inch) thick stainless steel or chromium plated brass.
3. Form surface of soap tray with raised ridges or patterned dimples to provide gripping surface for soap bar, or provide flush soap tray with a retaining lip. Plastic soap trays or tray inserts are not acceptable.

2.9 MOP RACKS

A. Minimum 1016 mm (40 inches) long with five holders.

B. Clamps:

1. Minimum of 1.3 mm (0.05 inch) thick stainless steel bracket retaining channel with hard rubber serrated cam; pivot mounted to channel.
2. Clamps to hold handles from 13 mm (1/2 inch) minimum to 32 mm (1-1/4 inch) maximum diameter.

C. Support:

1. Minimum 1 mm (0.04 inch) thick stainless steel hat shape channel to hold clamps away from wall as indicated.
2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.

D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.

2.10 STAINLESS STEEL SHELVES (TYPE 44)

A. Shelves:

1. Fabricate shelves of 1.2 mm (0.0478 inch) thick sheet to size and design indicated on Drawings.
2. Fabricate shelves of hollow metal type construction, forming a depressions indicated, with closed fronts, backs, ends and bottoms. Reinforce shelves with 1.2 mm (0.05 inch) thick sheet steel hat channel stiffeners, full depth, welded to underside of top at bracket locations.
3. Miter cuts, where made at corners of shelves, continuously welding.

B. Form brackets of 3 mm (1/8 inch) thick steel as shown. Drill brackets for 6 mm (1/4 inch) anchor bolts.

C. Weld or Screw brackets to shelves.

2.11 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. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.

G. Hot-dip galvanized steel or stainless steel, anchors and fastening devices.

H. Shop assemble accessories and package with components, anchors, fittings, fasteners and keys.

I. Key items alike.

J. Provide templates and rough-in measurements.

K. Round and deburr edges of sheets to remove sharp edges.

2.12 FINISH

A. Steel Paint Finish:

1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
   a. One coat primer.
   b. One coat thermosetting topcoat.
   c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
   d. Color: P-1 unless otherwise noted on drawings.

B. Nylon Coated Steel: Nylon coating powder formulated for fluidized bonding process to steel to provide hard smooth, medium gloss finish, minimum 0.3 mm (0.012 inch) thick, rated as self-extinguishing when tested according to ASTM D635.

C. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.

D. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.

E. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.13 ACCESSORIES

A. Fasteners:

1. Fasteners in Mental Health and Behavioral Patient Care Units: Tamper resistant hot-dipped galvanized or stainless steel.
2. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
3. Concealed Fasteners:
   a. Shower, Bath Tubs, and High Moisture Areas: Stainless steel.
   b. Other Locations: Steel, hot-dipped galvanized.

4. Toggle Bolts: For use in hollow masonry or frame construction.
5. Sex bolts: For through bolting on thin panels.
6. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
7. 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.

E. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.

F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance.

G. Align mirrors, dispensers and other accessories even and level, when installed in battery.

H. Install accessories to prevent striking by other moving, items or interference with accessibility.

I. Install accessories in Mental Health and Behavioral Units with tamper resistant screws that are flush mounted so that they will not support a rope or material for hanging.

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. See drawings.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. Acrylic glazing: Section 08 80 00, GLAZING.

B. Field Painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION PUBLICATIONS

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

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

D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

Recessed type with flat trim of size and design shown.

2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
2. Design doors to open 180 degrees.
3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

A. Finish interior of cabinet body with baked-on semigloss white enamel.

B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

PART 3 - EXECUTION

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

B. Install cabinet so that bottom of cabinet is 914 mm (36 inches) above finished floor.

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SECTION 11 41 21
WALK-IN COOLERS AND FREEZERS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies walk-in site assembled, refrigerators and freezers.

1.2 RELATED WORK:

A. Section 09 30 13, CERAMIC TILING: Quarry tile floor.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

F. Refer to the construction documents for the refrigeration equipment schedules and installation details.

H. Refer to Division 26, ELECTRICAL for lighting and power requirements.

1.3 WARRANTY:

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

B. Refrigeration Compressor Warranty: Manufacturer Submit compressor warranty.

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. Walk-in units, including assembly instructions.
2. Condensing units, with mounting rack where required.
3. Unit coolers.
4. Temperature controls and alarms.
5. Diagrams and details of piping, wiring and controls.

C. Operational test reports.

D. Final field test reports.

E. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

F. Manufacturer’s compressor warranty.

1.5 APPLICABLE PUBLICATIONS:

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

B. Air-Conditioning and Refrigeration Institute (ARI):

420-08	Unit Coolers for Refrigeration.
520-04	Performance Rating of Positive Displacement Condensing Units.

C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):

15-10	Safety Standard for Refrigeration Systems

D. ASTM International (ASTM):

A240/A240M-14	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications
E84-11	Surface Burning Characteristics of Building Materials

E. National Sanitation Foundation/American National Standard (NSF/ANSI):

7-09	Commercial Refrigerators and Storage Freezers

F. National Fire Protection Association (NFPA):

70-14	National Electric Code

G. Underwriters Laboratories, Inc. (UL):

207-08(R2014)	Refrigerant-Containing Components and Accessories, Nonelectrical
471-10(R2014)	Commercial Refrigerators and Freezers
1598-03(R2012)	Luminaires

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

A. NSF Standards: Provide equipment that bears NSF Certification Mark certifying compliance with applicable standards.

B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and

casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

C. Regulatory Requirements: Install equipment to comply with the following:
   1. ASHRAE 15, “Safety Code for Mechanical Refrigeration.”
   2. NFPA 70, “National Electric Code.”

2.2 WALK-IN REFRIGERATOR/FREEZER CONSTRUCTION:

A. General: Prefabricated, sectional, all-metal clad, modular, designed for easy accurate field assembly.

B. Provide walk-in units manufactured for food service use conforming to NSF/ANSI 7, UL 207, and UL 471. Floorless, with insulated floor screeds, installed under elevated slab..

C. Panel Construction:
   1. General: Interchangeable, 1219 mm (48 inch) maximum width, 101 mm (4 inch) thick, filled with insulation. Double seal serrated neoprene rubber gaskets to assure air and vapor tight joints.
   2. Corner panels: 90 degree angle, radiuses 15 mm (0.5 inch) inside and outside, with 305 mm (12-inch) dimensions each side.
   3. Panel edges: Foam-in-place, tongue-and-grooved urethane to assure tight joints. Provide double seal serrated neoprene rubber gaskets to assure air and vapor tight joints on the interior and exterior of each panel along every tongue.
   4. Insulation: 101 mm (4 inch) minimum foamed-in-place polyurethane with manufacturer’s rated “K” factor of not more than 0.15, free rise design of not less than 27 kg per cubic meter (1.7 pounds per cubic foot), or in-place density of not less than 32 kg per cubic meter (2 pounds per cubic foot). Provide floor screeds with minimum of 63 mm (2-1/2 inches) of foamed insulation.
   5. Door Panel and Door:
      a. Provide channel thermal breaker type reinforcing steel frame around the entire perimeter of the door opening.

b. Door to be an infitting flush-mounted type with dual flexible blade wiper gasket on the bottom, and a replaceable magnetic gasket on the top edge and along both sides.
c. Provide heated, double glass view windows in refrigerator doors.
d. Door to be equipped with a minimum of three (3) hinges, for rough usage including aluminum diamond plate on inside of door panel and frame to a height of 915 mm (36 inches).
e. Provide hydraulic exterior door closer to prevent slamming and assure secure closing.
f. Door hinges and latch and strike assembly: Manufacturer's standard, self-closing cam-lift type hinges, for 1219 mm (48 inch) door, chrome plated or polished aluminum finish, made to provide for locking, but with an inside safety release mechanism to prevent anyone from being locked inside when door is locked from outside.
g. Concealed, energy use selective, anti-sweat heater wire circuit: Provide sufficient heat to prevent condensation and frost formation at the door jambs and exterior edges of the door on all sides.
h. Thermometer: Manufacturer's standard, 50 mm (2-inch) minimum diameter, dial type, flush mounted in door panel.

6. Pressure relief port: Provide for all freezers operating at 18 degree C (0 degree F), or lower, two-way type ports, to allow for an increase or decrease of air pressure on the interior of the freezer to equalize with air pressure on the exterior. Provide ports with automatically controlled, UL approved anti-sweat heaters. Complete device to carry UL Label and be assembled ready for connection. Install port in a wall panel away from the direct air stream flowing from the coils.
8. Floorless Refrigeration Floors:
   a. Make floorless refrigerator floors flush with the surrounding building floor. Provide the built-in floor with two (2) 50 mm (2 inch) thick polyurethane board insulation

with staggered joints set in mastic. Under the floor deck on elevated slab below.

9. Floor Finish: Non-slip quarry tile with cove base on grout flush with adjoining floor. Refer to Section 09 30 13, CERAMIC PORCELAIN TILING for quarry tile work. See color and material shield for alternate floor finish.

D. Wherever compartment dimension exceed clear-span ability of ceiling panels, provide I-beam support on exterior of ceiling or spline-hangers. Install 13 mm (1/2 inch) diameter steel rods through beam/hangers and secure to structure above. Beams or posts within compartments are not acceptable.

E. Rub rail wall protectors: Manufacturer’s standard, at floor line of walls exposed to traffic.

F. Lights: Provide high-efficiency rated two-tube fluorescent lamps in vapor-proof fixtures with safety shields. Lighting must conform with UL 1598. Provide diffuser and ballast capable of operating in minus 23 degrees C (10 degrees F) temperature. Lights must run full length of walk-in starting 610 mm (24 inches) from front panel and extending within 610 mm (24 inches) of back panel. Run between shelf rows to obtain 323 lux (30 foot-candles) at floor level regardless of any interior furnishings.

2.3 CONDENSING UNITS:

A. Comply with ARI Standard 520. Air cooled type as shown in construction documents.

B. Provide motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls.

C. Receiver capacity not to be less than 125 percent of system refrigerant charge.

D. For units racked above each other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1143 mm (45 inches) above the floor.

E. Provide two (2) condensing units and unit coolers with independent refrigeration systems for freezer when shown on

construction documents or recommended by manufacturer due to size or freezer.

F. Do not locate compressors on top of refrigerators or freezers.

G. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.

H. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance. Provide inherent protection, in compressor terminal box, for each phase of motor.

I. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.

J. Air Cooled Condensing Units:

1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions. Designed and weather-proofed for outdoor installation, to operate satisfactorily at winter ambient temperatures down to -12 degrees C 12 degrees F), and be provided with crankcase and receiver heaters.

2. The condenser fans are to be driven by permanent split capacitor motors.

2.4 UNIT COOLERS:

A. Comply with ARI Standard 420. Units to be UL listed, forced-ventilation type. Provide integral defrosting, internal or external refrigerant distributor, single or multiple fans and motors, drip-pan, deflectors, aluminum or baked-enamel steel housing, hangers, and all accessories.

B. Motors: Permanent split capacitor type in accordance with mechanical drawings spec. Provide motors with thermal overload protection and manual starting switch.

C. Drain Pans: Galvanized sheet steel. Provide additional drain pans under uncovered refrigerant connections, and interconnect them with main drain pan. For freezer units provide electrically heated drain pan.

D. Defrost Provision:

1. Refrigerators: Defrost to occur during compressor off cycle with evaporator fan running continuously.

2.5 MONITORING ALARM SYSTEM:

A. Provide an electronic monitoring and alarm system for each section of each unit.
   1. System Components: Detecting thermostat, master control panel, interconnecting wiring, remote audible alarm, and defrost compensator. Provide dials showing temperatures and pilot lights, warning lights, switches, transformer, and buzzer, all as a part of the master control panel. Locate master control panel and remote audible alarm as indicated on construction documents. Provide power fuse to protect system components.
   2. System Operation: Set alarms at 5 degrees C (10 degrees F) above and below specified operating temperatures.

B. Personnel Alarm: For each unit, provide separate audible alarm system operable from inside unit, for use of personnel unable to exit unit. Locate remote audible alarm where indicated on construction documents.

2.6 EQUIPMENT IDENTIFICATION REQUIREMENTS:

A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Identify all walk-ins, refrigeration equipment and alarm devices.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Assemble walk-in units and install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal all panel penetrations to prevent condensation or frosting.
   1. Unit cooler: NSF approval requires that the unit be suspended at 90 mm (3-1/2 inches) minimum distance below the ceiling to allow cleaning the top of the unit cooler.
   2. Mount pipe, conduit, and instrumentation on the exterior and pass thru neatly drilled penetrations to the lights or other devices.

B. Piping, Pipe Insulation and Refrigerant: Provide in accordance with other relevant spec sections.

C. Controls Installation: As specified in Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

3.2 REFRIGERATOR/FREEZER START-UP, AND PERFORMANCE TESTS AND INSTRUCTIONS:

A. Initial Start-up and Operational Test:
   1. Provide all lubricants and accessories before initial start-up. Start and operate all equipment.
   2. Follow the manufacturer’s procedures and place the systems under all modes of operation.
   3. Supplement initial charges of lubricating oil to assure maximum operating capacity.
   4. Adjust all safety and automatic control instruments. Record manufacturer’s recommended readings hourly.
   5. Operational tests must cover a period of not less than three (3) days. Submit operational test report.

B. Test Reports: Submit the final field test reports for each system tested, describing test apparatus, instrumentation calculations, and equipment data based on industry standard forms. Include in data:
   1. Compressor and air moving device ampere readings.
   2. Power supply characteristics, including phase imbalance, with 1/2 percent accuracy.
   3. Thermostatic expansion valve superheat-value as determined by field test.
   4. Sub-cooling.
   5. High and low refrigerant temperature switch set-points.
   6. Monitoring alarm system.
   7. Low oil pressure switch set-point.
   8. Defrost system timer and thermostat set-points.
   9. Moisture content.
   10. Ambient, condensing and coolant temperatures.
   11. Capacity control set-points.
   12. Field data and adjustments which affect unit performance and energy consumption.

13. Where final adjustments and settings cannot be permanently marked or drilled and pinned as an integral part of device, include adjustment and setting data in test report.

C. By arrangement with the Contracting Officer Representative (COR), 24 hours in advance, use the start-up and test period for required operation and maintenance instructions to VA personnel in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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SECTION 11 53 13
LABORATORY FUME HOODS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section includes chemical (general-purpose) hoods, radioisotope hoods, and perchloric acid hoods.

1.2 DEFINITIONS:

A. Chemical or General-Purpose Hoods

1. BYPASS HOOD: A hood that contains openings above the sash and below the airfoil, which redistribute the air to reduce fluctuations in face velocity and turbulence within the hood, when the sash is re-positioned.
2. LOW-VELOCITY HOOD: A high-performance hood that yields energy savings by reducing the sash opening and the corresponding exhaust volume, while maintaining safe containment levels with the sash raised for set-up and face velocity as low as 0.30 m/s (60 fpm).

1.3 RELATED WORK:

A. Section 12 31 00, MANUFACTURED METAL CASEWORK; for cabinetry below laboratory fume hoods.
B. Section 22 11 00, FACILITY WATER DISTRIBUTION: Plumbing connections.
C. Section 22 13 00, FACILITY SANITARY AND VENT PIPING: Plumbing connections.
D. Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY and HEALTHCARE FACILITIES: Plumbing connections.
E. Section 22 63 00, GAS SYSTEMS FOR LABORATORY and HEALTHCARE FACILITIES: Connections to gas and vacuum systems.
F. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
G. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION EQUIPMENT: Integral blowers on hoods.
H. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Face velocity sensor controller.
I. Section 23 34 00, HVAC FANS.
J. Section 23 36 00, AIR TERMINAL UNITS: Airflow control valves.
K. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Electrical connections.
L. Section 26 27 26, WIRING DEVICES: Electrical devices.
M. Section 26 29 11, MOTOR CONTROLLERS: Motor controllers.

1.4 PERFORMANCE REQUIREMENTS:

A. Average face velocity for low velocity laboratory fume hoods can be as low as 0.3 m/s (60 fpm) with sash located at the average low velocity hood sash stop height of 304 to 457 mm (12 to 18 inches).

B. Containment: Furnish and install laboratory fume hoods that are tested according to ASHRAE 110 at a release rate of 4.0 L/min (0.14 CFM).

1. Face Velocity Variation: Allowable variation threshold is not more than +-10% of average face velocity.
2. Sash Position:
   a. For horizontal-sash units, test with maximum opening on side, with maximum opening in the center, and with opening at each side equal to half of maximum opening.
   b. For combination-sash units, test with sash fully raised, with maximum opening on side, with maximum opening in the center, and with opening at each side equal to half of maximum opening.
   c. For vertical sash units, test with sash fully open, and at typical sash stop height of 457 mm (18 inches).
3. As-Manufactured (AM) Rating: AM 0.05 mg/L (0.05 ppm).
4. As-Installed (AI) Rating: AI 0.05 mg/L (0.05 ppm).

C. Average Static-Pressure Loss: Not more than 93 Pa (3/8-inch wc) at 0.51 m/s (100 fpm) face velocity when tested according to SEFA 1.2.

1.5 QUALITY ASSURANCE:

A. Manufacturer’s Qualifications: Manufacturer with a minimum of three (3) years’ experience in providing items of types specified. Submit manufacturer’s qualifications.

B. Installer’s Qualifications: Installers who have with a minimum of three (3) years’ experience in the installation of units required for this project. Submit installer qualifications.

C. Digital electronics devices, software and systems to be the current generation of technology that has a proven satisfactory service record of at least three (3) years.

1.6 SUBMITTALS:

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

B. Manufacturer's Literature and Data: Include the following:

1. Illustrations and descriptions of laboratory fume hoods and factory-installed devices for fume hoods.
2. Catalog or model numbers for each item incorporated into the work.
3. Static-pressure losses and exhaust volumes for fume hoods.
4. Results of testing according to ASHRAE 110.

C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.

D. Field Test Reports: Indicate dates and times of tests and certify test results.

E. Factory Test Reports: Provide manufacturer’s QC checklist or other reports that indicate comprehensive factory testing has been performed, and the results of these tests have been certified.

F. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

G. Manufacturer’s qualifications.

H. Installer’s qualifications.

I. Manufacturer’s warranty.

1.7 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer Submit manufacturer warranty.

1.8 APPLICABLE PUBLICATIONS:

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

B. American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ANSI/ASHRAE):

110-1995.....Method of Testing Performance of Laboratory Fume Hoods

C. Scientific Equipment and Furniture Association (SEFA):

1-05.....Recommended Practices for Laboratory Fume Hoods

2-10.....Recommended Practices for Installation

D. National Fire Protection Association (NFPA):

45-2011.....Standard on Fire Protection for Laboratories using Chemicals

PART 2 – PRODUCTS

2.1 FUME HOODS, GENERAL:

A. Furnish and install laboratory fume hoods that comply with recommendations in SEFA 1.

B. Factory install service fixtures and electrical devices as shown on the construction documents.

C. Ductwork: All ductwork shall be stainless steel. Refer to Section 23 31 00, HVAC DUCTS and CASINGS.

D. Face Velocity Controller (VAV Fume hoods): Provide fume hood exhaust controllers to control a damper in the hood discharge to maintain the velocity through the open face of the hood regardless of sash position. Refer to Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

E. Gas, Air, and Vacuum Service Fixtures: Remote controlled; with valve identified by index button; with serrated tip outlets; color-code valves and outlets. Section 22 63 00, GAS SYSTEMS FOR LABORATORY and HEALTHCARE FACILITIES.

F. Water Service Fixtures: Remote controlled, with integral vacuum breaker and as follows:

1. Turret 152.4 mm (6 inch) swivel gooseneck Turret and 152.4 mm (6 inch) swivel gooseneck outlet.
2. Epoxy-coated brass.
3. Refer to Section 22 11 00 FACILITY WATER DISTRIBUTION.

G. Service-Fixture Color-Coding: Color-code service fixtures as follows:

Service	**Color**
Water	Dark Green
Air	Orange
Gas	Dark Blue
Vacuum	Yellow

H. Lighting Fixtures:

1. Vapor proof Fixtures: 120-V LED.

2. Explosion-Proof Fixtures: 120-V LED. Fixtures shall be shipped loose for field wiring and installation.

I. Receptacles and Switches: Include junction box and cover plate. Refer to Section 26 27 26, WIRING DEVICES.
   1. Duplex Receptacles: 120 V, single phase,20 A, 2-pole, 3-wire.
   2. Single Receptacles: 250 V, single phase, 20 A, 2-pole, 3-wire.
   3. Ground Fault Interrupter (GFI) Duplex Receptacles: Integral unit with 2-pole, 3-wire, 120-V, 20-A receptacle.
   4. Lighting Fixture Switches: Toggle, single pole, 120-277 V, 20 A.
   5. Switches with Receptacles: Single-pole switch to control lighting fixtures and 120-V, 15-A, 2-pole, 3-wire single receptacle.
   6. Switches with Neon Pilots: Single-pole toggle turns on pilot light, which indicates switch and load are "on"; 120 V, 15 A.
   7. Motor Controller Switches: Double-pole switch with pilot light and thermal-overload protection. Refer to Section 26 29 11, MOTOR CONTROLLERS.

J. Airflow Monitor: With audible alarm and warning light. Provide digital type unit with alarm contacts to allow connection to the DDC control system to facilitate remote monitoring. Refer to Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

K. Airflow Control Valve (VAV Hoods): Refer to Section 23 36 00, AIR TERMINAL UNITS.

2.2 BYPASS FUME HOODS:

A. Airflow Systems: Bypass. Hoods served by variable air volume exhaust systems to include a, factory install bypass block to restrict the bypass of air and allow reduction of the exhaust air volume as the sash is lowered while maintaining a constant face velocity.

B. Liners:Stainless Steel Type 304, No. 4 finish.

C. Work Surfaces: Epoxy resin.

D. Sinks: Epoxy resin.
   1. Cup Sinks: Equip with Diametre Nominal (DN) 40 (Nominal Pipe Size (NPS) 1-1/2 inch) tailpiece, sink stopper, and P trap.
   2. Laboratory Sinks: Equip with DN 40 (NPS 1-1/2 inch) sink outlet, sink stopper, beehive overflow, and P trap.

E. Lighting Fixtures: Vapor proof .

F. Blowers: Remote; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open. Blowers to be

constructed with chemical-resistant coating. Refer to Section 23 34 00, HVAC FANS.

G. Sashes: Combination type; fully tempered safety glass.
   1. Accessories: Sash stops, commonly installed 457 mm (18 inches).

H. Bases:Cabinet. Refer to Section 12 31 00, MANUFACTURED METAL CASEWORK.

2.6 LOW VELOCITY FUME HOODS:

A. Airflow Systems: Restricted Bypass. For hoods served by variable air volume exhaust systems, provide a factory installed bypass block to further restrict the bypass and allow reduction of the exhaust air volume as the sash is lowered while maintaining a constant face velocity.

B. Liners: Stainless steel, Type 304, finish.

C. Work Surfaces: Epoxy
   1. Cup Sinks: Equip with DN 40 (NPS 1-1/2) tailpieces, sink stoppers, and P traps.

D. Lighting Fixtures: Vapor-proof.

E. Blowers: Remote; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open (sized at the reduced average face velocity the hood is rated for). Blowers to be constructed with chemical chemical-resistant coating. Refer to Section 23 34 00 HVAC FANS.

F. Sashes: Combination Type; fully tempered safety glass
   1. Accessories: Sash stops, commonly installed at 457 mm (18 inches).

G. Bases: Cabinet. Refer to Section 12 31 00, MANUFACTURED METAL CASEWORK.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install laboratory fume hoods to comply with SEFA 2.

B. Locate unit away from fans, heating and air conditioning registers, laboratory hoods, high traffic areas and doors that could interfere with airflow patterns.

3.2 TESTS:

A. Field test installed laboratory fume hoods according to ASHRAE 110 to verify compliance with performance requirements for containment.
   1. For units that fail testing, make adjustments and corrections to installation, or replace fume hoods, and repeat tests until fume hoods comply with requirements.

3.3 PROTECTING AND CLEANING:

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

B. At the completion of work, clean equipment as required to prepare for use.

3.4 INSTRUCTIONS:

A. Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS. Training must be provided by Manufacturer or Installer.

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SECTION 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section includes cloth shades, vertical blinds and venetian blinds. Provide window shades complete, including brackets, fittings and hardware.

1.2 RELATED WORK:

A. Refer to drawings material schedule for or equal to selection sheet A800.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualification: Submit evidence that the manufacture has a minimum of three (3) years’ experience in providing item of type specified, and that the blinds have performed satisfactorily on similar installations. Submit qualifications.

B. Submit qualifications for installers who are trained and approved by manufacturer for installation of units provided.

C. Electrical Requirements:

1. NFPA 70 Article 100.
2. Listed and labeled in accordance with UL 325.
3. Marked for intended use, and tested as a system.
4. Individual testing of components is not acceptable in lieu of system testing.

1.4 SUBMITTALS:

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

B. Samples:

1. Shade cloth, each type, 610 mm (24 inch) square, including cord and ring, showing color, finish and texture.

C. Manufacturer's literature and data; showing details of construction and hardware for:

Cloth and window shades

D. Shop Drawings: Provide fabrication and installation details for cloth shades, including shade cloth materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

E. Fire Testing: Submit report of flame spread and smoke developed during product material tests by independent testing laboratory.

F. Manufacturer’s warranty.

1.5 WARRANTY:

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

1.6 APPLICABLE PUBLICATIONS:

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

B. Federal Specifications (Fed. Spec.):

AA-V-00200B.....Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories

C. ASTM International (ASTM):

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

B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

G21-13.....Determining Resistance of Synthetic Polymeric Materials to Fungi

D. National Electric Manufacturer’s Association (NEMA):

ICS 6-93(R2006).....Industrial Control and Systems Closures

E. National Fire Protection Association (NFPA):

70-14.....National Electrical Code (NEC)

701-15.....Fire Tests for Flame Propagation of Textiles and Films

F. Underwriters Laboratories Inc. (UL):

325-06(R2013).....Door, Drapery, Gate, Louver, and Window Operators and Systems

PART 2 - PRODUCTS

2.1 SHADES:

A. Light-Filtering Shade : Woven fabric, stain and fade resistant.

1. Type: see drawings design to/or equal to selection on material schedule.
2. Weave: see drawings.
3. Thickness: see drawings.
4. Weight: Per design to spec on drawings.
5. Orientation on Shadeband: Up the bolt .
6. Openness Factor: see drawings percent.
7. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Submit report for testing of shade cloth materials identical to products provided.
8. Drive-End Location: Right side of inside face of shade and as noted on shop drawings.
9. Shade Anti-Microbial Characteristics: ‘No Growth’ per ASTM G21 results for fungi ATCC9642, ATCC9677, and ATCC9645.
11. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated on construction documents, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring for motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
    a. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.
    b. Electric Motor: Manufacturer’s standard tubular, enclosed in roller.
        1) Electrical Characteristics: Single phase, 24V, 60 Hz.
    c.
        6) Provide switches that are adjustable and interlocked with motor controls and set to automatically stop the shade at fully raised and fully lowered positions. Provide low voltage switching.

7) Operating Function: Stop and hold shade at 5 pre-determined positions including open, closed and 3 user-programmed positions.

8) Provide the following options: Group switching with integrated switch control; single face plate for multiple switch cut-outs. Backup gear and crank operator for manual operation during power failures with detachable handle, length required to make operation convenient from floor level Power failure memory for the life of the systems which protects presets.

2.6 FASTENINGS:

A. Zinc-coated or cadmium plated steel or stainless steel fastenings of length and type recommended by manufacturer. Except as otherwise specified, provide fastenings for installation with various structural materials as follows:

Type of Fastening	Structural Material
Wood screw	Wood
Tap screw	Metal
Case-hardened, self-tapping screw in pre-drilled hole	Solid masonry, concrete
Screw or bolt in expansion shields	Solid masonry, concrete
Toggle bolts	Hollow blocks, gypsum wallboard, plaster

2.7 FABRICATION:

A. Fabricate shades to fit measurements of finished openings obtained at site.

B. Shades: Rolling type, constructed of shade cloth mounted on rollers. Provide shade cloth with plain sides, and with hem at bottom to accommodate weight bar.

1. Provide separate shades for each individual sash within opening. Provide shade length that exceeds height of window by 305 mm (12 inches) measured from head to sill, in addition to material required to make-up hem:

a. Provide rollers with spindles, nylon bearings, tempered steel springs, and other related accessories required for positive action.
b. Provide rollers of diameter and wall thicknesses required to accommodate operating mechanisms, weights, and widths of shadebands indicated without deflection.
c. Provide rollers with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
d. Secure shade cloth to rollers to prevent wrinkling or folding, and on line parallel to axis of rollers so that shade hangs plumb.
e. Secure shade cloth with zinc-coated steel or stainless steel machine screws spaced not over 228 mm (9 inches) on centers.
f. Do not attach shade cloth to rollers with tacks.
g. Provide hem bar of extruded aluminum for entire width of shade band. Heat seal hem bar on all sides to prevent removal.
h. Provide eyelets with clear openings large enough to accommodate cords, without cutting into cloth when set.
i. Provide cords of sufficient length to permit shades to be drawn to bottom of opening with ends looped and held with cord rings. Attach cords to hems through metal eyelets in center of slats in bottom hems.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Measure openings before fabrication. Do not scale construction documents.
B. Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions.
   1. Locate rollers in level position as high as practicable at heads of windows.
   2. Install shades to prevent infiltration of light over rollers.
   3. Where extension brackets are necessary for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
   4. Place brackets and rollers so that shades do not interfere with window and screen hardware.

8. Electrical Connections: Connect motor-operated shade cloth roller shades to building electrical system.
9. Shade installation methods not specifically described, are subject to approval of Contracting Officer Representative (COR).

3.2 ADJUSTING:

A. Adjust and shades to operate smoothly, free from binding or malfunction throughout entire operational range.

3.3 CLEANING AND PROTECTION:

A. Clean shade surfaces after installation, according to manufacturer’s written instructions.

B. Provide final protection and maintain conditions that ensure that shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged shades that cannot be repaired, in a manner approved by COR before time of Substantial Completion.

3.4 DEMONSTRATION:

A. Furnish services of factory-authorized service representative to train maintenance personnel to adjust, operate, and maintain motorized shade operation systems.

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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. Sealants: Section 07 92 00, JOINT SEALANTS.

B. Color of Casework Finish to be selected from full range of available options during submittal review.

C. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

D. Backing Plates for Wall Mounted Casework: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

E. Countertop Construction and Materials and Items Installed in Countertops: Section 12 36 00, COUNTERTOPS.

F. Plumbing Requirements Related to Casework: Division 22, PLUMBING.

G. Electrical Lighting and Power Requirements Related to Casework: Division 26, ELECTRICAL.

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.
2. One (1) complete casework assembly, including base and wall cabinet(s) with drawers and doors.
3. One (1) glazed sliding door with track and pertinent hardware. A complete cabinet may be submitted to fulfill this requirement.

F. Manufacturer’s warranty.

1.5 WARRANTY:

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

B. Manufacturer Warranty: 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

C1172-14.....Laminated Architectural 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. U.S. Department of Commerce, Product Standard (PS):

PS 1-09.....Construction and Industrial Plywood

H. Underwriters Laboratories Inc. (UL):

325-06(R2013).....Door, Drapery, Gate, Louver, and Window Operators and Systems

437-08(R2013).....Key Locks

I. Federal Specifications (Fed. Spec.):

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

J. Scientific Equipment and Furniture Association (SEFA):

2.3-10.....Installation of Scientific Laboratory Furniture and Equipment

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; except where laminated glass is shown on construction documents.
3. For Shelves:9 mm (3/8 inch)thick.

E. Laminated Glass: Fabricate of two sheets of 3 mm (1/8 inch) thick clear ASTM C1172, Kind LT glass, laminated together with a 1.5 mm (0.060 inch) thick vinyl interlayer, to a total overall thickness of 8 mm (5/16 inch).

F. 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 heads or terminate flush with top of beads.

G. Plywood:

1. Prod. Std. PS 1, seven ply, interior.
2. Where both sides are exposed, use Grade AA.
3. Grade AB for other uses.

H. 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 walls 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 sinks provide one (1) piece, lowered backs.
12. In base units with doors provide removable backs.
13. Provide built-in raceways or tubular or channel shaped members of casework for installation of wiring and electric work.
    a. Mount junction boxes on rear of cabinets.
    a. Provide electric work in accordance with Division 26, ELECTRICAL.
14. Provide reinforcing for hardware.
15. 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)	1 (25)	0 (0)
	Width	- -	0 (0)	1 (25)
Wall Hung Cabinet	Height	- -	1 (25)	1 (25)
Counter Mounted Cabinet	Height	- -	1 (25)	1 (25)
Floor Standing Cabinet	Height	- -	1 (25)	0 (0)

1)Full height cabinets shown on construction documents are to be the same height back to back.

2) 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. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.
3. Omit sloping tops or filler plates whenever a gypsum wall board bulkhead assembly is furred down to top face of casework.
4. Provide exposed ends of sloping tops with flush closures.
5. 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.
6. At pharmacy with sloping shelf, provide 13 mm (1/2 inch) wide clear acrylic plastic raised edge, 3 mm (1/8 inch) thick, secured to front edge of shelf.

I. Closures and Filler Strips at Pipe Spaces:
1. Flat steel strips or plates.
2. Openings less than 203 mm (8 inches) wide: 1.2 mm (0.047 inch) thick.
3. Openings more than 203 mm (8 inches wide 0.9 mm (0.359 inches) wide.

J. Frames:
1. Undercounter Table and Bench Frames:
a. Provide welded construction.
b. Provide open frame type with aprons and legs when required.
c. Aprons:
1) Channels shaped welded at corners, with leg sockets and reinforcing triangular corner gussets welded in corners.
2) Pierce sockets to receive leg bolts and notch gussets to receive legs.
3) Upper flange perforated or slotted to receive screws at 200 mm (8 inch) centers, and back channels when installed against wall. Size slots for 6 mm (1/4 inch) anchor bolts.
4) Pierce aprons to receive drawer formation, rail at top of drawer opening. Install channel shaped apron division welded at ends, 762 mm 30 inches apart to front and back aprons, or at each side of drawer.
5) Fabricate metal components from sheet steel.
a) Use 1.5 mm (0.0598 inch) thick sheet for gussets and channel aprons.
b) Use 1.2 mm (0.0478 inch) thick sheet for other items.
6) At knee space, provide exposed metal sides and metal closure plate for soffit. Where shown on construction documents at knee space, provide exposed metal back secured with continuous angle closures at both side.
d. Legs:

1) Cold rolled tubing or 1.5 mm (0.0598 inch) formed steel.
2) Leveling-anchoring device at floor.
3) Stud bolt at top for attachment to leg socket.

e. Leg Braces:
1) Tables and benches not anchored to walls.
2) Brace back against front legs near bottom with steel angle, channel or tubular braces.
3) Fasten braces together with steel straps.

f. Leg Shoes:
1) Fit laboratory casework legs at bottom with either stainless steel, aluminum, or chromium plated brass shoes, not less than 25 mm (1 inch) in height.
2) Fit other legs with a movable molded vinyl shoe 100 mm (4 inches) high and coved at bottom.

2. Suspension Frame:
a. Provide suspension system for independent suspension of interchangeable under-counter cabinets and of countertops. Provide for removal or exchange of under counter cabinets of various heights, widths and types, and for vertical adjustment of counter tops to heights indicated on construction documents.
b. Suspension Frames: Fabricate of 32 mm (1-1/4 inch square) or 25 mm (1 inch) x 38 mm (1-1/2 inch) rectangular, 2.6 mm (0.104 inch; 12 gauge) steel tubing welded to form full rectangle. Provide integral, adjustable leveling device in steel leg with non-marring foot cap.
c. Provide mounting channels and support frames to allow for pipe chases and service channels when required.
d. Cabinets to have a 1.49 mm (0.059 inch) steel shaped form welded across entire width of back to engage continuous slot in wall mounting channel. Provide two (2) fastening devices through case stile at the front to provide final positive latching and locking of case in position.
e. Paint construction materials that are exposed.

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 for each service, such as Nursing Units, Administrative.
   a. Key drug locker inner door different from outer door.
   b. Furnish two (2) keys per lock.
   c. Furnish six (6) master keys per service or Nursing Unit.
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. Door in seismic zones: B03352.
   a. Do not provide thumb latch on doors equipped with three (3) point locking device.
   b. Provide lever operated two (2) point latching device on paired doors over 915 mm (36 inches) high if three (3) point locking or latching device is not used.
3. 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.
4. 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.
5. 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.
   f. Do not weld hinges to doors or cabinets.
6. Pivot hinges: ANSI/BHMA A156.1 A875B.
7. 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.

8. 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.
9. Auxiliary Hardware: ANSI A156.16.
10. Door silencers: LO3011 or LO3031.
    a. Install two (2) rubber bumpers each door.
    b. Silencers set near top and bottom of jamb.
11. Closet Bar: L03131 chrome finish of required length.

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 cm^3 (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 to be selected from full range of available colors during submittal review.

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.

2.7 VA STANDARD CABINETS:

A. Laboratory and Hospital Casework, including metal casework of the following types:
   1. Wardrobe Cabinet, Metal, 5A (VA Standard Detail SD123100-02).
   2. Wall Cabinet, Metal, 5B (VA Standard Detail SD123100-01).

2.8 PRODUCTS OF OTHER COMPONENTS DIRECTLY RELATED TO CASEWORK:

A. 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.

D. Refer to Section 12 36 00, COUNTERTOPS for work related to plastic laminate, acid-resistant plastic laminate, metal, molded resin, wood, and methyl methacrylic polymer countertops and/or shelving used in conjunction with casework systems. When countertop materials are provided by the casework manufacturer, they are to include the following features:
   1. Capable of being suspended from vertical support rails or horizontal wall strips or service modules.
   2. Provided with rounded corners and impact resistant material on exposed edges.
   3. Capable of being easily relocated and installed without tools.
   4. Capable of being suspended and easily changed under counter mounted storage units.
   5. Provide leveling adjustment capability so units can be brought into a level position.

6. Secured using fasteners. Show detail on shop drawings.

E. Refer to Section 12 36 00, COUNTERTOPS for work related to and integral with countertop systems such as pegboards, funnel and graduate racks.

F. Refer to Division 22, PLUMBING for the following work related to casework systems:
   1. Sinks, faucets and other plumbing service fixtures, venting, and piping systems.
   2. Compressed air, gas, vacuum and piping systems.

G. Refer to Division 26, ELECTRICAL for the following work related to casework systems:
   1. Connections and wiring devices.
   2. Connections and lighting fixtures except when factory installed by the manufacturer.

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 location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.

C. Verify reinforcement of walls and partitions for support and anchorage of casework.

D. 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 and per SEFA 2.3 recommendations.
   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).

4. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.

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 finish 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.

B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.

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.

B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.

C. Commencing at least seven (7) days prior to opening of facility, provide one (1) 4-hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

- - - E N D - - -

SECTION 12 34 00
MANUFACTURED PLASTIC CASEWORK

PART 1 – GENERAL

1.1 DESCRIPTION:

A. This section specifies interchangeable modular plastic casework system.

B. System includes support components, storage units, accessories, electrical wiring chases, for wall hung, and island arrangements.

1.2 RELATED WORK:

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

B. Color of Casework Finish: as noted on sheet A800.

C. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

D. Backing Plates for Wall Mounted Casework: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

E. Standard Manufactured Metal Casework: Section 12 31 00, MANUFACTURED METAL CASEWORK.

F. Countertop Construction and Materials and Items Installed in Countertops: Section 12 36 00, COUNTERTOPS.

G. Plumbing Requirements Related to Casework: Division 22, PLUMBING.

H. Electrical Lighting and Power Requirements Related to Casework: Division 26, ELECTRICAL.

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 modular plastic casework, casework components and accessories of scope and type similar to indicated requirements 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 indicated requirements.
3. Submit manufacturer’s qualifications and list of projects, including owner contact information.

C. Installer Qualifications:

1. Installer has completed at least three (3) projects in last 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. Product data:

1. Manufacturer’s literature and other data showing compliance with the specification for materials.

C. Certification:

1. Manufacturer’s qualifications specified.
2. Installer’s qualifications specified.

D. Shop drawings:

1. Drawings complete, accurate and to scale.
2. Show:
   a. Location of each component.
   b. Dimensions and clearance as required.
   c. Identify each component with both drawing identification and manufacturer’s product number.
   d. Details including cuts, holes, scribes, attachments and specialized construction requirements.
3. Installation procedures: Show dimensions, methods of assembly, anchorage, installation and conditions relating to adjoining work.
4. Placement Listing: Itemized listing by room number of components provided.
5. Complete listing of each component used.
6. Include the weight of each component.

E. Samples:

1. Support rail, 1219 mm (48 inches) long.
2. Plastic laminate.

F. Operational and Maintenance Manual.

G. Manufacturer’s warranty.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store and handle to prevent damage and deterioration until final acceptance of project.

B. Deliver and store materials in manufacturer’s original, labeled containers after building is enclosed and wet work is complete and dry.

C. Store materials in a secure, locked area.

D. Repair or replace damaged items due to storage or handling.

1.6 WARRANTY:

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

B. Manufacturer Warranty: Manufacturer Submit manufacturer warranty.

1.7 APPLICABLE PUBLICATIONS:

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

B. American Hardwood Association:

A135.4-12.....Basic Hardwood

C. American National Standards Institute (ANSI):

A208.1-09.....Particleboard

D. ASTM International (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

A1008/A1008M-11.....Steel Sheet, Carbon Cold-Rolled, Commercial Quality

A423/A423M-09(R2014)....Seamless and Electric-Welded Low-Alloy Steel Tubes

A568/A568M-14.....Steel, Sheet, Carbon, Structural and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements

B221-14.....Aluminum and Aluminum-Alloy Extruded Bars, Rods Wire, Profiles and Tubes

B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods Wire, Profiles and Tubes (Metric)

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

D1201-13.....Polyester Thermosetting Molding Compound

D4673-02(R2008).....Acrylonitrile-Butadiene-Styrene (ABS) Molding and Extrusion Materials

E84-11.....Surface Burning Characteristics of Plastics and Alloys Building Materials

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. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

G. National Electrical Manufacturers Association (NEMA):

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

H. American Welding Society (AWS):

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

D9.1/D9.1M-06(R2012)....Sheet Metal Welding Code

I. National Fire Protection Association (NFPA):

70-11.....National Electric Code (NEC)

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

PS1-95.....Construction and Industrial Plywood

K. Scientific Equipment and Furniture Association (SEFA):

2.3-10.....Installation of Scientific Laboratory Furniture and Equipment

L. Underwriters Laboratories (UL):

Annual Fire Resistance Directories

PART 2 - PRODUCT

2.1 DESIGN REQUIREMENTS:

A. Provide components which are alike by one (1) manufacturer with specified flexibility and interchangeability requirements.

B. Components interchangeable to form flexible system which will accommodate change:

1. Dimensions of products are nominal and shown on construction documents and schedules.

2. Hanging components modular on same increments.
3. Selectively removable and replaceable without disturbing adjacent components.

C. Combustibility: Maximum flame spread rating of 25 and smoke development of 450 when tested in accordance with ASTM E84.

D. Basic Support Components:

1. Service Modules:
   a. Steel support frames designed to support storage assemblies and work surfaces, enclosed plumbing and electrical lines and hold fixtures.
   b. Used to form work area configurations that are easily rearranged.
   c. Modules maybe installed as wall-attached structures or in freestanding configurations.
   d. Adjacent modules capable of being joined together.
   e. Equip module with adjustable floor guides to compensate for uneven floors.
   f. Modules equipped with stability accessories such as floor anchors and wall attachments brackets as required. Show details on shop drawings.
   g. Provide access panels for easy access to interior of pipe chase areas. Access panels supported individually and not tied into each other.
   h. Modules contain method to secure piping for fixtures, electrical outlets and sinks. Detail on shop drawing.
   i. Enclose modules to floor with a removable panel.
   j. Modules have end panels where noted. End panels capable of supporting storage assemblies.
   k. Modules shipped completely finished preassembled, ready for installation.
2. Vertical Wall Strips:
   a. Fabricated of steel or aluminum.
   b. Wall-mounted designed to suspend selected components that require vertical height adjustments.
   c. Vertical adjustment 25 mm (1 inch) maximum.
   d. Only one (1) wall strip is required between side by side suspended components.

e. Attach wall strips to walls or service modules by mechanical fasteners. Wall strips may be an integral part of service modules.

3. Horizontal Support Rail:
   a. Fabricated of steel or aluminum.
   b. Designed to suspend selected components in one place, allowing them to be removed and replaced in same or different location.
   c. Rail designed to be supported from vertical rails or service modules.
   d. Rail configuration able to receive each hanging component.
   e. Rail able to be cut to any length using simple hand tool or applied to form continuous runs.
   f. System designed to eliminate area of potential dust accumulation or bacteriological growth.
   g. Attach rail to walls or service modules with mechanical fasteners to provide a permanent installation.
4. Panel Support System:
   a. Steel hanger supports with slots of 25 mm (1 inch) intervals for suspension of casework or countertops.
   b. Adjustable level or slides to provide uniform height on adjacent units.
   c. Allow removal, replacement or relocation without removing adjacent panels.
   d. Capable of installation on top of finished floor without use of fasteners to floors.
   e. Have electrical channels as specified in electrical components with two (2) duplex outlets per panel side.
   f. Heights from 865 mm (34 inches) to 2032 mm (80 inches) standard with manufacturer.
   g. Widths from 305 mm (12 inches) to 1220 mm (48 inches) standard with manufacturer.
   h. Connectors to withstand weight of loaded components and stress of movement under loaded conditions, including a variety of panel configurations and panels of differing heights.

E. Process Tables:

1. Free-standing work surface same construction as countertops for work surface.
2. Have capability to suspend and easily change under table mounted storage units.
3. Locate support legs at work surface edges to maximize knee and storage unit space.
4. Equip legs with adjustable leveling feet.
5. Provide leveling adjustment capability so units can be brought into a level position to compensate for in-site floor conditions and excessive weight loads on surfaces.

F. Modular Storage Units:

1. Fabricate with no exterior cracks, crevices, joints corners or angles that may facilitate bacterial accumulation.
2. Design to accept drawers, shelves, tambour doors and other accessories as indicated in construction documents. Drawer and shelf guides integrally molded into unit. Provide for shelf adjustments or drawer adjustments.
3. Provide unit with a top or with the ability to accept a lid.
4. Capable of being assembled by simple hand action without tools, except for those components fastening to work surfaces.
5. Designed to be suspended from support rail or from countertops.
6. Units, when broken apart for periodic washing and sanitizing operations have inherent capability for easy draining.
7. Drawers available in sizes indicated in construction documents and meet following requirements:
   a. Drawer body molded one (1) piece unit. Drawer front may be added to a molded one (1)-piece tray.
   b. Drawers capable of being suspended from horizontal support elements of storage unit without use of tool or additional pieces.
   c. Drawers capable of stacking.
   d. Drawers capability to accept snap-on labels.
   e. Drawers capability to accept dust cover.
   f. Provide quantity of sub-containers and dividers for drawers, as shown on construction documents with label flags for compartments.

g. Drawer depth to be full depth of the base cabinet.

G. Shelves:

1. Continuous molded lip around perimeter designed to retain liquid spillage and retain container dividers.
2. Self-stacking for storage.
3. Capability to easily accept snap-on labels.
4. Provide container dividers, as indicated in construction documents.

H. Shelf units-Open and Closed Type:

1. Rounded exposed surfaces free from sharp edges.
2. Attach and interchangeable on wall strips and service module.
3. Doors designed to allow maximum use of interior cubic space.
4. Provide for shelf adjustment on 25 mm (1 inch).
5. Readily installed, removed and relocated without disturbing adjacent units.

I. Miscellaneous Components:

1. Mobile Storage Carts:
   a. Capable of supporting six (6) full-loaded storage units.
   b. Equipped with minimum 127 mm (5 inch) diameter hard-rubber tire casters, with grease fittings for lubrication. Equip two (2) casters with brakes.
   c. Exposed and non-exposed surfaces capable of easily being cleaned and sanitized.
2. Sink modules:
   a. Meet requirements of work services.
   b. Design to hang on support rail and service modules.
   c. Provide solid front and sides to conceal plumbing hardware.
   d. Provide backsplash.
3. Included in casework features that are part of the manufacturer’s standards commercial product.
4. Keyboard Tray:
   a. Minimum of 558 mm (22 inches) wide by 254 mm (10 inches) deep.
   b. Designed to attach to underside of counter and roll out on supports.
   c. Fabricated as plastic laminate face unit with vinyl edge strip.

5. Transportation:
   a. Single unit capable of lifting large storage modules on and off storage rails providing a stable platform for transporting large storage modules to other locations without tipping over.
   b. Equipped with hard rubber tires wheels not less than 127 mm (5 inches) in diameter with grease fitting for lubrication to accommodate washing and cleaning.
   c. Design to be moved to insure safety to operator.

J. Assembly and Disassembly:
   1. Mechanical interlock system that does not require tools. Positive locking system that prevents potential of accidental dislodged.
   2. Use of standard hand tools where fasteners used, no special designed tools permitted.
   3. Components of such size and weight that can easily be lifted or moved by one (1) person or with transportation designed for such purpose.

K. Live Load Capacity:
   1. Loads in addition to weight of components supported.
   2. Panel types; minimum of 130 kg (300 lbs.) maximum of 500 kg (1100 lbs.) per panel per sides.
   3. Open panel types: Minimum of 86 kg (190 lbs.), maximum of 181 kg (400 lbs.).
   4. Roller Rails: 136 kg (300 lbs.) per linear foot.
   5. Vertical wall strips: Minimum 272 Kg (600 lbs.).
   6. Service modules: frames: 998 kg (2200 lbs.).
   7. Undercounter storage units: 91 kg (200 lbs.).
   8. Overhead Storage Units:
      a. 762 mm (30 inches) wide by 381 mm (15 inch) deep by 533 mm (21 inches) high, maximum of 32 kg (70 lbs.).
      b. 1200 mm (48 inches) wide by 381 mm (15 inches) deep by 533 mm (21 inches) high maximum of 64 kg (140 lbs.)
      c. Manufactures standard modular sizes acceptable.
   9. Special Storage Units:
      a. 558 mm (22 inches) wide by 610 mm (24 inches) deep by 635 mm (25 inches) high maximum of 91 kg (200 lbs.).

b. 558 mm (22 inches) wide by 762 mm (30 inches) deep by 635 mm (25 inches) high: maximum of 91 kg (200 lbs.).

c. Pullout shelves or fixed shelves. Maximum of 23 kg (50 lbs.) each.

d. Manufacturers standard modular sizes acceptable

10. Drawers: 181 kg (400 lbs.) for drawers 101 mm (4 inches) deep.

L. Finish:

1. As noted on sheet A800, color and material schedule.
2. More than one (1) color may be selected for units.
3. Steel components finished with chemical resistant paint.

M. Locks:

1. Manufactures standard design.
2. Drawers capable of locking into cabinets or lockable lids.
3. Cabinets capable of locking.

2.2 MATERIALS:

A. Carbon Structural Steel: ASTM A36/A36M.

B. Stainless Steel: ASTM A240/A240M Type 302B with number 4 finish minimum.

C. Steel plates: ASTM A283/A283M.

D. Sheet Steel: ASTM A1008/A1008M or ASTM A568/A568M.

E. Steel Tubes: ASTM A423/A423M.

F. Aluminum: ASTM B221M (B221).

G. ABS compounds: ASTM D4673.

H. Plastic Laminate: NEMA LD-3.

I. Hardboard: AHA A135.4, Class 1, tempered.

J. Particleboard: ANSI A208.1; no added urea formaldehyde.

K. Plywood, Softwood: Prod. Std. PS1, five (5) ply construction from 13 mm to 28 mm (1/2 inch to 1-1/8 inch) thickness, and seven (7) ply for 31 mm (1-1/4 inch) thickness.

2.3 FABRICATION:

A. Manufacturer’s standard design of modular casework system meeting design requirements.

1. Casework requirements specified are intended to establish minimum requirements.
2. Dimensions of components shown on construction documents are nominal to represent module requirements.

3. Provide components compatible with each other as to color, finish and hardware.

B. Components of acrylonitrile butadiene styrene (ABS) compounds, ASTM D4673, with integral color throughout and molded to manufacturer's standard system design.

C. Components stain and rust-resistant capable of withstanding washing temperatures up to 85 degrees C (185 degrees F) without distortion or physical imperfections.

D. Storage modules, plastic laminate exposed surfaces including interiors conforming to and fabricated in accordance with LD3, over plywood conforming to PS1 or not less than 641 Kg/cubic meter (45 lbs. per cubic foot) particleboard conforming to ANSI A208.1.

E. Storage modules of molded plastic:
   1. Fire-retardant thermoplastic or sheet-molding compound ASTM D1201, injection-molding, compression-molding or vacuum-forming technique.
   2. Constructed to achieve structural strength, durability and resistance to acids, stains, corrosion and heat.
   3. Color integral throughout plastic.

F. Fabricate frames and rails of steel or aluminum as standard with modular casework manufacturer’s system.

G. Finish metals in accordance with NAAMM AMP 500-505 and plated steel in accordance with ASTM B456 as standard with modular casework manufacturer’s system.

H. Fabricate steel components of ASTM A36/A36M, ASTM A283/A283M, ASTM A1008/A1008M or ASTM A568/A568M as standard with casework system manufacturer.

I. Weld in accordance with AWS D1.1/D1.1M or AWS D9.1/D9.1M. Finish welds smooth and free of sharp edges where exposed.

J. Plated Metal: Finish in accordance with ASTM B456 for steel products and NAAMM AMP 500-505.

K. Painted Steel: Finish in accordance with NAAMM AMP 500-505

L. Anodized Aluminum: Finish as standard with modular cabinet manufacturers system.

2.4 PRODUCTS OF OTHER COMPONENTS DIRECTLY RELATED TO CASEWORK:

A. 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.

D. Refer to Section 12 36 00, COUNTERTOPS for work related to plastic laminate, acid-resistant plastic laminate, metal, molded resin, wood, and methyl methacrylic polymer countertops and/or shelving used in conjunction with casework systems. When countertop materials are provided by the casework manufacturer, include the following features:

   1. Capable of being suspended from vertical support rails or horizontal wall strips or service modules.
   2. Provided with rounded corners and impact resistant material on exposed edges.
   3. Capable of being easily relocated and installed without tools.
   4. Capable of being suspended and easily changed under counter mounted storage units.
   5. Provide leveling adjustment capability so units can be brought into a level position.
   6. Secured using fasteners. Show detail on shop drawings.

E. Refer to Section 12 36 00, COUNTERTOPS for work related to and integral with countertop systems such as pegboards, funnel and graduate racks.

F. Refer to Division 22, PLUMBING for the following work related to casework systems:

   1. Sinks, faucets and other plumbing service fixtures, venting, and piping systems.
   2. Compressed air, gas, vacuum and piping systems.

G. Refer to Division 26, ELECTRICAL for the following work related to casework systems:

   1. Connections and wiring devices.

2. Connections and lighting fixtures except when factory installed by the manufacturer.

PART 3 – EXECUTION

3.1 COORDINATION:

A. Begin only after work of other trades in complete, i.e. wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected and area is free of trash and debris.

B. Verify location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.

C. Verify reinforcement of walls and partitions for support and anchorage of casework.

D. 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 and per SEFA 2.3 recommendations.

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).
4. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.

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 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 finish 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, secure with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.

B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.

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 1220 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 proposed fastenings and method of installation on shop drawings.

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.

B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.

C. Commencing at least seven (7) days prior to opening of facility, provide one (1) four (4) hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

- - - E N D - - -

SECTION 12 36 00
COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies casework countertops with integral accessories.

B. Integral accessories include:

1. Sinks with traps and drains.
2. Eye and Face Wash Units.
3. Mechanical Service fixtures.
4. Electrical Receptacles.
5. Hot Plates (Range)
6. Pegboards

1.2 RELATED WORK

A. Color and patterns to be as noted on drawings sheet A800 for all rooms noted. All other countertops or countertop noted by other (which is synonymous) for manufacture supplied countertop for metal casework in lab areas to be selected from the full range of manufacture material during submittal review.

B. DIVISION 22, PLUMBING.

C. DIVISION 26, ELECTRICAL.

D. Equipment Reference Manual for SECTION 12 36 00, COUNTERTOPS.

1.3 SUBMITTALS

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

B. Shop Drawings

1. Show dimensions of section and method of assembly.
2. Show details of construction at a scale of ½ inch to a foot.

C. Samples:

1. 150 mm (6 inch) square samples each top.
2. Front edge, back splash, end splash and core with surface material and booking.

1.4 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. American Hardboard Association (AHA):

A135.4-95.....Basic Hardboard

C. Composite Panel Association (CPA):

A208.1-09.....Particleboard

D. American Society of Mechanical Engineers (ASME):

A112.18.1-12.....Plumbing Supply Fittings

A112.1.2-12.....Air Gaps in Plumbing System

A112.19.3-08(R2004).....Stainless Steel Plumbing Fixtures (Designed for Residential Use)

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

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

A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength, Low Alloy

D256-10.....Pendulum Impact Resistance of Plastic

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

D638-10.....Tensile Properties of Plastics

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

D790-10.....Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

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

F. Federal Specifications (FS):

A-A-1936.....Adhesive, Contact, Neoprene Rubber

G. U.S. Department of Commerce, Product Standards (PS):

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

H. National Electrical Manufacturers Association (NEMA):

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

PART 2 - PRODUCTS

2.1 MATERIALS

B. Molded Resin:

1. Non-glare epoxy resin or furan resin compounded and cured for minimum physical properties specified:

Flexural strength	70 MPa (10,000 psi)	ASTM D790
Rockwell hardness	105	ASTM D785

Water absorption, 14 hours (weight)	.01%	ASTM D570

2. Material of uniform mixture throughout.

I. Adhesive

1. For plastic laminate FS A-A-1936.
2. For wood products: ASTM D4690, unextended urea resin or unextended melamine resin, phenol resin, or resorcinol resin.
3. For Field Joints:
   a. Epoxy type, resistant to chemicals as specified for plastic laminate laboratory surfaces.
   b. Fungi resistant: ASTM G-21, rating of 0.

J. Fasteners:

1. Metals used for welding same metal as materials joined.
2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.

K. Solid Polymer Material:

1. Filled Methyl Methacrylic Polymer.
2. Performance properties required:

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

Property	Result	Test
High temperature resistance	Slight surface dulling	NEMA LD3

3. Cast into sheet form and bowl form.
4. Color throughout with subtle veining through thickness.
5. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
6. Bio-based products will be preferred.

2.2 SINKS

A. Molded Resin:
   1. Cast or molded in one piece with interior corners 25 mm (one inch) minimum radius.
   2. Minimum thickness of sides and ends 13 mm (1/2 inch), bottom 16 mm (5/8 inch).
   3. Molded resin outlet for drain and standpipe overflow.
   4. Provide clamping collar permitting connection to 38 mm (1-1/2 inch) or 50 mm (2 inch) waste outlet and trap, making sealed but not permanent connection.

2.3 TRAPS AND FITTINGS

A. Material as specified in DIVISION 22, PLUMBING.
B. For Molded Resin Sinks:
   1. Chemical resisting P-traps and fittings for chemical waste service.
   2. Provide traps with cleanout plug easily removable without tools.
   .

2.10 COUNTERTOPS

A. Fabricate in largest sections practicable.
B. Fabricate with joints flush on top surface.
C. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets.
D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
E. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
F. Fabricate with end splashes where against walls or cabinets.
G. Splash Backs and End Splashes:
   1. Not less than 19 mm (3/4 inch) thick.

2. Height 100 mm (4 inches) unless noted otherwise.
3. Laboratories and pharmacy heights or where fixtures or outlets occur: Not less than 150 mm (6 inches) unless noted otherwise.
4. Fabricate epoxy splash back in maximum lengths practical of the same material.

H. Drill or cutout for sinks, and penetrations.
1. Accurately cut for size of penetration.
2. Cutout for VL 81 photographic enlarger cabinet.
a. Finish cutout to fit flush with vertical side of cabinet, allowing adjustable shelf to fit into cutout space of cabinet at counter top level. Finish cutout surface as an exposed edge.
b. Provide braces under enlarger space to support not less than 45 kg (100 pounds) centered on opening side along backsplash.

K. Molded Resin Tops:
1. Molded resin with drip groove cut on underside of overhanging edge.
2. Finish thickness of top minimum 25 mm (1 inch).
3. Joints: Epoxy Type.
4. Secure reagent shelves to counter tops with fasteners from underside and seal seam.

M. Laboratory Shelf 200 mm (8 inches) deep: Fabricate of 27 mm (1-1/16 inch) thick hardwood. Finish with black acid resisting enamel.

N. Laboratory Shelf with Funnel and Graduate Rack 300 mm (12 inches) deep shelf: Fabricate of 27 mm (1-1/16 inch) thick hardwood. Finish with black acid resisting enamel.

O. Laboratory Shelf 254 mm (10 inch deep): Fabricate of corrosion resisting steel.

S. Countertop products shall comply with following standards for biobased materials:

Material Type	Percent by Weight
Composite Panel	89 percent biobased material
Hardwood	89 percent biobased material
Particleboard	89 percent biobased material
Plywood	89 percent biobased material

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installing countertops verify that wall surfaces have been finished as specified and that mechanical and electrical service locations are as required.

B. Secure countertops to supporting rails of cabinets with metal fastening devices, or screws through pierced slots in rails.

1. Where type, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.
2. Use round head bolts or screws.
3. Use epoxy or silicone to fasten the epoxy resin countertops to the cabinets.
4. Use wood or sheet metal screws for wood or plastic laminate tops; minimum penetration into top 16 mm (5/8 inch), screw size No 8, or 10.

C. Rubber Moldings:

1. Where shown install molding with butt joints in horizontal runs and mitered joints at corners where ceramic tile occurs omit molding.
2. Fasten molding to wall and to splashbacks and splashends with adhesive.

D. Sinks

1. Install stainless steel sink in plastic laminate tops with epoxy compound to form watertight seal under shelf rim.
   a. In laboratory and pharmacy fit stainless steel sink with overflow standpipe.
   b. Install faucets and fittings on sink ledges with watertight seals where shown.
2. Install molded resin sinks with epoxy compound to form watertight seal with underside of molded resin top.
   a. Install sink with not less than two channel supports with threaded rods and nuts at each end, expansion bolted to molded resin top.
   b. Design support for a twice the full sink weight.
   c. Install with overflow standpipes.

3. Install methyl methacrylic polymer sinks in manufacturers recommended adhesive sealer or epoxy compound to underside of methyl methacrylic polymer countertop.
   a. Bolt or screw to countertop to prevent separation of bowl and fracture of adhesive sealant joint.
   b. Install drain and traps to sink.

E. Faucets, Fixtures, and Outlets:
   1. Seal opening between fixture and top.
   2. Secure to top with manufacturers standard fittings.

F. Range Tops, Electrical Outlets, Film Viewer:
   1. Set in cutouts with manufacturers gasket sealing joint with top to prevent water leakage.
   2. Install control unit and electric outlets where shown. Seal escutcheon plate at lap if on counter or top to prevent water leakage.

3.2 PROTECTION AND CLEANING

A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.

B. Clean at completion of work.

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SECTION 13 05 41
SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

PART 1 – GENERAL

1.1 DESCRIPTION:

A. Provide seismic restraint in accordance with the requirements of this section in order to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event.

B. The design to resist seismic load shall be based on Seismic Design Categories per section 4.0 of the VA Seismic Design Requirements (H-18-8) dated August 2013,http://www.cfm.va.gov/til/etc/seismic.pdf.

C. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:

1. Architectural Elements: Facades that are not part of the structural system and its shear resistant elements; cornices and other architectural projections and parapets that do not function structurally; glazing; nonbearing partitions; suspended ceilings; stairs isolated from the basic structure; cabinets; bookshelves; medical equipment; and storage racks.
2. Electrical Elements: Power and lighting systems; substations; switchgear and switchboards; auxiliary engine-generator sets; transfer switches; motor control centers; motor generators; selector and controller panels; fire protection and alarm systems; special life support systems; and telephone and communication systems.
3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems; boiler equipment and components.
4. Transportation Elements: Mechanical, electrical and structural elements for transport systems, i.e., elevators and dumbwaiters, including hoisting equipment and counterweights.

1.2 RELATED WORK:

1.3 QUALITY CONTROL:

A. Shop-Drawing Preparation:

1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of

seismic force restraints. The professional structural engineer shall be registered in the state where the project is located.

2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State where project is located.

B. Coordination:

1. Do not install seismic restraints until seismic restraint submittals are approved by the COR.
2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

C. Seismic Certification:

In structures assigned to IBC Seismic Design Category C, D, E, or F, permanent equipments and components are to have Special Seismic Certification in accordance with requirements of section 13.2.2 of ASCE 7 except for equipment that are considered rugged as listed in section 2.2 OSHPD code application notice CAN No. 2-1708A.5, and shall comply with section 13.2.6 of ASCE 7.

1.4 SUBMITTALS:

A. Submit a coordinated set of equipment anchorage drawings prior to installation including:

1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified.
3. Numerical value of design seismic brace loads.
4. For expansion bolts, include design load and capacity if different from those specified.

B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:

1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
3. Pipe contents.
4. Structural framing.

5. Location of all gravity load pipe supports and spacing requirements.
6. Numerical value of gravity load reactions.
7. Location of all seismic bracing.
8. Numerical value of applied seismic brace loads.
9. Type of connection (Vertical support, vertical support with seismic brace etc.).
10. Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.

C. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:
1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
3. Maximum spacing of hangers and bracing.
4. Seal of registered structural engineer responsible for design.

D. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.

E. Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

1.5 APPLICABLE PUBLICATIONS:

A. The Publications listed below (including amendments, addenda revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only.

B. American Concrete Institute (ACI):
355.2-07.....Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary

C. American Institute of Steel Construction (AISC):
Load and Resistance Factor Design, Volume 1, Second Edition

D. American Society for Testing and Materials (ASTM):
A36/A36M-08.....Standard Specification for Carbon Structural Steel
A53/A53M-10.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A307-10.....Standard Specification for Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength.

A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

A325M-09.....Standard Specification for High-Strength Bolts for Structural Steel Joints [Metric]

A490-10.....Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

A490M-10.....Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]

A500/A500M-10.....Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

A501-07.....Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

A615/A615M-09.....Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

A992/A992M-06.....Standard Specification for Steel for Structural Shapes for Use in Building Framing

A996/A996M-09.....Standard Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement

E488-96(R2003).....Standard Test Method for Strength of Anchors in Concrete and Masonry Element

E. American Society of Civil Engineers (ASCE 7) Latest Edition.

F. International Building Code (IBC) Latest Edition

G. VA Seismic Design Requirements, H-18-8, August 2013

H. National Uniform Seismic Installation Guidelines (NUSIG)

I. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum

1.6 REGULATORY REQUIREMENT:

A. IBC Latest Edition.

B. Exceptions: The seismic restraint of the following items may be omitted:

1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.

2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
3. Gas and medical piping less than 2 ½ inches inside diameter.
4. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
5. All other piping less than 2 ½ inches inside diameter, except for automatic fire suppression systems.
6. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
7. All electrical conduits, less than 2 ½ inches inside diameter.
8. All rectangular air handling ducts less than six square feet in cross sectional area.
9. All round air handling ducts less than 28 inches in diameter.
10. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

PART 2 – PRODUCTS

2.1 STEEL:

A. Structural Steel: ASTM A36.
B. Structural Tubing: ASTM A500, Grade B.
C. Structural Tubing: ASTM A501.
D. Steel Pipe: ASTM A53/A53M, Grade B.
E. Bolts & Nuts: ASTM A307.

2.2 CAST-IN-PLACE CONCRETE:

A. Concrete: 28 day strength, f’c = 25 MPa (3,000 psi) B. Reinforcing Steel: ASTM A615/615M or ASTM A996/A996M deformed.

PART 3 – EXECUTION

3.1 CONSTRUCTION, GENERAL:

A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.
B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.
C. Construct seismic restraints and anchorage to allow for thermal expansion.
D. Testing Before Final Inspection:
   1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20

consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.

2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

3.2 EQUIPMENT RESTRAINT AND BRACING:

A. See drawings for equipment to be restrained or braced.

3.3 MECHANICAL DUCTWORK AND PIPING; BOILER PLANT STACKS AND BREACHING; ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS; AND TELECOMMUNICATION WIRES AND CABLE TRAYS

A. Support and brace mechanical ductwork and piping; electrical busways, conduits and cable trays; and telecommunication wires and cable trays including boiler plant stacks and breeching to resist directional forces (lateral, longitudinal and vertical).

B. Brace duct and breeching branches with a minimum of 1 brace per branch.

D. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment, or building members.

E. Seismic Restraint of Piping:

1. Design criteria:
   a. Piping resiliently supported: Restrain to support 120 -percent of the weight of the systems and components and contents.
   b. Piping not resiliently supported: Restrain to support 60 -percent of the weight of the system components and contents.
2. Provide seismic restraints according to one of the following options:

F. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.

3.4 PARTITIONS

A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.

B. Properly anchor masonry walls to the structure for restraint, so as to carry lateral loads imposed due to earthquake along with their own weight and other lateral forces.

3.5 CEILINGS AND LIGHTING FIXTURES

A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.

B. Independently support and laterally brace all lighting fixtures. Refer to applicable portion of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

3.6 FACADES AND GLAZING

A. Do not install concrete masonry unit filler walls in a manner that can restrain the lateral deflection of the building frame. Provide a gap with adequately sized resilient filler to separate the structural frame from the non-structural filler wall.

B. Tie brick veneers to a separate wall that is independent of the steel frame as shown on construction drawings to ensure strength against applicable seismic forces at the project location.

C. Install attachments to structure for all façade materials as shown on construction drawings to ensure strength against applicable seismic forces at the project location.

3.7 STORAGE RACKS, CABINETS, AND BOOKCASES

A. Install storage racks to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.

B. Anchor medical supply cabinets to the floor or walls and equip them with properly engaged, lockable latches.

C. Anchor filing cabinets that are more than 2 drawers high to the floor or walls, and equip all drawers with properly engaged, lockable latches.

D. Anchor bookcases that are more than 30 inches high to the floor or walls, and equip any doors with properly engaged, lockable latches.

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SECTION 14 21 00
ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies the engineering, furnishing and installation of complete and ready for operation electric traction elevator systems described herein and as indicated on the Contract drawings.

B. Items listed in the singular apply to each and every elevator in this specification except where noted.

C. Passenger Elevator shall be basement traction, microprocessor control system, power operated single-speed center opening car and hoistway doors with Class “A” load rated.
The design to standard/equal too would be Otis GEN2 gearless machine-room less elevator

ELEVATOR SCHEDULE	
Elevator Number	EC027
Overall Platform Size	6’-0” wide x 9’-10” wide (+/-) 1”
Clear Inside Platform	5’-11” wide x 8’-4”deep (+/-) 1”
Rated Load – kg (lb)	5000 lbs service
Contract Speed - m/s (fpm)	200 fpm
Total Travel – m (ft)	50’-3”
Floors Served	Front 1,3,4,5 stops with rear 2 stop
Number of Openings	5
Entrance Type & Size	2 speed slider with 54” wide x 84” high door
Typing of Roping	Traction regeneration drive

1.2 RELATED WORK

A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.

C. Interior cab finishes to be selected from full range of available manufacture colors.

D. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.

E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.

F. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.

G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

H. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.

I. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.

J. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.

K. Section 26 24 16, PANELBOARDS: Low voltage panelboards.

L. Section 26 43 13, TRANSIENT-VOLTAGE SURGE SUPPRESSION: Surge suppressors installed in panelboards.

M. Section 26 51 00, INTERIOR LIGHTING: Fixture and ballast type for interior lighting.

1.3 QUALIFICATIONS

A. Approval by the Contracting Officer is required for products and services of proposed manufacturers, suppliers and installers and shall be contingent upon submission of certificates by the Contractor stating the following:

1. Elevator contractor is currently and regularly engaged in the installation of elevator equipment as one of his principal products.

2. Elevator contractor shall have three years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
3. Elevator Mechanic (Installer) shall have passed a Mechanic Examination approved by the U.S. Department of Labor and have technical qualifications of at least five years of experience in the elevator industry or 10,000 hours of field experience working in the elevator industry with technical update training. Apprentices shall be actively pursuing Certified Elevator Mechanic status. Certification shall be submitted for all workers employed in this capacity.

B. Approval of Elevator Contractor’s equipment will be contingent upon their identifying an elevator maintenance service provider that shall render services within two hours of receipt of notification, together with certification that the quantity and quality of replacement parts stock is sufficient to warranty continued operation of the elevator installation.

C. Approval will not be given to elevator contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record for unsatisfactory elevator installations, have failed to complete awarded contracts within the contract period, and do not have the requisite record of satisfactorily performing elevator installations of similar type and magnitude.

D. Equipment within a group of electric traction elevators shall be the product of the same manufacturer.

E. The Contractor shall provide and install safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

F. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS Dl.1 to perform the type of work required. Certificates shall be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and shall be obtained from the VAMC safety department. Request permit one day in advance.

G. Electrical work shall be performed by a Licensed Master Electrician and Licensed Journeymen Electricians as requirements by NEC. Certificates shall be submitted for all workers employed in this capacity.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification. Elevator installation shall meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.

B. Federal Specifications (Fed. Spec.):

J-C-30B.....Cable and Wire, Electrical (Power, Fixed Installation)

J-C-580.....Cord, Flexible, and Wire, Fixture

W-S-610.....Splice Connectors

W-C-596F.....Connector, Plug, Electrical; Connector, Receptacle, Electrical

W-F-406E.....Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible

HH-I-558C.....Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)

W-F-408E.....Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin- wall Type)

RR-W-410.....Wire Rope and Strand

TT-E-489J.....Enamel, Alkyd, Gloss, Low VOC Content

QQ-S-766.....Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip

C. International Building Code (IBC)

D. American Society of Mechanical Engineers (ASME):

A17.1 - Safety Code for Elevators and Escalators

A17.2 - Inspectors Manual for Electric Elevators and Escalators

E. National Fire Protection Association:

NFPA 13.....Standard for the Installation of Sprinkler Systems

NFPA 70.....National Electrical Code (NEC)

NFPA 72.....National Fire Alarm and Signaling Code

NFPA 101.....Life Safety Code

NFPA 252.....Fire Test of Door Assemblies

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

A1008/A1008M-09.....Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Farability

E1042-02.....Acoustically Absorptive Materials Applied by Trowel or Spray

G. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):

SP-58.....Pipe Hangers and Supports

H. Society of Automotive Engineers, Inc. (SAE):

J517-91.....Hydraulic Hose, Standard

I. Gauges:

Sheet and Plate: U.S. Standard (USS)

Wire: American Wire Gauge (AWG)

J. American Welding Society (AWS):

D1.1.....Structured Welding Code Steel

K. National Electrical Manufacturers Association (NEMA):

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

L. Underwriter's Laboratories (UL):

486A.....Safety Wire Connectors for Copper Conductors

797.....Safety Electrical Metallic Tubing

M. Institute of Electrical and Electronic Engineers (IEEE)

N. Regulatory Standards:

VA Barrier Free Design Handbook H-18-13

VA Seismic Design Manual H-18-8

1.5 SUBMITTALS

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

B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related elevator material shall be forwarded to the Contracting Officer.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each and every elevator unit specified including:
   a. Hoisting machines, controllers, power conversion devices, governors, and all other components located in machine room.
   b. Car, counterweight, sheaves, supporting beams, guide rails, brackets, buffers, and size of car platform, car frame members, and other components located in hoistway.
   c. Rail bracket spacing and maximum vertical forces on guide rails in accordance with H 18-8 for Seismic Risk Zone 2 or greater.
   d. Reaction at points of support and buffer impact loads.
   e. Weight of principal parts.
   f. Top and bottom clearances and over travel of car and counterweight.
   g. Location of main line switch/shunt trip circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.
2. Drawings of hoistway entrances and doors showing details of construction and method of fastening to the structural members of the building.
   a. If drywall construction is used to enclose hoistway, submit details of interface fastenings between entrance frames and drywall.
   b. Sill details including sill support.

D. Samples:
1. One each of stainless steel, 75 mm x 125 mm (3 in. x 5 in.).
2. One each of baked enamel, 75 mm x 125 mm (3 in. x 5 in.).
3. One each of color floor covering.
4. One each of protection pads, 75 mm x 125 mm (3 in. x 5 in.) if used.
5. One each car and hoistway Braille plate sample.
6. One each car and hall button sample.
7. One each car and hall lantern/position indicator sample.
8. One each wall and ceiling material finish sample.
9. One each car lighting sample.

E. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the elevator layouts:
1. Hoisting Machine.

2. Hoisting Machine Motor, HP and RPM ratings, Voltage, Starting and Full Load Ampere, and Number of Phases.
3. Controller.
4. Starters and Overload Current Protection Devices.
5. Car Safety Device; Type “B” safeties and Governor.
6. Electric Door Operator; HP, RPM, Voltage, and Ampere rating of motor.
7. Hoistway Door Interlocks.
8. Car and Counterweight Buffers; maximum and minimum rated loads, maximum rated striking speed and stroke.
9. Cab Ventilation Unit; HP rating and CFM rating.
10. Hoist and Compensation Ropes; breaking strength, allowable working load, and actual working load.

F. Complete construction drawings of elevator car enclosure showing dimensioned details, fastenings to platform, car lighting, ventilation, ceiling framing, top exits, and location of car equipment.

G. Complete dimensioned detail of vibration isolating foundations for traction hoisting machines.

H. Dimensioned drawings showing details of:
1. All signal and operating fixtures.
2. Car and counterweight roller guides.
3. Hoistway door tracks, hangers, and sills.
4. Door operator, infrared curtain units.

I. Cut sheets and drawings showing details of controllers and supervisory panels.

J. Furnish certificates as required under: Paragraph "QUALIFICATIONS".

1.6 WIRING DIAGRAMS

A. Provide three complete sets of paper and one electronic set field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the elevator machine room as directed by the COR.

B. In the event field modifications are necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the COR within thirty (30) days of final acceptance.

C. Provide the following information relating to the specific type of microprocessor controls installed:
   1. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
   2. System logic description.
   3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
   4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

1.7 ADDITIONAL EQUIPMENT

A. Additional equipment required to operate the specified equipment manufactured and supplied for this installation shall be furnished and installed by the contractor. The cost of the equipment shall be included in the base bid.

B. Equipment not required by specification, which would improve the operation, may be installed in conjunction with the specified equipment by the contractor at his option at no additional cost to the Government, provided prior approval is obtained from the Contracting Officer’s Representative (COR).

1.8 TOOL CABINET

A. Provide a metal parts/tool cabinet, having two shelves and hinged doors. Cabinet size shall be 1220 mm (48 in.) high, 762 mm (30 in.) wide, and 457 mm (18 in.) deep.

1.9 PERFORMANCE STANDARDS

A. The elevators shall be capable of meeting the highest standards of the industry and specifically the following:
   1. Contract speed is high speed in either direction of travel with rated capacity load in the elevator. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
   2. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per ft/s/s and the maximum acceleration and retardation shall not exceed 0.2G per ft/s/s.

3. Starting, stopping, and leveling shall be smooth and comfortable without appreciable steps of acceleration and deceleration.

B. Passenger/ Service door operator shall open the car door and hoistway door at 2.5-feet per second and close at 1-foot per second. Freight door operators shall open and close at 1-foot per second.

C. Floor level stopping accuracy shall be within 3 mm (.125 in.) above or below the floor, regardless of load condition.

D. Noise and Vibration Isolation: All elevator equipment including their supports and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

E. Sound Isolation: Noise level relating to elevator equipment operation in machine room shall not exceed 80 dBA. All dBA readings shall be taken three (3) feet off the floor and three (3) feet from equipment.

F. Airborne Noise: Measured noise level of elevator equipment during operation shall not exceed 50 dBA in elevator lobbies and 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed.

1.10 WARRANTY

A. Submit all labor and materials furnished in connection with elevator system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The one year Warranty shall commence after final inspection, completion of performance test, and upon full acceptance of the installation and run concurrent with the guarantee period of service.

B. During warranty period if a device is not functioning properly in accordance with specification requirements, more maintenance than the contract requires keeping device operational, device shall be removed and a new device meeting all requirements shall be installed as part of work until satisfactory operation of installation is obtained. Period of warranty shall start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

1.11 POWER SUPPLY

A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.

B. Main Line Disconnect Switch/Shunt Trip Circuit Breaker for each controller shall be located inside the machine room at the strike side of the machine room door and lockable in the “Off” position.

C. Surge Suppressors to protect the elevator equipment.

1.12 EMERGENCY POWER SUPPLY

A. Emergency power supply, its starting means, transfer switch for transfer of elevator supply from normal to emergency power, two pair of conductors in a conduit from an auxiliary contact on the transfer switch (open or close contacts as required by Controller Manufacturer) to terminals in the group elevator controller and other related work shall be provided by the Electrical Contractor.

B. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device.

C. Prior to the return of normal power an adjustable timed circuit shall be activated that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual transfer of power from emergency power to normal building power shall take place after all cars are stopped at a floor with their doors open.

D. Car lighting circuits shall be connected to the emergency power panel.

1.13 ELEVATOR MACHINE ROOM AND MACHINE SPACE

A. Provide a machine room that meets the requirements of ASME A17.1, IBC, and NEC.

B. Provide stairs and landing for access to the machine room. The landing shall be large enough to accommodate full opening of the door plus 24 in.

C. Locate the light switch on the lock side of the door inside the machine room.

D. Locate sprinkler pipes to provide seven (7) feet head clearance. Do not locate sprinkler heads, heat detectors, and smoke detectors directly over elevator equipment.

1.14 HOISTWAY LIGHTING - OPTIONAL

A. Provide lighting with 3-way switches at the top and bottom of the hoistway accessible from elevator hoistway entrance prior to entering the pit or stepping onto the car top.

B. Lighting shall illuminate top of elevator cab when it is at the top floor and the pit when at the bottom floor.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and surfaces shall be smooth and without waves. During installation all stainless steel surfaces shall be protected with suitable material.

B. Where cold rolled steel is specified it shall be low-carbon steel rolled to stretcher level standard flatness, complying with ASTM A109.

2.2 MANUFACTURED PRODUCTS

A. Materials, devices, and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. The elevator equipment, including controllers, door operators, and supervisory system shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system.

B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit. Components shall be compatible with each other and with the total assembly for the intended service.

C. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.

D. If key operated switches are furnished in conjunction with component of this elevator installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each and every key shall have a tag bearing a stamped or etched legend identifying its purpose.

2.3 CONDUIT AND WIREWAY

A. Install electrical conductors, except traveling cable, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than .75 inch or electrical metallic tubing smaller than .50 inch electrical trade size shall not be used. All raceways completely embedded in concrete slabs, walls, or floor

fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the elevator machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than .375 inch electrical trade size may be used, not exceeding 18 inches in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

B. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.

C. Rigid conduit and EMT fittings using set screws or indentations as a means of attachment shall not be used.

D. Connect motor or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

2.4 CONDUCTORS

A. Conductors shall be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets. Tap connectors may be used in wireways provided they meet all UL requirements.

B. Provide all conduit and wiring between machine room, hoistway and fixtures.

C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.

D. Where size of conductor is not given, voltage and amperes shall not exceed limits set by NEC.

E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.

F. Terminal connections for all conductors used for external wiring between various items of elevator equipment shall be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Elevator Contractor may, at his option, make these terminal connections on #10 gauge or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

2.5 TRAVELING CABLES

A. All conductors to the car shall consist of flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks shall have permanent indelible identifying numbers for each connection. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.

C. Provide shielded wires for the auto dial telephone system within the traveling cable, five (5) pair shielded wires for card reader, one (1) RG-6 Ethernet cable for Wi-FI, and two (2) pair 14 gauge wires for power as needed.

D. If traveling cables come into contact with the hoistway or elevator due to sway or change in position, provide shields or pads to the elevator and hoistway to prevent damage to the traveling cables.

E. Hardware cloth may be installed from the hoistway suspension point to the elevator pit to prevent traveling cables from rubbing or chafing. Hardware cloth shall be securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

2.6 CONTROLLER AND SUPERVISORY PANEL

A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches, and relays on a steel frame in a NEMA Type 1 General Purpose Enclosure. Cabinet shall be securely attached to the building structure.

B. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controller and supervisory panel shall be neatly formed, laced, and identified.

C. Controller shall be provided with wiring and components for additional future travel if required.

2.7 MICROPROCESSOR CONTROL SYSTEM

A. Provide a microprocessor control system with absolute position/speed feedback to control dispatching, signal functions, door operation, and VVVF Drive for hoist motor control. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval. Add Regenerative Drive when economically advantages to the VA.

1. Controller manufacturer shall provide factory training, engineering and technical support, including all manuals, wiring diagrams, and tools necessary for adjusting, maintenance, repair, and testing of equipment to the VA for use by the VA’s designated Elevator Maintenance Service Provider.

2.8 EMERGENCY POWER OPERATION

A. The control system for Elevator(s) shall provide for the operation of at least one car per elevator group on emergency power upon failure of the normal power supply.

B. Auxiliary equipment on elevator controllers, wiring between associated elevator controllers and wiring between elevator controllers and remote selector panel as required to permit the elevators to operate as detailed, shall be provided by the Elevator Contractor.

C. Upon loss of normal power supply there shall be a delay before transferring to emergency power of 10 seconds minimum to 45 seconds maximum, the delay shall be accomplished through an adjustable timing device. Following this adjustable delay the associated elevators shall function as follows:

1. Selector switch, Automatic position:
   a. Not more than one elevator at a time in each group shall be automatically selected and returned to the main floor, at contract speed, cycle its car and hoistway doors and shut down, with "Door Open" button remaining operable.
   b. As each elevator reaches the designated floor and shuts down, another elevator shall start and return to the designated floor.
   c. Elevators that have been manually removed from automatic service and are on independent service, fire service or medical emergency shall receive an automatic return signal. Elevators on inspection service or out of service shall not receive a signal.
   d. When an elevator is given a signal to return and it is unable to start its movement to the designated floor within 30 seconds it shall be by-passed. When an elevator is by-passed, another elevator shall start and return.
   e. This process shall continue until all elevators have returned to the designated floor and shut down.
   f. Any elevator or elevators by-passed on initial return signal shall be signaled again.
   g. When all cars in group have returned to designated floor, one elevator in each group shall be designated for automatic operation. Individual cars in each group shall restart at 5 second intervals.

h. If elevator(s) are keyed on to medical emergency service in the car prior to transfer to emergency power operation, medical emergency service shall be retained. This elevator shall be the first automatically selected elevator to operate on emergency power operation and complete its selected call demand. The elevator will return to the designated floor after the key switch is reset to normal position.

2. Selector switch, Manual operation:

a. Selector switch shall be mechanically and electrically interlocked to prevent the selection of more than one elevator from operating on emergency power.

b. The selector switch shall have positions marked with the number of each elevator controlled. It shall also have a position marked "Automatic". When the selector switch is set to the automatic position, the medical emergency service car shall operate on emergency power operation, or if none, the last car arriving at the designated floor shall operate on emergency power operation.

c. Change in selection of elevators shall be by means of the selection switch and shall occur only when the previous selected elevator is stopped at the designated floor.

d. The selector switch shall be locked out of operation when the system is in the normal mode of operation.

e. Locate the selector switch above the hall push button at the designated level. The key switch shall be a tumbler type lock furnished with four keys. The enclosure faceplate shall be identified "Emergency Power Control" with 13 mm (.50 in.) engraved letters filled with black paint.

D. Prior to the return of normal power an adjustable timer circuit shall activate that will cause all cars to remain at a floor if already there or stop and remain at the next floor if in flight. Actual transfer of power from emergency power to normal building power shall take place after all cars are stopped at a floor with their doors open.

2.9 MACHINE ROOM MONITOR

A. Provide a monitor in each machine room, separate monitors for each passenger elevator group, and each service elevator group. Provide one keyboard for each monitor.

B. The monitor shall contain indicators to provide the following information:

1. The floor where each elevator is currently located.
2. The direction that each elevator is currently traveling or is scheduled to travel.
3. The location and direction of currently registered hall calls.
4. Elevators that are currently out of service.
5. Elevators that are currently bypassing hall calls.
6. Elevators that are currently engaged in passenger transfers.
7. Operations program under which entire group is currently operating.
8. Zone divisions of the entire group.
9. Door positions.
10. Status indication for cars on independent service, car top inspection, stop switch activated, alarm activated, fire service, and earthquake protection activated, etc.

C. The maintenance terminal shall be suitable for all troubleshooting procedures related to the specific type microprocessor installed on this project.

2.10 FIREFIGHTER’S SERVICE

A. Provide Firefighter’s Service.

1. Main Floor:
2. Alternate Floor:
3. Verify main and alternate floors with Contract Officer’s Representative.

2.11 INDEPENDENT SERVICE

A. Provide a legibly and indelibly labeled "INDEPENDENT SERVICE", two-position key operated switch on the face of the main car operating panel that shall have its positions marked "ON" and "OFF". When the switch is in the "ON" position, the car shall respond only to calls registered on its car dispatch buttons and shall bypass all calls registered on landing push buttons. The car shall start when a car call is registered, car call button or door close button is pressed, car and

hoistway doors are closed, and interlock circuits are made. When switch is returned to "OFF" position, normal service shall be resumed.

2.12 MEDICAL EMERGENCY SERVICE – PATEINCE CARE FACILITIES ONLY

A. Provisions shall be made for calling elevator(s) to any floor served by the elevator on an emergency basis, operating independently from the dispatch signals and landing call signals.

B. Install card reader/key switch in the floor landing push button fixture above the push buttons.

C. Provide a call registered light indicator adjacent to card reader/key switch. The card reader/key switch at the landings and in the car shall only be operable by authorized personnel with a valid VA ID badge/key.

D. When card reader/key switch is activated at any floor, the call register light indicator shall illuminate at the call floor and inside the elevator only. The elevator control system shall instantly select an elevator to respond to the medical emergency call. Immediately upon selection, all car calls shall be cancelled. If car is traveling away from the medical emergency call, it shall slow down and stop at the nearest floor, maintain closed doors, reverse direction and proceed nonstop to the medical emergency call floor. If the car is traveling toward the medical emergency call floor, it shall proceed to that floor nonstop. If at the time of selection it is slowing down for a stop, the car shall stop, maintain doors closed, and start immediately toward the medical emergency floor.

E. Arriving at the medical emergency floor, the car shall remain with doors open for 30 seconds. After this interval has expired and the car has not been placed on medical emergency operation inside the car, the car shall automatically return to normal service.

F. Provide an LED illuminated indicator light next to the Medical Emergency card reader/key switch the same size as the Fire Service indicator.

   1. Locate a “Medical Emergency” card reader/key switch above call buttons in the main car operating panel for selecting medical emergency service. Activation of the card reader will allow the car to accept a car call for any floor, close doors, and proceed nonstop to the floor desired.

2. After medical emergency call has been completed the elevator shall return to normal operation after an adjustable time of 30 to 90 seconds has expired.

G. In the center of the rear cab panel provide a back lighted "MEDICAL EMERGENCY" LED illuminated display that shall flash on and off continuously when the car is assigned to this operation and until it is restored to normal service. "MEDICAL EMERGENCY" indicator shall be a photographic negative type 1830 mm (72 in.) to center above the floor, 152 mm (6 in.) wide X 76 mm (3 in.) high, with 12 mm (.50 in.) high letters legible only when illuminated.

H. If the car being operated on “Independent Service”, the medical emergency service indicator lights in the car operating panel and rear wall shall be illuminated, buzzer shall sound, and the “Audio Voice” system shall direct the attendant to return the car to automatic operation.

I. If the car is out of service and unable to answer medical emergency calls, the call register light shall not illuminate.

J. Each card reader/key switch shall have its identity legible and indelible engraved in faceplates. All lettering shall be 6 mm (.25 in.) high, filled with black paint.

K. When Phase I fire recall is activated it shall over-ride elevators on medical emergency service and return them to the main or alternate fire service recall floor. When the fire emergency floor has been identified the attendants may complete their medical emergency run on Phase II firefighter’s operation if life safety is not affected.

2.13 LOAD WEIGHING

A. Provide means for weighing car load for each and every elevator. When load in a car reaches an adjustable predetermined level of the rated capacity, that car shall bypass registered landing calls until the load in the car drops below the predetermined level. Calls bypassed in this manner shall remain registered for the next car. The initial adjustment of the load weighting bypass setting shall be 60 to 100 percent.

2.14 ANTI-NUISANCE FEATURE

A. If weight in the car is not commensurate with the number of registered car calls, cancel car calls. Systems that employ either load weighing or door protective device for activation of this feature are acceptable.

2.15 SEISMIC REQUIREMENTS

A. Meet the requirements of VA Seismic Design Manual H-18-8. Seismic Zone 2

2.16 ELEVATOR MACHINE BEAMS

A. Overhead beams shall support machines and machinery in place to prevent movement under any conditions imposed in service.

2.17 TRACTION HOIST MACHINE

A. Provide geared/gearless traction machine with an AC motor, brake, drive sheave, and deflector sheave mounted in proper alignment on an isolated bedplate.

B. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.

C. Drive sheaves shall be free from cracks, sand holes, and other imperfections that would tend to injure the hoist ropes. Sheave shall be turned smooth and true with rope grooves of proper design to insure maximum traction and maximum life of the hoist ropes. Traction sheave shall be mechanically coupled to the hoist motor shaft centered in a positive manner.

D. Hoisting machine brake shall be drum or disc type and shall have the capacity to stop and hold the elevator with 125 percent of rated load. Arrange brake circuits so that no current shall be applied to the brake coil prior to the establishment of the hoistway door interlock circuit, except during leveling, re-leveling, and hoistway access operation.

2.18 SHEAVES

A. Provide deflector sheaves with a metal basket type guard mounted below the sheave and a guard to prevent ropes from jumping out of grooves. Securely fasten guard to sheave support beams.

B. Two-to-one idler sheaves on car and counterweight, if used, shall be provided with metal guards that prevent foreign objects from falling between ropes and sheave grooves and to prevent ropes from jumping out of grooves.

C. Securely mount overhead sheaves on overhead beams in proper alignment with basement traction sheave, car and counterweight rope hitches or sheaves. Provide blocking beams where sheaves are installed on two or more levels.

2.19 HOIST ROPES

A. Provide elevator with the required number and size of ropes to insure adequate traction and required safety factor. Hoisting ropes shall be pre-formed 8 x 19 or 8 x 25 traction steel, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.50 inch.

B. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on top of the elevator.

2.20 HOIST ROPE COMPENSATION

A. Provide compensation when required by controller manufacturer. Compensation shall consist of a necessary number and size of encapsulated chains attached to the underside of car and counterweight frames.

1. Provide pit guide to minimize chain sway.
2. Provide take-up to compensate for hoist rope stretch.
3. Pad areas where compensation may strike car or hoistway items.

2.21 GOVERNOR ROPE

A. Governor Rope shall be 6 x 19 or 8 x 19 wire rope, preformed traction steel, uncoated, fiber core, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.375 inch having a minimum safety factor of 5. Tiller rope construction is not acceptable.

B. Under normal operation rope shall run free and clear of governor jaws, rope guards, and other stationary parts.

C. Securely attach governor rope tag to governor rope releasing carrier.

2.22 SPEED GOVERNOR

A. Provide Centrifugal car driven governor to operate the car safety device . Governor shall be complete with weighted pit tension sheave, governor release carrier and mounting base with protected cable sleeves.

B. Furnish overspeed switch and speed reducing switches when required.

C. The governor rope clamping device shall be designed to prevent appreciable damage to or deformation of the governor rope that results from the stopping action of the device operating the safety.

D. Provide metal guard over top of governor rope and sheaves.

E. Where the elevator travel does not exceed 100 feet, the weight tension sheave may be mounted on a pivoted steel arm in lieu of operating in steel guides.

2.23 CAR SAFETY DEVICE

A. Provide “Type B Safeties” on the elevator

2.24 ASCENDING CAR OVERSPEED PROTECTION

A. Provide a device to prevent ascending over speed and unintended motion away from the landing when the doors are not locked.

2.28 GUIDE RAILS, SUPPORTS, AND FASTENINGS

A. Guide rails for car shall be planed steel T-sections and weigh 27.5 kg/m (18.5 lb/ft). B. Securely fasten guide rails to the brackets or other supports by heavy duty steel rail clips.

C. Provide car and counterweight rail brackets and counterweight spreader brackets of sufficient size and design to secure substantial rigidity to prevent spreading or distortion of rails under any condition.

D. Guide rails shall extend from channels on pit floor to within 76 mm (3 in.) of the underside of the concrete slab or grating at top of hoistway with a maximum deviation of 3.2 mm (.125 in.) from plumb in all directions. Provide a minimum of 19 mm (.75 in.) clearance between bottom of rails and top of pit channels.

E. Guide rail anchorages in pit shall be made in a manner that will not reduce effectiveness of the pit waterproofing.

F. In the event inserts or bond blocks are required for the attachment of guide rails, the Contractor shall furnish such inserts or bond blocks and shall install them in the forms before the concrete is poured. Use inserts or bond blocks only in concrete or block work where steel framing is not available for support of guide rails. Expansion-type bolting for guide rail brackets will not be permitted.

G. Guide rails shall be clean and free of any signs of rust, grease, or abrasion before final inspection. Paint the shank and base of the T-section with one field coat of manufacturer’s standard enamel.

2.29 NORMAL AND FINAL TERMINAL STOPPING DEVICES

A. Mount terminal slowdown switches and direction limit switches on the elevator or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.

1. Switches shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.
2. Switches, when opened, shall permit operation of elevator in reverse direction of travel.

B. Mount final terminal stopping switches in the hoistway.
   1. Switches shall be positively opened should the car travel beyond the terminal direction limit switches.
   2. Switches shall be independent of other stopping devices.
   3. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake, and prevent operation of car in either direction.

2.30 CROSSHEAD DATA PLATE AND CODE DATA PLATE

A. Permanently attach a non-corrosive metal Data Plate to car crosshead.

B. Permanently attach a non-corrosive Code Data Plate to the controller.

2.31 WORKMAN'S LIGHTS AND OUTLETS

A. Provide duplex GFCI protected type receptacles and lamps with guards on top of each elevator car and beneath the platform. The receptacles shall be in accordance with Fed. Spec. W-C-596 for Type D7, 2-pole, 3-wire grounded type, rated for 15 amperes and 125 volts.

2.32 TOP-OF-THE CAR OPERATING DEVICE

A. Provide a cartop operating device.

B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 6 mm (.25 in.) letters.

C. Movement of the elevator shall be accomplished by the continuous pressure on a direction button and a safety button.

D. Provide an emergency stop switch, push to stop/pull to run.

E. Provide permanent identification for the operation of all components in the device.

F. The device shall be permanently attached to the elevator crosshead on the side of the elevator nearest to the hoistway doors used for accessing the top of the car.

2.33 CAR LEVELING DEVICE

A. Car shall be equipped with a two-way leveling device to automatically bring the car to within 3 mm (.125 in.) of exact level with the landing for which a stop is initiated regardless of load in car or direction.

B. If the car stops short or travels beyond the floor, the leveling device, within its zone shall automatically correct this condition and maintain the car within 3 mm (.125 in.) of level with the floor landing regardless of the load carried.

C. Provide encoded steel tape or steel tape with magnets. Submit design for approval.

2.34 EMERGENCY STOP SWITCHES

A. Provide an emergency stop switch, push to stop/pull to run, for each top-of-car device, pit, machine spaces, service panel and firefighter's control panel inside the elevator. Mount stop switches in the pit adjacent to pit access door, at top of the pit ladder 1220 mm (48 in.) above the bottom landing sill and 1220 mm (48 in.) above the pit floor adjacent to the pit ladder.

B. Each stop switch shall be red in color and shall have "STOP" and "RUN" positions legibly and indelibly identified.

2.35 MAIN CAR OPERATING PANEL

A. Locate the main car operating panel in the car enclosure on the front return panel for passenger/service elevators and the front of the side wall for freight elevators. The top floor car call push button shall not be more than 1220 mm (48 in.) above the finished floor. Car call push buttons and indicator lights shall be round with a minimum diameter of 25 mm (1 in.), LED white light illuminated.

B. One piece front faceplate with edges beveled 15 degrees or swing return panel shall have the firefighter's service panel recessed into the upper section and the service operation panel recessed into the lower section fitted with hinged doors. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with cylinder type key operated locks. Secure the faceplate with stainless steel tamperproof screws.

C. All terminology and tactile symbols on the faceplate shall be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. Use 6 mm (.25 in.) letters to identify all devices in the faceplate. The handicapped markings with contrasting background shall be 12mm (.50 in.) high raised .030 inch on the plate. Surface mounted plates are not acceptable.

D. The upper section shall contain the following items in order listed from top to bottom:

1. Elevator number, 12.5 mm (.50 in.) high with black paint for contrast.
2. Capacity plate information with black paint for contrast with freight loading class and number of passengers allowed.

3. LED illuminated digital car position indicator with direction arrows.
4. Emergency car lighting system consisting of a rechargeable battery, charger, controls, and LED illuminated light fixture. The system shall automatically provide emergency light in the car upon failure or interruption of the normal car lighting service, and function irrespective of the position of the light control switch in the car. The system shall be capable of maintaining a minimum illumination of 1.0 foot-candle when measured 1220 mm (48 in.)above the car floor and approximately 305 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.
5. Firefighter’s Emergency Operation Panel shall be 1676 mm (66 in.) minimum to 1830 mm (72 in.) maximum to the top of the panel above finished floor.
6. Firefighter’s Emergency Indicator Light shall be round with a minimum diameter of 25 mm (1 in.).
7. Medical Emergency card reader/key switch marked “MEDICAL EMERGENCY” with two positions labeled “ON” and “OFF” and Medical Emergency Indicator Light located next to the card reader/key switch shall be round with a minimum diameter of 25 mm (1 in.). Instruction for Medical Emergency operation shall be engraved below the card reader/key switch and light.
8. Key operated Independent Service Switch.
9. Provide a Door Hold Button on the faceplate next to the Independent Service Key Switch. It shall have “DOOR HOLD” indelibly marked on the button. Button shall light when activated. When activated, the door shall stay open for a maximum of one minute. To override door hold timer, push a car call button or door close button.
10. Complete set of round car call push buttons, minimum diameter of 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call buttons shall be legibly and indelibly identified by a floor number and/or letter not less than 12mm (.50 in.) high in the face of the call button.
11. Door Open and Door Close buttons shall be located below the car call buttons. They shall have “OPEN” and “CLOSE” legibly and indelibly identified by letters in the face of the respective button. The Door Open button shall be located closest to the door jamb.

a. Rear Door Open and Rear Door Close buttons shall be located below the Front Door Open and Front Door Close buttons. They shall have “REAR OPEN” and “REAR CLOSE” legibly and indelibly identified by letters in the face of the respective button.

12. Red Emergency Alarm button that shall be located below the car operating buttons. Mount the emergency alarm button not lower than 890 mm (35 in.) above the finished floor. It shall be connected to audible signaling devices. Provide audible signaling devices including the necessary wiring.
13. Emergency Help push button shall activate two way communications by Auto Dial telephone system that is compatible with the VAMC’s telephone system. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button “HELP” in the face of the button with 12 mm (.50 in.) high letters.

E. The service operation panel, in the lower section shall contain the following items:

1. Light switch labeled “LIGHTS” for controlling interior car lighting with its two positions marked “ON” and “OFF”.
2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch shall be labeled “ACCESS ENABLE” with its two positions marked “ON” and “OFF”.
3. Three position switch labeled “FAN” with its positions marked “HIGH”, “LOW” and “OFF” for controlling car ventilating blower.
4. Two position, spring return, toggle switch or push button to test the emergency light and alarm device. It shall be labeled “TEST EMERGENCY LIGHT AND ALARM”.
5. Two position emergency stop switch, when operated, shall interrupt power supply and stop the elevator independently of regular operating devices. Emergency stop switch shall be marked “PUSH TO STOP” and “PULL TO RUN”.

2.36 AUXILIARY CAR OPERATING PANEL

A. Provide an auxiliary car operating panel in the side wall of the elevator between the handrails immediately adjacent to the front entrance column strike jamb. The auxiliary car operating panel shall

contain only those controls essential to passenger (public) operation. The auxiliary car operating panel faceplate shall match the main car operating panel faceplate in material and general design. Secure the faceplate with stainless steel tamperproof screws.

1. Complete set of round car call push buttons, minimum diameter 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call button shall be legibly and indelibly identified by a floor number and/or letter not less than 12 mm (.50 in.) high in the face of the call button corresponding to the numbers of the main car operating buttons.
2. Mount door "OPEN" and door "CLOSE" buttons closest to the door jamb and mount the alarm button no lower than 875 mm (35 in.) above the finished floor. The Door Open button shall be located closest to the door.
3. Cross-connect all buttons in the auxiliary car operating panels to their corresponding buttons in the main car operating panel. Registration of a car call shall cause the corresponding button to illuminate in the main and auxiliary car operating panel.
4. Emergency Help push button shall activate two way communications by auto dial telephone that is compatible with the VAMC’s telephone system. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button “HELP” in the face of the button with 12 mm (.50 in.) high letters.
5. All terminology and tactile symbols on the faceplate shall be on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. The handicapped markings with contrasting background shall be 12mm (0.50 in.) high raised .030 inch on the plate, square or rectangular in shape. Use 6 mm (.50 in.) letters to identify all other devices in the faceplate. Surface mounted plates are not acceptable.

2.37 CAR POSITION INDICATOR

A. Provide an alpha-numeric digital car position indicator in the main car operating panel, consisting of numerals and arrows not less than 63 mm (2.5 in.) high, to indicate position of car and direction of car travel. Locate position indicator at the top of the main car operating panel, illuminated by light emitting diodes.

2.38 AUDIO VOICE SYSTEM

A. Provide digitized audio voice system. Audio voice shall announce floor designations, direction of travel, and special announcements. The voice announcement system shall be a natural sounding human voice that receives messages and shall comply with ADA requirements for audible car position indicators. The voice announcer shall have two separate volume controls, one for the floor designations and direction of travel, and another for special announcements. The voice announcer shall have a full range loud speaker, located on top of the cab. The audio voice unit shall contain the number of ports necessary to accommodate the number of floors, direction messages, and special announcements. Install voice announcer per manufacturer’s recommendations and instructions. The voice system shall be the product of a manufacturer of established reputation. Provide manufacturer literature and list of voice messages.

2.39 AUTO DIAL TELEPHONE SYSTEM

A. Furnish and install a complete ADA compliant auto dial telephone that is compatible with the VAMC’s telephone system.

B. Provide a two-way communication device in the car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with two numbers.

C. “HELP” button shall illuminate and flash when call is acknowledged. Button shall match floor push button design.

D. Provide “HELP” button tactile symbol signage and Braille adjacent to button mounted integral with car operating panels.

E. The auto dial system may be located in the main or auxiliary car operating panel. The speaker and unit shall be mounted on the backside of the perforated stainless steel plate cover.

F. Each elevator shall have individual phone numbers.

G. If the operator ends the call, the passenger shall be able to redial the telephone immediately.

2.40 CORRIDOR OPERATING DEVICES

A. Fabricate faceplates for elevator operating and signal devices from not less than 3 mm (.125 in.) thick flat stainless steel with all edges beveled 15 degrees.

B. Corridor push button faceplates shall be sized to accommodate corridor pictograph on faceplate. The centerline of the landing push buttons shall be 1067 mm (42 in.) above the corridor floor.

C. Elevator Corridor Call Station Pictograph shall be engraved in the faceplate.

D. Fasten all car and corridor operating device and signal device faceplates with stainless steel tamperproof screws.

E. All terminology and tactile symbols on the faceplate shall be raised .030 inch with contrasting background, on square or rectangular plates recessed into the faceplate with its surface flush with the surface of the faceplate. The handicapped markings with contrasting background shall be 12mm (0.5 in.) high raised .030 inch on the plate, square or rectangular in shape. Use 6 mm (.25 in.) letters to identify all other devices in the faceplate. Surface mounted plates are not acceptable.

F. Provide two risers of landing call buttons for each elevator or group of elevators as shown on contract drawings.

G. Each button shall contain an integral registration LED white light which shall illuminate upon registration of a call and shall extinguish when that call is answered.

H. The direction of each button shall be legibly and indelibly identified by arrows not less than 12 mm (.50 in.) high in the face of each button.

I. Landing push buttons shall not re-open the doors while the car and hoistway doors are closing at that floor, the call shall be registered for the next available elevator. Calls registered shall be canceled if closing doors are re-opened by means of "DOOR OPEN" button or infrared curtain unit.

J. Provide emergency power indicator light, medical emergency card reader/key switch and indicator light, fire service recall key switch and indicator light, fire recall instruction, communication failure light, audible enunciator, and reset key switch in a separate fixture at the designated main floor.

K. Submit design of hall pushbutton fixtures for approval.

2.41 DIGITAL CORRIDOR ARRIVAL LANTERN/POSITION INDICATOR

A. Provide elevator with combination corridor lantern/position indicator digital display mounted over the hoistway entrances at each and every

floor in healthcare facilities. For non-healthcare facilities provide combination fixtures only at main and alternate fire recall floors. Provide each terminal landing with "UP" or "DOWN", minimum 63 mm (2.5 in.) high digital arrow lanterns and each intermediate landing with "UP" and "DOWN" digital arrow lanterns. Each lens shall be LED illuminated of proper intensity, so shielded to illuminate individual lens only. The lenses in each lantern shall be illuminated green to indicate "UP" travel and red to indicate "DOWN" travel. Lanterns shall signal in advance of car arrival at the landing indicating the direction of travel. Corridor lanterns shall not be illuminated when a car passes a floor without stopping. Each lantern shall be equipped with an audible electronic chime which shall sound once for "UPWARD" bound car and twice for "DOWNWARD" bound car. Audible signal shall not sound when a car passes the floor without stopping. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.

B. Install alpha-numeric digital position indicator between the arrival lanterns. Indicator faceplate shall be stainless steel. Numerals shall be not less than 63 mm (2.5 in.) high with direction arrows. Cover plates shall be readily removable for re-lamping. The appropriate direction arrow shall be illuminated during entire travel of car in corresponding direction.

2.42 HOISTWAY ACCESS

A. Provide hoistway access switches for elevator at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Elevators with side slide doors, mount the access key switch 1830 mm (6 ft.) above the corridor floor in the wall next to the strike jamb.

B. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions.

C. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position.

D. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center.

E. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor. Submit design and location of access switches for approval.

F. Provide emergency access for all hoistway entrances, keyways for passenger and service elevators.

2.43 HOISTWAY ENTRANCES: PASSENGER/SERVICE ELEVATORS

A. Provide complete entrances with sills, sill supports, hangers, hanger supports, tracks, angle struts, unit frames, door panels, fascia plates, toe guards, hardware, bumpers, sight guards, and wall anchors.

B. Provide one piece extruded aluminum sills grooved for door guides and recessed for fascia plates. Sills shall have overall height of not less than 19 mm (.75 in.) set true, straight, and level, with hoistway edges plumb over each other, and top surfaces flush with finished floor. Hoistway entrance frames and sills shall be grouted solid full length after installation.

C. Construct hanger supports of not less than 4.5 mm (.1875 in.) thick steel plate, and bolted to strut angles.

D. Structural steel angles 76 mm x 76 mm x 9 mm (3 in. x 3 in. x .375 in.) shall extend from top of sill to bottom of floor beam above, and shall be securely fastened at maximum 457 mm (18 in.) on center and at each end with two bolts.

E. Provide jambs and head soffits, of not less than 14-gauge stainless steel. Jambs and head soffits shall be bolted/welded construction and provided with three anchors each side. Side jambs shall be curved. Radius of curvature shall be 89 mm (3.5 in.). Head jamb shall be square, and shall overhang corridor face of side jambs by 6 mm (.25 in.). Rigidly fasten jambs and head soffits to building structure and grouted solid. After installation, protect jambs and head soffits to prevent damage to finish during construction.

F. Provide raised numerals or letters on cast, rear mounted plates for all openings. Numerals shall be a minimum of 50 mm (2 in.) high, located on each side of entrance frame, with centerline of 1524 mm (5 ft) above the landing sill. The number plates shall contain Braille.

G. Provide unique car number on every elevator entrance at designated main fire service floor level, minimum 76 mm (3 in.) in height.

H. Provide passenger entrances with single speed center opening horizontal sliding doors and service entrances with two speed side opening horizontal sliding doors.

1. Door panels shall be flush hollow metal construction, not less than 32 mm (1.25 in.) thick, consisting of one continuous piece 16-gauge stainless steel on corridor side wrapped around the leading edge. Separate two plates by a sound-deadening material, and reinforce by steel shapes welded to the plates at frequent intervals. Reinforce panels as required for installation of hangers, power-operating and door-opening devices. Top and bottom of door panels shall have continuous stiffener channels welded in place. Reinforcement of the door panels shall be a minimum of 1.0 mm (0.04 in.) in thickness and of the hat section type.
2. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 76 mm (3 in.) in diameter, made of non-metallic sound-reducing material. Equip hangers with adjustable ball-bearing rollers to take upward thrust of panels. Upthrust rollers shall be capable of being locked in position after adjustment to a maximum of .38 mm (.015625 in.) clearance. Provide the hanger sheaves with steel fire stops to prevent disengagement from tracks. Do not use hangers that are constructed integrally with the door panels.
3. Provide two removable laminated phenolic gibs or other approved material guides and a separate fire gib at the bottom of door panel.
4. Reinforce each door panel for interlock mechanism, drive assembly, and closer. Provide relating devices to transmit motion from one door panel to the other.
5. One door panel for each entrance shall bear a BOCA label, Underwriters' label or labels from other accredited test laboratories may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR.
6. Fasten sight guard of 14-gauge stainless steel, extending full height of panel, to leading edge of fast speed panel of two-speed doors each panel of center opening doors.

I. Provide 14-gauge sheet steel fascia plates in hoistway to extend vertically from head of hanger support housing to sill above. Plates shall be three (3) inches wider than door opening of elevator and

reinforced to prevent waves and buckles. Below bottom terminal landing and over upper terminal landing provide shear guards beveled back to and fastened to the wall.

J. Equip each hoistway door with an electrical/mechanical interlock, functioning as hoistway unit system, to prevent operation of car until doors are locked in the closed position unless car is operating in leveling zone or hoistway access switch is used.

K. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.

2.44 CAR FRAME: PASSENGER/SERVICE ELEVATORS

A. Car frame shall be constructed of channel stiles, crosshead, gussets, braces, and cable hitch plate securely bolted and/or welded. The entire assembly shall be constructed to withstand unequal loading of platform. Car frame members shall be constructed to relieve the car enclosure of all strains.

2.45 CAR PLATFORM: PASSENGER/SERVICE ELEVATORS

A. Construct the car platform to meet the requirements of class loading specified. The platform shall be designed to withstand the forces developed under the loading conditions specified. Provide car entrances with extruded aluminum sill or better with machined or extruded guide grooves. Cover underside and all exposed edges of wood filled platform with sheet metal of not less than 26-gauge, with all exposed joints and edges folded under. Fire resistant paint is not acceptable. Platform shall have flexible composition flooring not less than 3 mm (.125 in.) thick. Color to be selected from full range of available manufacture colors during submittal review. Refer to sheet A800 for elevator design to finishes and selected flooring. Adhesive material shall be type recommended by manufacturer of flooring. Lay flooring flush with threshold plate and base.

B. Provide a platform guard (toe guard) of not less than 12-guage sheet-steel on the entrance side, extend 76 mm (3 in.) beyond each side of entrance jamb. Securely brace platform guard to car platform, and bevel bottom edge at a 60-75 degree angle from horizontal. Install platform in the hoistway, so that the clearance between front edge and landing threshold shall not exceed 32 mm (1.25 in.).

C. Isolate the platform from the car frame by approved rubber pads or other equally effective means.

D. Provide adjustable diagonal brace rods to hold platform firmly within car suspension frame.

E. Balance car front to back and side to side. Provide balancing frame and weights, properly located, to achieve the required true balance.

F. Provide a bonding wire between frame and platform.

2.46 CAR ENCLOSURE: PASSENGER/SERVICE ELEVATORS

A. Car enclosure shall have a dome height inside the cab of 2440 mm (8 ft).

B. Securely fasten car enclosure to platform by through bolts located at intervals of not more than 457 mm (18 in.) running through an angle at the base of panels to underside of platform.

C. Front return wall panel, entrance columns, entrance head-jamb and transom shall be 14-gauge stainless steel. Transom shall be full width of cab. Side and rear walls shall be constructed of 14-gauge cold rolled steel. Coat exterior of walls with mastic sound insulation material approximately 2.5 mm (.09375 in.) thick followed by a prime coat of paint.

D. Side and rear walls of passenger elevators may have raised panels covered in fire rated materials approved for use in elevator interior.

E. Side and rear walls of service elevators, up to the center line of the top handrail, shall be covered with stainless steel. Side and rear walls to the ceiling shall be covered with high pressure plastic laminate panels stainless steel applied directly to the cab walls or raised panels. Submit a method of fastening panels to steel walls.

F. Construct canopy of not less than 12-gauge steel.

G. Provide car top railings.

H. Provide a hinged top emergency exit cover. Exit shall be unobstructed when open and shall have mechanical stops on the cover. Provide a exit switch to prevent operation of the elevator when the emergency exit is open.

I. Provide duplex, GFCI protected receptacle in car. Locate flush-mounted receptacle on the centerline of the main car operating panel, 150 mm (6 in.) above the car floor.

J. Lighting for passenger/service elevators:

1. Provide aluminum hanging ceiling frame. Construct frame of .125 in. x 1.50 in. x 1.50 in. “T” and “L” sections, divide ceiling into six panels.

2. Provide LED illuminated car light fixtures above the ceiling panels. Maintain a minimum light level of 50-foot candles at 914 mm (36 in.) above the finished floor.

K. Optional lighting for service elevators:
   1. Provide car with indirect LED lamps mounted front to rear in lighting coves along each side of the cab ceiling, no hanging ceiling.
   2. Equip the lighting cove with asymmetrical reflectors having specular finish. Maintain a minimum light level of 50-foot candles 914 mm (36 in.) above finished floor at the car operating panels.
   3. Enclose the entire vertical space between the light trough outer edge and the cab canopy with approved opaque white or clear lumicite sheeting. Lumicite sheeting shall be removable for cleaning and re-lamping.

L. Provide a blower unit arranged to exhaust through an opening in the canopy. Provide a stainless or chrome plated fan grill on the interior side of the opening. Provide screening over intake and exhaust end of blower. Provide 2-speed fan, with rated air displacement of 250 cfm and 400 cfm at respective speeds. Mount fan on top of car with rubber isolation to prevent transmission of vibration to car structure. Provide a 3-position switch to control the unit in the service panel.

M. Provide car enclosure with two sets of handrails with centerlines 750 mm and 1050 mm (30 in. and 42 in.) above the car floor.
   1. Locate handrails 38 mm (1.50 in.) from cab wall. Install handrails on side walls only for front and rear openings . Conceal all handrail fastenings. Handrails shall be removable from inside the car enclosure.
   2. Provide service elevators with flat stock handrails with the ends at the entrance turned back to the wall.

N. Provide passenger car with single speed center opening horizontal sliding doors and service car with two-speed side opening horizontal sliding doors constructed the same as hoistway doors.

O. Provide one set of protective pads for service elevator of sufficient length to completely cover two sides, rear walls and front return of cab interior. Pads shall consist of a minimum of 6 mm (.25 in.) thick glass fiber insulation securely sewn between flame resistant vinyl coated coverings. Color of the covering shall be approved by the COR.

Provide stainless steel pad buttons or hooks, spaced at intervals of not more than 150 mm (18 in.) to adequately support pads.

2.47 POWER DOOR OPERATORS: PASSENGER/SERVICE ELEVATORS

A. Provide a high-speed heavy duty door operator to automatically open the car and hoistway doors simultaneously when the car is level with the floor, and automatically close the doors simultaneously at the expiration of the door-open time. Provide microprocessor door control with circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Motor shall be of the high-internal resistance type, capable of withstanding high currents resulting from stall without damage to door operator/motor. The door operator shall be capable of opening a car door and hoistway door simultaneously, at a speed of .762 m (2.5 ft) per second. Closing speed of the doors shall be .305 m (1 ft) per second. Reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction of the infrared curtain or the door "OPEN" button, shall be accomplished within 38 mm (1.50 in.) maximum of door movement. Emphasis is placed on obtaining quiet interlock and door operation; smooth, fast, dynamic braking for door reversals, and stopping of the doors at extremes of travel.

B. Equip car doors with electric contact that prevents operation of car until doors are closed unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car.

C. Car and hoistway doors shall be manually operable in an emergency without disconnecting the power door operating equipment unless the car is outside the unlocking zone.

   1. It shall not be possible for the doors to open by power unless the elevator is within the leveling zone.
   2. Provide infrared curtain unit. The device shall cause the car and hoistway doors to reverse automatically to the fully-open position should the unit be actuated while the doors are closing. Unit shall function at all times when the doors are not closed, except during firefighter’s operation.

D. Should the doors be prevented from closing for more than a predetermined adjustable interval of 15 to 30 seconds by operation of the curtain unit, the doors shall stay open, the audio voice message

and a buzzer located on the car shall sound only on automatic operation. Do not provide door nudging.

1. If an obstruction of the doors should not activate the photo-electric door control device and prevent the doors from closing for more than a predetermined adjustable interval of 15 to 30 seconds, the doors shall reverse to the fully open position and remain open until the “Door Close” button re-establishes the closing cycle.

E. Provide door "OPEN" and "CLOSE" buttons. When the door "OPEN" button is pressed and held, the doors, if in the open position, shall remain open and if the doors are closing, they shall stop, reverse and re-open. Momentary pressure of the door "CLOSE" button shall initiate the closing of the doors prior to the expiration of the normal door open time.

PART 3 – EXECUTION

3.1 PREPARATION

A. Examine work of other trades on which the work of this Specification depends. Report defects to the COR in writing that may affect the work of elevator contractor.

B. Examine elevator hoistway openings for plumb, level, in line, and that elevator pit is proper size, waterproofed and drained with necessary access door, and ladder.

C. Examine machine room for proper illumination, heating, ventilation, electrical equipment, and beams are correctly located complete with access stairs and door.

A. If the Elevator Contractor requires changes in size or location of trolley beams or their supports and trap doors, etc., to accomplish their work, he must make arrangements, subject to approval of the Contracting officer, and include additional cost in their bid.

B. Work required prior to the completion of the elevator installation:

1. Supply of electric feeder wires to the terminals of the elevator control panel, including circuit breaker.
2. Provide light and GFCI outlets in the elevator pit and machine room.
3. Furnish electric power for testing and adjusting elevator equipment.
4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.

5. Supply power for cab lighting and ventilation from an emergency power panel specified in Division 26, ELECTRICAL.
6. Machine room enclosed and protected from moisture, with self-closing, self-locking door and access stairs.
7. Provide fire extinguisher in machine room.

C. Provide to General Contractor for installation; inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.

3.2 ARRANGEMENT OF EQUIPMENT

A. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same machine room. Locate controller near and visible to its respective hoisting machine.

3.3 WORKMANSHIP, INSTALLATION, AND PROTECTION

A. Installations shall be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation shall be mechanically and electrically correct. Materials and equipment shall be new and without imperfections.

B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Contractor's work. All new holes in concrete shall be core drilled.

C. Structural members shall not be cut or altered. Work in place that is damaged or defaced shall be restored equal to original new condition.

D. Finished work shall be straight, plumb, level, and square with smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. At final completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.

E. Sleeves for conduit and other small holes shall project 50 mm (2 in.) above concrete slabs.

F. Hoist cables that are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal or expanded metal guards.

D. Exposed gears, sprockets, and sheaves shall be guarded from accidental contact.

3.4 CLEANING

A. Upon completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster, dust, and other debris.

B. Clean machine room and equipment.

C. Perform hoistway clean down.

D. Prior to final acceptance remove protective coverings from finished or ornamental surfaces. Clean and polish surfaces with regard to type of material.

3.5 PAINTING AND FINISHING

A. All equipment, except specified as architectural finish, shall be painted one coat of approved color, conforming to manufacturer's standard.

B. Hoist machine, motor, shall be factory painted with manufacturer's standard finish and color.

C. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers except their machined surfaces, cams, brackets and all other uncoated ferrous metal items shall be painted one factory primer coat or approved equal.

D. Stencil or apply decal floor designations not less than 100 mm (4 in.) high on hoistway doors, fascia or walls within door restrictor areas. The color of paint used shall contrast with the color of the surfaces to which it is applied.

E. Elevator hoisting machine, controller, governor, main line shunt trip circuit breaker, safety plank, and cross head of car shall be identified by 100 mm (4 in.) high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled or decaled.

F. Hoistway Entrances of Passenger, and Service Elevators:

1. Door panels shall be given rust resistant treatment and a factory finish of one coat of baked-on primer and one factory finish coat of baked-on enamel.

2. Fascia plates, top and bottom shear guards, dust covers, hanger covers, and other metalwork, including built-in or hidden work and structural metal, (except stainless steel entrance frames and surfaces to receive baked enamel finish) shall be given one approved

prime coat in the shop, and one field coat of paint of approved color.

G. Hoistway Entrances of Freight Elevators:
   1. Metal surfaces of doors and frames shall receive shop prime coat.
   2. Finish painting, after installation, shall be one coat of paint of approved color.

H. Elevator Cabs for Passenger and Service Elevators:
   1. Interior and exterior steel surfaces shall be given rust resistant treatment before finish is applied.
   2. Interior steel surfaces shall be factory finished with one coat of paint of approved color.
   3. Give exterior faces of car doors one finish coat of paint of approved color.

I. Elevator Cabs for Freight Elevators:
   1. Give interior of cab one prime coat and a minimum of one coat of paint of approved color.
   2. Give exterior of cab one prime coat and one finish coat of paint of approved color.
   3. All surfaces of door frames, door panels, and cab interior surfaces that become damaged or marred shall be restored to original condition before final acceptance of work.

3.6 PRE-TESTS AND TESTS

A. Pre-test the elevators and related equipment in the presence of the COR or his authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by COR.
   1. Procedure outlined in the Inspectors Manual for Electric Elevators, ASME A17.2 shall apply.
      a. Final test shall be conducted in the presence of and witnessed by a third party ASME QEI-1 Certified Elevator Inspector, contracted by the VA.
      b. Government shall furnish electric power including necessary current for starting, testing, and operating machinery of each elevator.
   2. Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked certified test weights, voltmeter, amp probe, thermometers,

direct reading tachometer, megohm meter, vibration meter, sound meter, light meter, stop watch, and a means of two-way communication.

B. Inspect workmanship, equipment furnished, and installation for compliance with specification.

C. Balance Tests: The percent of counterbalance shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counter balance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.

D. Full-Load Run Test: Elevator shall be tested for a period of one hour continuous run with full contract load in the car. The test run shall consist of the elevator stopping at every floor, in either direction of travel, for not less than five or more than ten seconds per floor.

E. Speed Test: The actual speed of the elevator shall be determined in both directions of travel with full contract load and no load in the elevator. Speed shall be determined by applying a certified tachometer to the car hoisting ropes or governor rope. The actual measured speed of the elevator with all loads in either direction shall be within three (3) percent of specified rated speed. Full speed runs shall be quiet and free from vibration and sway.

F. Temperature Rise Test: The temperature rise of the hoisting motor shall be determined during the full load test run. Temperatures shall be measured by the use of thermometers. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees Centigrade above ambient temperature. Test shall start when all machine room equipment is within five (5) degrees Centigrade of the ambient temperature. Other tests for heat runs on motors shall be performed as prescribed by the Institute of Electrical and Electronic Engineers.

G. Car Leveling Test: Elevator car leveling devices shall be tested for accuracy of leveling at all floors with no load in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (.125 in.) of level with landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall

maintain the car floor within plus or minus 3 mm (.125 in.) of level with the landing floor regardless of change in load.

H. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator. Down stopping shall be tested with 125 percent of rated load in the elevator.

I. Insulation Resistance Test: The elevator's complete wiring system shall be free from short circuits and ground faults and the insulation resistance of the system shall be determined by use of megohm meter, at the discretion of the Elevator Inspector conducting the test.

J. Safety Devices: Car and counterweight safety devices shall be tested.

K. Overload Devices: Test all overload current protection devices in the system at final inspection.

L. Limit Stops:

1. The position of the car when stopped by each of the normal limit switches with no load and with contract load in the car shall be accurately measured.
2. Final position of the elevator relative to the terminal landings shall be determined when the elevator has been stopped by the final limits. The lower limit stop shall be made with contract load in the elevator. Elevator shall be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

M. Oil Buffer Tests: These tests shall be conducted with operating device and limit stops inoperative and with contract load in the elevator for the car buffer and with no load in the elevator for the counterweight buffer. Preliminary test shall be made at the lowest (leveling) speed. Final tests shall be conducted at contract speed. Buffers shall compress and return to the fully extended position without oil leakage.

N. Operating and Signal System: The elevator shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.

O. Performance of the Elevator supervisory system shall be witnessed and approved by the elevator inspector and a representative of the COR.

P. If equipment fails test requirements and a re-inspection is required, the Contractor shall be responsible for the cost of re-inspection; salaries, transportation expenses, and per-diem expenses incurred by the elevator inspector and representative of the COR.

3.7 INSTRUCTION OF VA PERSONNEL

A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one eight hour day. Instruction shall commence after completion of all work and at the time and place directed by the COR.

B. Written instructions in triplicate relative to care, adjustments and operation of all equipment and accessories shall be furnished and delivered to the COR in independently bound folders. DVD recordings will also be acceptable. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list of with descriptive literature, and identification and diagrams of equipment and parts. Information shall also include electrical operation characteristics of all circuits, relays, timers, electronic devices, and related characteristics for all rotating equipment.

C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

3.8 INSPECTION AND MAINTENANCE SERVICE: GUARANTEE PERIOD OF SERVICE

A. Furnish complete inspection and maintenance service on entire elevator installation for a period of one (1) year after completion and acceptance of all the elevators in this specification by the COR. This maintenance service shall run concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices.

B. This contract will cover full maintenance including emergency call back service, inspections, and servicing the elevators listed in the schedule of elevators. The Elevator Contractor shall perform the following:

1. Bi-weekly systematic examination of equipment.

2. During each maintenance visit the Elevator Contractor shall clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in like new condition and proper working order.
3. Furnishing all lubricant, cleaning materials, parts and tools necessary to perform the work required. Lubricants shall be only those products recommended by the manufacturer of the equipment.
4. Equalizing tension, shorten or renew hoisting ropes.
5. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates, signal system, car safety device, governors, tension sheaves, and buffers shall be cleaned, lubricated and adjusted.
6. Guide rails, overhead sheaves and beams, counterweight frames, and bottom of platforms shall be cleaned every three months. Car tops and machine room floors shall be cleaned monthly. Accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Cleaning supplies and vacuum cleaner shall be furnished by the Contractor.
7. Maintain the performance standards set forth in this specification.
8. The operational system shall be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
9. Maintain smooth starting and stopping and accurate leveling at all times.

C. Maintenance service shall not include the performance of work required as a result of improper use, accidents, and negligence for which the Elevator Contractor is not directly responsible.

D. Provide 24 hour emergency call-back service that shall consist of promptly responding to calls within two hours for emergency service should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of persons and equipment in and about the elevator.

E. Service and emergency personnel shall report to the COR or his authorized representative upon arrival at the hospital and again upon

completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the COR or his authorized representative.

F. The Elevator Contractor shall maintain a log book in the machine room. The log shall list the date and time of all weekly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed or parts replaced.

G. Written “Maintenance Control Program” shall be in place to maintain the equipment in compliance with ASME A17.1.

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