B. Keying: Provide Sargent removable core cylinders to match existing keying system. All cylinders shall be delivered to the VA Togus lock shop. The VA Togus lock shop will do the keying.

1.10 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

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

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....Butts and Hinges
A156.2-03.....Bored and Pre-assembled Locks and Latches
A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts
A156.4-08.....Door Controls (Closers)
A156.5-14.....Cylinders and Input Devices for Locks.
A156.6-05.....Architectural Door Trim
A156.8-05.....Door Controls-Overhead Stops and Holders
A156.13-05.....Mortise Locks and Latches Series 1000
A156.16-08.....Auxiliary Hardware
A156.18-06.....Materials and Finishes
A156.21-09.....Thresholds
A156.22-05.....Door Gasketing and Edge Seal Systems
A156.23-04.....Electromagnetic Locks
A156.25-07 .....Electrified Locking Devices
A156.26-06.....Continuous Hinges
A156.31-07 .....Electric Strikes and Frame Mounted Actuators
A156.36-10.....Auxiliary Locks
A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Other Opening Protectives
101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle ball bearing hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless steel material.
2. Interior Doors: Type A5111 heavy weight hinges. Hinges shall be of stainless steel material.

B. Provide quantity and size of hinges per door leaf as follows:

1. Doors up to 1210 mm (4 feet) high: 2 hinges.
2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
5.
6. Doors in all widths, heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).

C. See Article below for continuous hinges.

2.2 CONTINUOUS HINGES

A. ANSI/BHMA A156.26, Grade 1-600.

1. Listed under Category N in BHMA's "Certified Product Directory."

B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete

C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.

1. Base Metal for Exterior Hinges: Stainless steel.
2. Base Metal for Interior Hinges: Stainless steel.
3. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel.
4. Provide with non-removable pin at lockable outswing doors.

5. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
6. Provide with manufacturer’s cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
7. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
8. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer’s adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

2.3 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer.

2.4 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.
   1. Door closers shall be LCN 4000 Series or Sargent 280 Series to match medical center campus standards. No Substitution.

B. Closers shall conform to the following:
   1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
   2. Where specified, closer shall have hold-open feature.
   3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
   4. Material of closer body shall be forged or cast.
   5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
   6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
   7. Closers shall have full size metal cover; plastic covers will not be accepted.
   8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.

9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½″ (38mm) minimum piston diameter.

2.5 DOOR STOPS

A. Conform to ANSI A156.16.
B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.
C. Provide wall stops where scheduled. Coordinate locations and blocking requirements with contractor for all door locations.
D. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
F. Omit stops where floor mounted door holders are required and where automatic operated doors occur.
G. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).
    1. Basis of Design: Glynn-Johnson 100S series, adjustable jamb bracket, SE version.

2.6 OVERHEAD DOOR STOPS AND HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.7 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Cylinders for all locksets shall be standard Sargent 10 Line, 6 pin type to match existing system for cylindrical locksets and 40/34 Series 6 pin type cylinders for mortise locks and exist devices. Verify with Togus VA lock shop before ordering. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer’s fire label. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the final keying.

B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Locks and latches shall be Sargent 10 Line to match Togus VA campus standard with LL trim. No Substitution.
    a. Where mortise locks are scheduled, locks shall be Sargent 8200 Series to match Togus VA campus standard with LNL trim. No Substitution.
2. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 1. All locksets and latchsets shall have lever handles fabricated from cast stainless steel. All locksets shall have dead latching latch bolts. Provide sectional (lever x rose) lever design matching Sargent LNL. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Provide lever design to match existing lever design.
2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locksets shall have dead latching latch

bolts. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Provide lever design to match existing lever design.

3. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.36.

2.8 PUSH-BUTTON COMBINATION LOCKS

A. ANSI/BHMA A156.5, Grade 1. Battery operated pushbutton entry.

B. Construction: Heavy duty mortise lock housing conforming to ANSI/BHMA A156.13, Grade 1. Lever handles and operating components in compliance with the UFAS and the ADA Accessibility Guidelines. Match lever handles of locks and latchsets on adjacent doors.

C. Special Features: Key override to permit a master keyed security system and a pushbutton security code activated passage feature to allow access without using the entry code.

2.9 KEYS

A. Furnish keys in quantities to VA lock shop as follows:

Locks/Keys	**Quantity**
Cylinder lock change key blanks	100 each different key way

2.10 KICK PLATES

A. Conform to ANSI Standard A156.6.

B. Provide protective plates as specified below:

1. Kick plates of stainless steel metal, Type J100 series.
2. Provide kick plates where specified. Kick plates shall be 254 mm (10 inches) high. Shall be minimum 1.27 mm (0.050 inches) thick. Provide kick plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick plates to within 6 mm (1/4 inch) of each edge

of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.

2.11 EXIT DEVICES

A. Exit devices shall be Sargent 80 Series to match Togus VA campus standard with lever trim to match locksets. No Substitution.

B. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

C. Surface vertical rod panics shall only be provided less bottom rod.

D. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

2.12 FLUSH BOLTS

A. Conform to ANSI A156.16. Flush bolts shall be Type L04201 unless otherwise specified.

1. Basis of Design: Ives 262 or 265, 6 inch length, double action spring holding bolt in projected or retracted position, deep cut finger hole, 1 inch bolt throw.

B. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (7/8 inch by 1-3/4 inches).

C. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.13 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flush bolt.

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.14 DOOR PULLS WITH PLATES

A. Conform to ANSI A156.6. Pull Type J401, 254 mm CTC (10 inches CTC) length by 25.5 mm (1 inch) diameter minimum with plate Type J302, 90 mm by 381 mm (3-1/2 inches by 15 inches), concealed mount, unless

otherwise specified. Provide pull with projection of 76.2 mm (3 inches) minimum and a clearance of 50.8 mm (2 inches) minimum. Cut plates of door pull plate for cylinders, or turn pieces where required.

2.15 PUSH PLATES

A. Conform to ANSI A156.6. Metal, Type J302, 203 mm (8 inches) wide by 406.4 mm (16 inches) high, beveled 4 edges. Cut plates for cylinders, and turn pieces where required.

2.16 COORDINATORS

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.17 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. Thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. Furnish thresholds for the full width of the openings, notched around stops.

2.18 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS

A. Conform to ANSI A156.22. Provide mortise or under-door type, except where not practical or indicated otherwise. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

1. Surface Mounted Automatic Door Bottom: Clear anodized extruded aluminum housing, double neoprene seal, heavy duty, adjustable plunger, internal magnet. Basis of design Zero 367AA.

2.19 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.20 SELF-ADHESIVE SEALS

A. Self-Adhesive Seals: Conform to ANSI A156.22.

1. Self-Adhesive Seals - General: Provide 1/4-inch high silicone compression bulb with MicroShield silver based anti-microbial additive, 1/2-inch width, stabilizer flange, adhesive backing. Basis of design Pemko AM88.

2. Batwing Seal: Provide .437 x .437 inch silicone double leg “batwing” adhesive backing on both legs. Basis of design Zero 8144 S-Bk-3M.

2.21 MISCELLANEOUS HARDWARE

A. Access Doors (including Sheet Metal Types): Equip each single or double metal access door with Lock Type E07213, conforming to ANSI A156.11. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Alarm Contacts (Door Position Switches): Sentrol 2500 Series or equivalent.

C. Mutes (Silencers): Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

D. Surface Bolts: Basis of Design Rockwood 580-24, 1-1/8 inch bolt throw, 1/4-inch x 3/4-inch bolt material, 24 inches bolt length, steel with 26D finish.

E. Electric Strikes: Basis of design, HES 1006 Series with SMART Pac III.

2.22 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 630.
2. Hinges --interior doors: 630.
3. Locksets, Latchsets and Exit Devices: 630.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Overhead Stops: 630.
6. Thresholds: Mill finish aluminum.
7. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.23 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652 (US26D)	Steel
626 (US26D)	Brass or bronze
630 (US32D)	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For new buildings locate hardware on doors at heights specified below, with all hand-operated hardware centered within 864 mm (34 inches) to 1200 mm (48 inches), unless otherwise noted:

B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are

mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements: For conventional hinges:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

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

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by COR. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

3.3 FINAL INSPECTION

A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.

2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

3.5 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

B. Hardware Consultant working on project furnishing the hardware will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

C. Where indicated, provide hardware for different conditions due to deduct alternates. Where deduct alternate hardware setrs are not indicated, provide the same hardware for RWC doors and for wood veneer faced doors.

ELECTRIC HARDWARE ABBREVIATIONS LEGEND:
ADO = Automatic Door Operator
EMCH = Electro-Mechanical Closer-Holder
MHO = Magnetic Hold-Open (wall- or floor-mounted)

INTERIOR SINGLE DOORS

HW-1

Doors 104A,204A

Each Door to Have: NON-RATED

1	Continuous Hinge	
1	Latchset	F75
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals	R0Y154

HW-2

Doors: 124, 230

Each Door to Have: NON-RATED

Hinges		QUANTITY & TYPE AS REQUIRED
1	Door Pull w/ Plate	J401 x J302
1	Push Plate	J302
1	Kick Plate	J102
1	Closer	C02011/C02021
1	Wall Stop	L02101 CONVEX
3	Silencers	L03011

HW-3 Sliding Doors

Doors 102, 104B, 105, 108, 112, 113, 117, 128, 129, 130, 202, 204B, 205, 207A, 215, 216, 218, 223, 234, 235, 236, 242

Each Door to Have: NON-RATED

Sliding door hardware, pulls and locks provided with doors specified in SECTION 08 36 16.13, INTERIOR FLUSH SLIDING DOORS AND FRAMES.

Doors 102, 202, 218: Provide cylinder for FSB sliding door classroom deadlock provided with sliding doors.

HW-4

Doors: 107, 125, 126, 135, 136, 206, 237 244

Each [ADO] Door to Have: NON-RATED

1	Continuous Hinge	
1	Keyed Mortise Privacy Indicator Lock	F13 x OCCUPANCY INDICATOR
1	Electric Strike	E09391 (FAIL-SECURE), 24VDC
1	Kick Plate	J102
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals	R0Y154

DOOR OPERATOR AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS. DOOR OPERATOR RELEASES ELECTRIC STRIKE.

HW-4 – Deduct Alternate #5

Delete low energy power assist operators at all restrooms.

Doors: 107, 125, 126, 135, 136, 206, 237, 244

Each Door to Have:		NON-RATED
1	Continuous Hinge	
1	Keyed Mortise Privacy Indicator Lock	F13 x OCCUPANCY INDICATOR
1	Closer	C02011/C02021
1	Kick Plate	J102
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals	R0Y154

HW-5

Door 145,228

Each Door to Have:		NON-RATED
	Hinges	QUANTITY & TYPE AS REQUIRED
1	Keyed Privacy Mortise Indicator Lock	F13 x OCCUPANCY INDICATOR
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals	R0Y154

HW-6

Doors: 106,109,

Each Door to Have:		NON-RATED
	Hinges	QUANTITY & TYPE AS REQUIRED
1	Privacy Lock	F76-MOD X OCCUPANCY INDICATOR
1	Wall Stop	L02101 CONVEX
3	Silencers	L03011

HW-7

Doors 118, 232, C15, C21

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Office Lock	F82
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals	R0Y154
1	Coat Hook	L03121

HW-8

Doors: 119, 144, 217

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Classroom Lock	F84
1	Wall Stop	L02101 CONVEX
3	Silencers	L03011

HW-9 rated storage

Doors: 149, 226, 248

Each Door to Have: RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Closer w/Delayed Action	C02011/C02021 w/Delayed Action
1	Wall Stop	L02101 CONVEX
1	Set Self-Adhesive Seals (Batwing type)	Zero 8144 S-Bk-3M

HW-10

Doors 207B (Lead-Lined), 208

Each [ADO] Door to Have: NON-RATED

1	Continuous Hinge	
1	Door Pull w/ Plate	J401 x J302
1	Push Plate	J302
1	Concealed Overhead Stop 90°	C01541-ADJUSTABLE
1	Set Self-Adhesive Seal	R0Y154

AUTO DOOR OPERATOR AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS.

HW-11

Doors:147, 233, 240, 243

Each Door to Have: RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
3	Silencers	L03011

HW-12

Doors: 227

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Wall Stop	L02101 CONVEX
3	Silencers	L03011

HW-13

Doors: 110

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Concealed Overhead Stop 110°	C11541
3	Silencers	L03011

HW-14

Doors: 143, 239

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Kick Plate	J102 (@ STORAGE, EVM, & HAC ROOMS ONLY)
1	Wall Stop L02101 CONVEX	
3	Silencers	L03011

HW-15

Door 142

Each Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Threshold	J32300 x 57 MM WIDTH (2-1/4 INCHES)
1	Auto Door Bottom	R3B334– HEAVY DUTY SURFACE ZERO 367
1	Set Self-Adhesive Seals (Batwing type)	ZERO 8144 S-Bk-3M
1	Set Acoustical Seals	PEMKO 350CSR – ADJUSTABLE

INTERIOR PAIRS OF DOORS

HW-16

Doors: 127, 146A, 146B, 209C, 209D, 210A, 210B

Each [ADO] Double-Egress Pair to Have: NON-RATED

2	Continuous Hinges	
2	Push Plate	J304 8″ x 16″
2	Floor Stop	L02121 x 3 FASTENERS
2	Silencers	L03011

DOOR OPERATORS (BOTH LEAFS) AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS. BOTH LEAFS OPEN UPON PUSH-PAD ACTIVATION. POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13.11).

HW-17

Door 238

Each Pair to Have: RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Set Auto Flush Bolts	TYPE 25 LESS BOTTOM BOLT
1	Storeroom Lock	F86
1	Coordinator	TYPE 21A
1	Overlapping Astragal Smoke Seal	Equal to Pemko 375CR
2	Closers	C02011/C02021
2	Wall Stops	L02121 x 3 FASTENERS
1	Set Self-Adhesive Seals	R0Y154

HW-18

Doors 140, 229, 246

Each Pair to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Surface Bolt	L04131
2	Wall Stops	L02101 CONVEX
2	Silencers	L03011

HW-19

Door 133

Each Pair to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F86
1	Flush Bolt	L04201
2	Silencers	L03011

EXTERIOR SINGLE DOORS

HW-20

Door 301

Each Door to Have: NON-RATED

1	Continuous Hinge	
1	Storeroom Lock	F86 (KEY ON INTERIOR SIDE OF DOOR)
1	Closer	C02011/C02021 HO ARM
1	Kick Plate	J102
1	Threshold (outswing door)	J32120 x SILICONE GASKET
1	Door Sweep	R0Y416
1	Set Frame Seals	R0Y164
1	Drip	R0Y976

SECURITY HARDWARE ABBREVIATIONS LEGEND:

AC = Access Control Device (Card reader, biometric reader, keypad, etc.)
ADO = Automatic Door Operator
DEML = Delayed Egress Magnetic Lock
DEPH = Delayed Egress Panic Exit Device
DPS = Door Position Switch (Door or Alarm Contact)
EL = Electric Lock or Electric Lever Exit Device
PB = Push-button Combination Lock (stand-alone)
RR = Remote Release Button
ELR = Electric Latch Retraction Exit Device
REX = Request-to-Exit Switch in Latching Device Inside Trim

INTERIOR SINGLE SECURITY DOORS

HW-21

Doors: 148, 245
Each [AC, ES, REX, DPS] Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electric Strike	E09311 (FAIL-SECURE), 12V/24VDC FIELD SELECTABLE
1	Storeroom Lock	F86
1	Closer	C02011/C02021
1	Floor Stop	L02121 x 3 FASTENERS
3	Silencers	L03011
1	Alarm Contact (DPS)	

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.
CARD READER BY DIVISION 28.
CONDUIT AND WIRING BY DIVISION 26.
CARD W/PINPAD READER, REGULATED AND FILTERED POWER SUPPLY, 24VDC, AMPERAGE AS REQUIRED BY DIVISION 28. DOOR POSITION SWITCH SENDS NOTIFICATION DOOR IS NOT CLOSED. REX SHUNTS DPS.

HW-22

Doors 137, 247

Each [AC, ES, REX, DPS] Door to Have: NON-RATED

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electric Strike	E09311 (FAIL-SECURE), 12V/24VDC, FIELD SELECTABLE, LATCH BOLT MONITOR
1	Storeroom Lock	F86
1	Closer	C02011/C02021
3	Silencers	L03011
1	Wall Stop	L02101 CONVEX
1	Alarm Contact (DPS)	

CONDUIT AND WIRING BY DIVISION 26.

CARD W/PINPAD READER, REGULATED AND FILTERED POWER SUPPLY, 24VDC, AMPERAGE AS REQUIRED BY DIVISION 28. DOOR POSITION SWITCH SENDS NOTIFICATION DOOR IS NOT CLOSED. LATCH BOLT MONITOR SENDS NOTIFICATION LATCH BOLT IS HELD IN RETRACTED POSITION. REX SHUNTS DPS.

INTERIOR PAIRS OF SECURITY DOORS

HW-23

Doors 127B

Each [AC, ADO, REX, DPS] Double Egress Pair to Have: NON-RATED

1	Continuous Hinge	
1	Continuous Transfer Hinge	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
1	Electrified Exit Device (Active Dummy Rail with REX Signal Switch)	TYPE 1 (E01-REX) Provide plug in wiring harness from hinge to exit device
1	Push Plate	J302
2	Floor Stops	L02121 x 3 FASTENERS
2	Alarm Contacts (Door Position Switch)	
2	Silencers	L03011

CONDUIT, AND WIRING BY DIVISION 26.

MAGNETIC LOCKS, CARD READER BY DIVISION 28. EXIT FROM SCA CORRIDOR BY EXIT DEVICE REX SIGNAL SWITCH OR BY PRESSING DOOR OPERATOR PUSH PAD RELEASING MAGNETIC LOCK. CARD READER ACCESS FROM HOSPITAL CORRIDOR RELEASING MAGNETIC LOCK. DOOR OPERATOR PUSH PAD FROM HOSPITAL CORRIDOR FUNCTIONS AFTER CARD ACTIVATION. PRESSING DOOR OPERATOR PUSH PAD FROM HOSPITAL CORRIDOR DOES NOT RELEASE MAGNETIC, OPERATOR CYCLES OFF. ALARM

CONTACTS SIGNAL TO SECURITY THROUGH ACCESS CONTROL SYSTEM IF DOOR ENTRY VIOLATION OCCURS AFTER HOURS.

DOOR OPERATOR (BOTH LEAFS) AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS. POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13.11)

HW-23– Deduct Alternate #5

Delete card access controls and magnetic locks.

Doors 127B

Each Double Egress Pair to Have:		NON-RATED
1	Continuous Hinge	
1	Continuous Transfer Hinge (for future access controls)	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
1	VR Exit Device LBR	TYPE 2 (E01) (REX for future access controls) Provide plug in wiring harness from hinge to exit device. Provide plug in wiring harness from hinge to above ceiling for future access controls connection.
1	Storeroom Lock	F86 Open back strike (locate to engage deadlatch)
1	Push Plate	J302
2	Closer	C02011/C02021
2	Floor Stops	L02121 x 3 FASTENERS
2	Silencers	L03011

CONDUIT, AND WIRING BY DIVISION 26.

EXIT DEVICE EXIT DEVICE FROM SCA AT ALL TIMES. ADJACENT LEAF FROM HOSPITAL CORRIDOR UNLOCKED DURING DAY BY RETRACTING FLUSH BOLT. NO ENTRY FROM HOSPITAL CORRIDOR AFTER HOURS.

HW-24

Doors 209B

Each [AC, ADO, REX, DPS] Pair to Have:		NON-RATED
2	Continuous Transfer Hinge	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
2		Electrified Exit Device TYPE 1 (E01-REX) Provide plug in wiring (Active Dummy Rail with REX harness from hinge to exit device

	Signal Switch)	
2	Floor Stops	L02121 x 3 FASTENERS
2	Alarm Contacts (DPS) (Door Position Switch)	
2	Silencers	L03011

CONDUIT, AND WIRING BY DIVISION 26.

MAGNETIC LOCKS, CARD READER BY DIVISION 28. EXIT FROM SCA CORRIDOR BY EXIT DEVICE REX SIGNAL SWITCH OR BY PRESSING DOOR OPERATOR PUSH PAD RELEASING MAGNETIC LOCKS. CARD READER ACCESS FROM HOSPITAL CORRIDOR RELEASING MAGNETIC LOCKS. DOOR OPERATOR PUSH PAD FROM HOSPITAL CORRIDOR FUNCTIONS AFTER CARD ACTIVATION. PRESSING DOOR OPERATOR PUSH PAD FROM HOSPITAL CORRIDOR DOES NOT RELEASE MAGNETIC, OPERATOR CYCLES OFF. ALARM CONTACTS SIGNAL TO SECURITY THROUGH ACCESS CONTROL SYSTEM IF DOOR ENTRY VIOLATION OCCURS AFTER HOURS.

DOOR OPERATOR (BOTH LEAFS) AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS. POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13.11)

HW-24– Deduct Alternate #5

Delete card access controls and magnetic locks.

Doors 209B

Each [REX, DPS]Double Egress Pair to Have:		NON-RATED
2	Continuous Transfer Hinge (for future access controls)	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
2	VR Exit Device LBR W/Lever Trim	TYPE 2 (E01) (F09 Storeroom) (REX for future access controls) Provide plug in wiring harness from hinge to exit device. Provide plug in wiring harness from hinge to above ceiling for future access controls connection.
1	Flush Bolt	L04201
1	Push Plate	J302
2	Closer	C02011/C02021
2	Floor Stops	L02121 x 3 FASTENERS
2	Silencers	L03011
2	Alarm Contacts (DPS)	(For future access controls. Run wiring to above ceiling)

CONDUIT, AND WIRING BY DIVISION 26.

EXIT DEVICE EXIT DEVICE FROM SCA AT ALL TIMES. LEVERS FROM HOSPITAL CORRIDOR LOCKED, ACCESS BY KEY DURING DAY.

HW-25

Doors 127A, 209A

Each [AC, REX, DPS] Double Egress Pair to Have: NON-RATED

1	Continuous Hinge	
1	Continuous Transfer Hinge	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
1	Electrified Exit Device (Active Dummy Rail with REX Signal Switch)	TYPE 1 (E01-REX) Provide plug in wiring harness from hinge to exit device.
1	Push Plate	J302
1	Closer 90° HO Arm	C02051/C02061
1	Closer 120° HO Arm	C02051/C02061
2	Floor Stops	L02121 x 3 FASTENERS
2	Alarm Contacts2 Floor Stops	L02121 x 3 FASTENERS
2	Alarm Contacts (Door Position Switch)	
2	Silencers	L03011

CONDUIT, AND WIRING BY DIVISION 26.

MAGNETIC LOCKS, CARD READER BY DIVISION 28. ACCESS CONTROL SYSTEM PROGRAMED TO UNLOCK DOORS BY DAY, WITH DOORS HELD OPEN WITH CLOSER ho ARMS. CARD READER ACCESS FROM HOSPITAL LOBBY AFTER HOURS. EXIT BY EXIT DEVICE REX SIGNAL SWITCH FROM WAITING CORRIDOR RELEASING MAGNETIC LOCKS AFTER HOURS. ALARM CONTACTS SIGNAL TO SECURITY THROUGH ACCESS CONTROL SYSTEM IF DOOR ENTRY VIOLATION OCCURS AFTER HOURS.

HW-25 – Deduct Alternate (#5)

Delete card access controls and magnetic locks.

Doors 127A, 209A

Each Double Egress Pair to Have: NON-RATED

1	Continuous Hinge	
1	Continuous Transfer Hinge (for future access controls)	4-THRUWIRE TRANSFER x IN-HINGE ACCESS PANEL
1	VR Exit Device LBR future w/Lever	TYPE 2 (F08 Entrance) (E01) (REX for access controls)

		Provide plug in wiring harness from hinge to exit device, and from hinge to above ceiling.
1	Flush Bolt	L04201
1	Push Plate	J302
1	Closer 90° HO Arm	C02051/C02061
1	Closer 120° HO Arm	C02051/C02061
2	Floor Stops	L02121 x 3 FASTENERS
2	Silencers	L03011
2	Alarm Contacts (DPS)	(For future access controls. Run wiring to above ceiling)

CONDUIT, AND WIRING BY DIVISION 26.

EXIT DEVICE UNLOCKED BY DAY AND ADJACENT LEAF UNLOCKED BY RETRACTING FLUSH BOLT. DOORS HELD OPEN BY DAY WITH CLOSER HOLD OPEN ARMS. EXIT DEVICE FROM WAITING CORRIDOR AFTER HOURS.

HW-26

Door 115

Each Door to Have:

ICU sliding door hardware and pulls provided with ICU sliding doors specified in Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

HW-26 – Deduct Alternate (#5)

Delete ICU breakaway door 115 and provide 4’0” x 7’0” medium stile full height glass aluminum storefront swing door.

Door: 115

Each Door to Have: NON-RATED

1	Continuous Hinge	
1	Latchset	F75
1	Concealed Overhead Friction Stop 110°	C11541 GJ100F – VERIFY WITH VA BEFORE ORDERING

Perimeter head and jamb seals specified with aluminum swing door frame in Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

HW-27

Doors 139A, 139B

Each Door to Have:

Sliding door hardware and pulls provided with doors specified in SECTION 08 36 20.13, INTERIOR RESIN PANEL SLIDING DOORS.

HW-28

Temporary Construction Doors - 90 Minute Rated Hinges

1 Push-button Combination Lock N3 – A156.13 F07 G1 E06

1 Closer

1 Stop

1 Set Self-Adhesive Seals

1 Sill brush weatherstripping

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SECTION 08 71 13.11
LOW ENERGY POWER ASSIST DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low-energy, power-assisted automatic swing door operators.

1.2 RELATED REQUIREMENTS

A. Commissioning; Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

B. Steel Doors; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

C. Wood Doors; Section 08 14 00, INTERIOR WOOD DOORS.

D. Door Hardware; Section 08 71 00, DOOR HARDWARE.

E. Electric General Wiring, Connections and Equipment Requirements; Division 26, ELECTRICAL.

1.3 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. B209-14 - Aluminum and Aluminum-Alloy Sheet and Plate.
2. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. Builders Hardware Manufacturers Association, Inc. (BHMA):

1. 156.19-07 - Power Assist and Low Energy Power Operated Doors.

1.4 PREINSTALLATION MEETINGS

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

1. Required Participants:
   a. Contracting Officer's Representative.
   b. Architect/Engineer.
   c. VA Interior Designer.
   d. Contractor.
   e. Installer.
   f. Manufacturer's field representative.
   g. Other installers responsible for adjacent and intersecting work, including electrical wiring installers.
2. Review installation and operation requirements, including the following:

a. Operator and push pad mounting locations. Concealed blocking locations for mounting of operators and push pad controls to provide secure attachment.
b. Electric strike requirements.
c. Line and low voltage wiring requirements.
d. Robot wireless activation.

1.5 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Submittal Drawings:
1. Show size, configuration, and fabrication and installation details.
2. Show location of operators, identifying which side of door opening operators to be located.
C. Manufacturer's Literature and Data:
1. Description of each product.
2. Maintenance manuals.
3. Installation instructions.
4. Warranty.
D. Samples:
1. Door Operator: Full sized, complete assembly.
2. Approved samples may be incorporated into work.
E. Certificates: Certify products comply with specifications.
1. Show door operator is UL Listed for specified application.
F. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.
2. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
B. Installer Qualifications:
1. Shall be an authorized trained installer by the door operator manufacturer. Installer shall have not less than 3 years' experience installing specified operators.

1.7 DELIVERY

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

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

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

1.8 STORAGE AND HANDLING

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

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Power assisted automatic door equipment accommodating normal traffic as well as the weight of the doors; UL approved and comply with applicable codes.

2.2 SYSTEM PERFORMANCE

A. Opening Force: Maximum 67 N (15 lbf.).

B. Cycle Tests: 300,000 cycles.

1. Use the widest and heaviest door specified as a test specimen. Narrower or lighter doors of the same configurations will be considered to meet the cycle test requirements.

2.3 MATERIALS

A. Aluminum:

1. Sheet: ASTM B209.
2. Extrusions: ASTM B221.

2.4 PRODUCTS - GENERAL

A. Provide automatic door operators from one manufacturer.

1. Product: Automatic door operators shall be Horton 7000 to match remainder of operators in Togus VAMC facility, no substitution.
   a. Lead Lined Doors 207B, 208: Automatic door operators shall be Horton 4000.

2.5 LOW-ENERGY AUTOMATIC DOOR OPERATORS

A. Conform to BHMA A156.19.

B. Mounting: Surface-mounted.

C. Enclosure: Self-contained within an extruded aluminum housing (alloy 6063-T6) to conceal operator mechanism and mounting brackets and with

removable access cover with an overall maximum size of 140 mm (5-1/2 inches) wide by 150 mm (6 inches) deep.

D. Safety Features:
   1. Adjustable time delay.
   2. Adjustable speed for opening and closing operations.
   3. Adjustable backcheck.
   4. Re-activation sensor mounted on the push-side door face near the top detect any person standing in the door swing path and prevent the door from closing.
   5. Motion sensor to detect any person standing in the door swing path and prevent the door from opening.
      a. Adjustable door sensor system providing complete operation and safety zone coverage.

2.6 OPERATION

A. Traffic Operation:
   1. Single Door: One way.
      a. Locate on room side.
   2. Double Doors: Double egress.
      a. Provide operators for both leafs on same side of doors with continuous header across full width of opening. Operators shall be located on the side of door with the least public viewing.

B. Operator: Electromechanical; surface-mounted.
   1. Operators to have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle.
   2. Operators to recycle doors instantaneously to full open position from any point in closing cycle when control switch is reactivated.
   3. Operators to allow manual door control in event of power failure.

C. Controls: Solid-state type.

D. Activation: Push-plate switch, hardwired; 4-3/4 inch by 4-3/4 inch stainless steel, engraved text “push to open,” flush mount.
   1. Wireless: Provide wireless radio control receiver in addition to push-plate activation to permit robot passage.
      a. Location: Doors 146A and 146B.
      b. Coordinate with robot remote control wireless transmitter frequency,
         1) Robot Transmitter Frequency: 900 MHz.
   2. Provide electric strike interface module to permit sequencing, push pad releases electric strike and activates operator.

a. See Section 08 71 00, DOOR HARDWARE, hardware sets for locations of door operators and electric strikes.

3. At doors with card access, low energy power assist operators shall interface with the card access system, providing a fully functional integrated system.

2.7 FINISHES

A. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-MI2C22A31; Class 2 Architectural.

2.8 ACCESSORIES

A. Signage: BHMA standard for operation and door type specified.

B. Fasteners: Corrosion-resistant, compatible with adjoining materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions effecting work, including door and frame preparation and electrical rough-ins.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.

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

B. Coordinate installation of equipment with other related work.

C. Mount manual controls and power disconnect switches recessed or semi-flush in partitions.

D. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment in finish work.

3.3 ADJUSTING

A. All equipment, including time delay switches, to be accessible for maintenance and adjustment.

B. Adjust operators to function properly for the type o£ traffic (pedestrians) expected to pass through doors.

C. Adjust each door leaf of pairs of doors to open and close in synchronization.

D. On pairs of doors, adjust operators allowing either door to be opened manually without the other door opening.

3.4 DEMONSTRATION AND TRAINING

A. Instruct VA personnel in proper door operator operation and maintenance.
   1. Trainer: Manufacturer approved instructor.

B. Submit training plan and trainer qualifications. See Section 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS.

C. Acceptance Condition: After completing work, operate door operators 15 consecutive calendar days without breakdown.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the following:
   1. Glass.
   2. Decorative privacy window film.
   3. Glazing materials and accessories for both factory and field glazed assemblies.

1.2 RELATED WORK:

A. Inspection, Documentation and Testing of Exterior Building Envelope: Section 07 08 00, FACILITY EXTERIOR CLOSURE COMMISSIONING.

B. Factory glazed by manufacturer in following units:
   1. Factory Glazed Wood Doors: Section 08 14 00, INTERIOR WOOD DOORS.
   2. Aluminum Storefront: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONT.
   3. Aluminum Framed Sliding Doors: Section 08 36 16.13, INTERIOR FLUSH SLIDING DOORS AND FRAMES.
   4. Mirrors: Section 10 28 00, TOILET ACCESSORIES.
   5. Factory-Glazed Aluminum Windows: Section 08 51 13, ALUMINUM WINDOWS.
   6. Pass Windows: Section 08 56 19, PASS WINDOWS.

1.3 LABELS:

A. Temporary labels:
   1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
   2. Label in accordance with NFRC label requirements.
   3. Temporary labels are to remain intact until glass is approved by Contracting Officer Representative (COR).

B. Permanent labels:
   1. Locate in corner for each pane.
   2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
      a. Tempered glass.
      b. Laminated glass or have certificate for panes without permanent label.

1.4 PERFORMANCE REQUIREMENTS:

A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual, GANA Laminated Glazing Manual, and GANA Sealant Manual, as applicable to project. Installed glazing is

to withstand applied loads, thermal stresses, thermal movements, building movements, permitted tolerances, and combinations of these conditions without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; unsafe engagement of the framing system; deflections beyond specified limits; or other defects in construction.

1.5 SUBMITTALS:

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

B. Manufacturer's Literature and Data:

1. Glass, each kind required.
2. Aluminum glazing channels
2. Glazing cushion.
3. Sealing compound.

1.6 DELIVERY, STORAGE AND HANDLING:

A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.7 PROJECT CONDITIONS:

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

1.8 APPLICABLE PUBLICATIONS:

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

B. American Architectural Manufacturers Association (AAMA):

800.....Test Methods for Sealants
810.1-77.....Expanded Cellular Glazing Tape

C. American National Standards Institute (ANSI):

Z97.1-14.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test

D. ASTM International (ASTM):

C864-05(R2011).....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

C920-14a.....Elastomeric Joint Sealants

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

C1172-14.....Laminated Architectural Flat Glass

E. Code of Federal Regulations (CFR):

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

F. Glass Association of North America (GANA):

2010 Edition.....GANA Glazing Manual

2008 Edition.....GANA Sealant Manual

2009 Edition.....GANA Laminated Glazing Reference Manual

G. International Code Council (ICC):

IBC.....International Building Code

H. National Fenestration Rating Council (NFRC)

I. Safety Glazing Certification Council (SGCC) 2012:

Certified Products Directory (Issued Semi-Annually).

J. U.S. Veterans Administration:

Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety Protected

Physical Security Design Manual for VA Facilities (VAPSDG); Mission Critical Facilities

Architectural Design Manual for VA Facilities (VASDM)

K. Environmental Protection Agency (EPA):

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

PART 2 - PRODUCT

2.1 GLASS:

A. Provide minimum thickness stated and as additionally required to meet performance requirements.

1. Provide minimum 6 mm (1/4 inch) thick glass units unless otherwise indicated.

B. Obtain glass units from single source from single manufacturer for each glass type.

2.2 HEAT-TREATED GLASS:

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

B. Clear Tempered Glass:
   1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
   2. Location: Aluminum storefront, ICU doors and H.M. frames.

2.3 LAMINATED GLASS:

A. Laminated Glass: ASTM C1172. Two or more lites of clear float glass (ASTM C1036, Type I, Class 1, Quality q3) bonded with polyvinyl butyral, ionomeric polymer, or cast-in-place and cured-transparent-resin interlayer complying with interlayer manufacturer's written instructions.

B. Interlayer: Use 1.5 mm (0.060 inch) thick interlayer.

C. Interlayer Color: Clear.

D. Bottom and Vertical Edges: Beveled and polished.
   1. Silicone glazed butt joints, square edge to receive structural silicone sealant.
   2. Outside Corners: Mitered with outside corner edge beveled, structural silicone joints.

E. Location: Sliding pass windows and stationary panels.

2.4 DECORATIVE PRIVACY WINDOW FILM

A. Decorative Privacy Window Film, WF1: Decorative, UV-resistant, polyester film, 0.05 mm thick, with acrylic adhesive and scratch resistant hard coat for application to interior glass surfaces.
   1. Basis-of-Design Product: 3M Commercial Window Films; 3M Fasara, Glace, No. SH2MAGL.

B. Opaque, Blackout Window Film, WF2: Opaque, UV-resistant, polyester film, 0.05 mm thick, with acrylic adhesive and scratch resistant hard coat for application to interior glass surfaces.
   1. Basis-of-Design Product: 3M Commercial Window Films; 3M Fasara, Opaque White, No. SH2MAOW.

2.5 GLAZING ACCESSORIES:

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

B. Setting Blocks: ASTM C864:
   1. Silicone type.
   2. Channel shape; having 6 mm (1/4 inch) internal depth.
   3. Shore A hardness of 80 to 90 Durometer.
   4. Block lengths: 50 mm (2 inches).
   5. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
   6. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Glazing Tapes:
   1. Semi-solid polymeric based closed cell material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
   2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
   3. Complying with AAMA 800 for the following types:
      a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

D. Glazing Sealants: ASTM C920, silicone neutral cure:
   1. Type S.
   2. Class 25 or 50 as recommended by manufacturer for application.
   3. Grade NS.
   4. Shore A hardness of 25 to 30 Durometer.
   5. VOC Content: For sealants used inside the weatherproofing system, not more than 250 g/L or less when calculating according to 40 CFR 59, (EPA Method 24).

E. Structural Sealant: ASTM C920, silicone acetoxy cure:
   1. Type S.
   2. Class 25.
   3. Grade NS.
   4. Shore a hardness of 25 to 30 Durometer.

5. Color: Clear.

F. Channel Frame for Stationary Glass Panels: Extruded aluminum channel sized for panel thickness; clear anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION:

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

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

3.2 PREPARATION:

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

B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

D. Verify that components used are compatible.

E. Clean and dry glazing surfaces.

F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION – GENERAL:

A. Install in accordance with GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, and IGMA TM-3000 unless specified otherwise.

B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

C. Set glazing without bending, twisting, or forcing of units.

D. Do not allow glass to rest on or contact any framing member.

E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

G. Laminated Glass:
   1. Tape edges to seal interlayer and protect from glazing sealants.
   2. Do not use putty or glazing compounds.
   3: Pass Windows: Comply with Section 08 56 19, PASS WINDOWS sliding door manufacturer’s requirements for hanging sliding panels and setting stationary sidelight panels.

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

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

3.5 INSTALLATION OF DECORATIVE GLAZING FILM

A. Decorative Glazing Film: Clean existing glass to remove all paint, dirt, films, smears and lint. Apply film squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in single sheet completely overlaying the back face of clean, dry glass, according to manufacturer's written instructions, including surface preparation and application temperature limitations.
   1. Glazing film to be installed at indicated locations prior to the start of construction as indicated on Phasing Schedule and Phasing Plans.

3.6 REPLACEMENT AND CLEANING:

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.7 PROTECTION:

A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

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

B. This section includes the shot blasting of the entire slab under the existing built-up asphaltic roofing surface being removed (first floor), that is becoming the walking surface for the new first floor.

1. This section includes the placement of a self-leveling underlayment over the entire slab.

C. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment.

1.2 RELATED WORK

A. Section 09 65 16, RESILIENT SHEET FLOORING

B. Section 09 65 19, RESILIENT TILE FLOORING.

1.3 SUBMITTALS

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

B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer

C. Product Data:

1. Moisture remediation system
2. Underlayment Primer
3. Cementitious Self-Leveling Underlayment
4. Cementitious Trowel-Applied Underlayment

D. Field Measurement Data: Perform survey of first floor to verify flatness of slab. Measure slab elevation in not more than an 8 foot grid pattern over the entire slab to establish slab elevation and required cementitious self-leveling underlayment thickness. Include elevation of adjacent floor slabs at existing building where new door openings occur.

1. Provide assessment of existing slab conditions and required cementitious self-leveling underlayment thickness.

1.4 DELIVERY AND STORAGE

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

B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

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

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

D4259-*88 (2012)*	Standard Practice for Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.
C109/C109M *-12 (2012)*	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) Modified Air Cure Only
D7234-*12 (2012)*	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
E96/E96M - 12 ***(2012)***	Standard Test Methods for Water Vapor Transmission of Materials
F710-*11 (2011)*	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
F1869-*11* *(2011)*	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-*11* *(2011)*	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C348-08 ***(2008)***	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C191-13 ***(2013)***	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle

PART 2 - PRODUCTS

2.1 MOISTURE REMEDIATION COATING

A. System Descriptions:

1. High-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment.

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

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers and installation method. Verify

compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Liquid applied coating:
   a. Resin: epoxy.
   b. Formulation Description: Multiple component high solids.
   c. Application: Per manufacturer's written installation requirements.
   d. Thickness: Minimum 10 mils

D. Material Vapor Permeance: Application shall achieve a permeance rating of less than 0.1 perm in accordance with ASTM E96/E96M.

E. Maximum RH requirement: 100% testing in accordance with ASTM F2170.

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

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

A. System Descriptions:

1. High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.
   a. Resurface first floor slab after removal of roof system.
   b. Apply over moisture remediation coating to serve as an absorptive surface for the application of conventional adhesives.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.

C. System Characteristics:

1. Wearing Surface: smooth

2. Thickness: Per architectural drawings, ranging from feathered edge to 1/2-inch, per application.

D. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

E. Compressive Strength: Minimum 4100 psi in 28 days in accordance with ASTM C109/C109M.

F. Flexural Strength: Minimum 1000 psi in 28 days in accordance with ASTM C348

G. Dry Time: Underlayment shall receive the application of floor coverings in 16 hours.

H. Primer: Compatible and as recommended by manufacturer for use over intended substrate

I. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Primer:
   a. Resin: copolymer
   b. Formulation Description: Single component ready to use.
   c. Application Method: Squeegee and medium nap roller.
      All puddles shall be removed, and material shall be allowed to dry, 1-2 hours at 70F/21C.
   d. Number of Coats: (1) one.
2. Grout Resurfacing Base:
   a. Formulation Description: Single component, cementitious self-leveling high-early and high-ultimate strength grout.
   b. Application Method: Colloidal mix pump, cam rake, spike roll.
      1) Thickness of Coat: 3/16-inch Per architectural scope.
      2) Number of Coats: One.
   c. Minimum Property Requirements:

Property	Test	Value
Compressive Strength	ASTM C109/C109M	2,200 psi @ 24 hrs 3,000 psi @ 7 days 4,700 psi @ 28 days
Initial set time Final Set time (Walkable)	ASTM C191	30-45 min. 2 to 3 hours
Bond Strength	ASTM D7234	100% bond to concrete failure
Flexural Strength	ASTM C348	1,000 psi at 28 days

2.3 CEMENTITIOUS TROWEL-APPLIED UNDERLAYMENT(PATCHING AT EXISTING FLOOR COVERING LOCATIONS, AND FOR MINOR REPAIRS AND TRANSITIONS)

A. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.

C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION (EXISTING CONCRETE SLABS WITH EXISTING FLOOR COVERINGS)

A. Existing concrete slabs with existing floor coverings:

1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.

B. Concrete shall meet the requirements of ASTM F710 and be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, old adhesives, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.

C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.

D. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.

E. Verify that concrete substrates are dry and surface is acceptable for application of specified adhesive.

F. Alkalinity: Measure surface pH in accordance with procedures provided in ASTM F710 or as outlined by qualified testing agency or flooring manufacturer’s technical representative.

G. Tolerances: Subsurface shall meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer.

Tolerance shall also not to exceed 1/4” deviation in 10’. As required, install underlayment to achieve required tolerance.

3.3 SURFACE PREPARATION (EXISTING CONCRETE SLAB AT FIRST FLOOR WITH BUILT-UP ROOFING REMOVED)

A. Existing concrete slabs with existing built-up roof (BUR) coverings:
   1. After built-up roofing materials have been removed, scrape loose material from surface.

B. General: Prepare and clean substrates according to cementitious self-leveling underlayment manufacturer's written instructions for substrate indicated. As a minimum, prepare slab by mechanical methods. No chemicals or solvents shall be used.

C. Prepare concrete substrates mechanical methods per ASTM D4259 as follows:
   1. Centrifugal-shot abrasive blasting.
   2. Comply with cementitious self-leveling underlayment manufacturer's written instructions for surface profile.

D. Verify that concrete substrates are dry.

E. Field Measurements: Perform survey of first floor to verify flatness of existing slab. Measure slab elevation in not more than an 8 foot grid pattern over the entire slab to establish slab elevation and required cementitious self-leveling underlayment thickness. Include elevation of adjacent floor slabs at existing building where new door openings occur.

3.3 MOISTURE REMEDIATION COATING:

A. Prepare surface and apply moisture remediation coating system in accordance with remedial floor coating manufacturer’s written instructions

B. Prior to remedial floor coating installation mechanically prepare the concrete surface to provide a concrete surface profile in accordance with ASTM D4259.

C. Mix and apply moisture remediation coating in accordance with manufacturer’s instructions.

D. Location: Moisture Remediation Coating with cementitious self-leveling underlayment topping.
   1. New concrete slabs receiving resilient flooring at Ground Floor.
   2. New concrete slabs receiving resilient flooring at Second Floor.

E. Moisture remediation coating surface shall be prepared to receive cementitious self-leveling underlayment topping.

3.4 CEMENTITOUS UNDERLAYMENT:

A. Install cementitious self-leveling underlayment as required to correct surface defects, floor flatness or levelness corrections to meet the tolerance requirements as or detailed on drawings, address non-moving cracks or joints, provide a smooth surface for the installation of floor covering, and meet elevation requirements detailed on drawings.

B. Prime prepared concrete surface in accordance with manufacturer's instructions.

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

D. Location and Thickness:

1. First Floor Slab: Apply 1/4-inch average thickness to entire first floor slab. Provide smooth, uniform, gradual taper where underlayment meets existing slab surfaces.
   a. Thickness shall be adjusted based upon slab flatness survey. Adjustment of cementitious self-leveling underlayment thickness, if required, will be modified accordingly in accordance with the contract.
2. Moisture Remediation Coating: Apply not less than 1/16 and not more than 1/8-inch thickness over moisture remediation coating to act as absorptive surface for conventional resilient flooring adhesives. Provide smooth, uniform, gradual taper where underlayment meets uncoated slab surfaces.

3.5 PROTECTION

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

3.6 FIELD QUALITY CONTROL

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

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SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

A. Curtainwall framing: Section 05 40 00, COLD-FORMED METAL FRAMING.

B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

C. Wood blocking to be concealed within studs walls: Section 06 10 00, ROUGH CARPENTRY.

D. Ceiling suspension systems for acoustical tile: Section 09 51 00, ACOUSTICAL CEILINGS.

E. Suspension system seismic requirements: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.

C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Studs, runners and accessories.
2. Hanger inserts.
3. Channels (Rolled steel).
4. Furring channels.
5. Screws, clips and other fasteners.

C. Shop Drawings:

1. Typical ceiling suspension system.

2. Typical metal stud and furring construction system including details around openings and corner details.
3. Typical shaft wall assembly, including fire rating required for each assembly.
4. Typical runner and gypsum board application that accommodates specified movement, and maintains the wall fire rating, and maintains acoustical sealant integrity, through repeated full deflection cycles over the life of the building.
5. Typical exterior and interior suspended ceiling and soffit details, including seismic design requirements.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C754.

1.6 SEISMIC REQUIREMENTS

A. Project Seismic Category: Seismic Design Category C, Site Class C, and Occupancy Category IV. Installed suspended ceiling systems shall comply with ASTM E580 Seismic Design Category C.

1.7 APPLICABLE PUBLICATIONS

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

B. American Society For Testing And Materials (ASTM)

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire
C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems
C635-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings
C636-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
C645-09.....Non-Structural Steel Framing Members
C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
C841-03(R2008).....Installation of Interior Lathing and Furring
C954-10.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, and resilient furring channels, with coating designation of G40 or equivalent. Provide G60 for exterior suspended ceiling system and associated supports and bracing. Hanger wires shall be stainless.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes as shown.
   1. Use C 645 steel, 20 gage, 0.75 mm (0.0296-inch) minimum base-metal (30 mil).
      a. Provide 14 gage studs for jamb studs at lead lined door openings.
   2. Runners same thickness as studs.
      a. Provide runners with leg height required to accommodate specified deflection.
      b. Runners shall accommodate movement, and maintain the wall fire rating, and maintain acoustical sealant integrity, through repeated full deflection cycles over the life of the building.
   3. Use of equivalent gage studs is not permitted. Heavier gage required for attachment of medical equipment.

B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.

C. Doubled studs for openings.

D. Studs 4267 mm (14 feet) or less in length shall be in one piece.

E. Shaft Wall Framing:
   1. Conform to rated wall construction.
   2. C-H Studs.
   3. E Studs.
   4. J Runners.
   5. Steel Jamb-Strut.

2.3 FURRING CHANNELS

A. Rigid furring channels (hat shape): ASTM C645.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. For fire rated construction: Type and size same as used in fire rating test.

C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

E. Concrete ceiling hanger inserts (anchorage for hanger wire and hanger straps): Steel, zinc-coated (galvanized), manufacturers standard items, designed to support twice the hanger loads imposed and the type of hanger used.

F. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
   a. Exterior suspended ceiling tie wire shall be non-corrosive.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

G. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

1. Fasteners for exterior locations shall be non-corrosive.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

C. Seismic Category C.

D. G60 finish for exterior soffit applications.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.

B. Space studs not more than 407 mm (16 inches) on center.

C. Cut studs less than floor to underside of structure overhead when extended to underside of structure overhead to accommodate structure deflection.
   1. Ground Floor: Cut studs and provide deflection track that will allow for 3/4-inch deflection.
   2. First Floor: Cut studs and provide deflection track that will allow for 1-1/2-inch deflection.
   3. Second Floor: Cut studs and provide deflection track that will allow for 3/4-inch deflection.

D. Unless indicated otherwise, extend studs to underside of structure (floor or roof deck) overhead, including for fire, rated partitions, smoke partitions, shafts, and sound rated partitions.
   1. Seismic Criteria: Building is in seismic category C. Building has flexible structural frame. Anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.

E. Openings:
   1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown. Jamb studs shall be one piece full height of wall.
   2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
   3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
   4. Frame jambs of lead lined door openings in stud partitions with three studs, two 14 gage studs placed back to back, plus one stud fastened flange to flange. Jamb studs shall be one piece full height of wall. Secure to structure to resist movement from power operated lead lined doors, and allow overhead deflection.

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

G. Chase Wall Partitions:
   1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
   2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).

H. Form building expansion joints as indicated.

I. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall furring-Stud System:
   1. Framed with 63 mm (2-1/2 inch) or narrower studs, 600 mm (24 inches) on center.
   2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
   3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing, or heating fixtures, recessed type plumbing fixture accessories, access panel frames, tackboards, recessed fire extinguisher cabinets and other items like auto door buttons supported by stud construction.
   1. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.
   2. Coordinate with Section 06 10 00, ROUGH CARPENTRY for installation of wood blocking and backup. Verify all blocking and supports are in place before installing wallboard.

B. At bariatric grab bars, reinforce studs to prevent deflection and displacement of steel studs and supports at maximum 1102 lbs (500 kg) loading.

3.5 INSTALLING SHAFT WALL SYSTEM

A. Conform to UL Design No. U415 System B or U438 for two-hour fire rating.

B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports

with power driven fasteners at both ends and 600 mm (24 inches) on center.

C. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.

D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.

E. Suitably frame all openings to maintain structural support for wall:

1. Provide necessary liner fillers and shims to conform to label frame requirements.
2. Frame openings cut within a liner panel with E studs around perimeter.
3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

3.6 INSTALLING SUSPENDED CEILINGS OR SOFFITS

A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and soffits. Install to comply with Seismic Design Category C.

1. Space framing at 600 mm (24-inch) centers maximum for gypsum board anchorage.

B. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

C. Concrete construction or concrete on steel decking:

1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.

D. Steel decking without concrete topping:

1. Do not fasten to steel decking.

E. Installing suspended ceiling system for gypsum board (ASTM C635 Option):

1. Install only for ceilings to receive screw attached gypsum board.
2. Install in accordance with ASTM C636.

a. Install main runners spaced 1200 mm (48 inches) on center.
b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
c. Install wall track channel at perimeter.

F. Installing Ceiling Bracing System:
1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and overhead construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling at exterior locations with down posts spaced no greater than 48 inches on center to resist 30 psf wind uplift movement.

3.7 TOLERANCES

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

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 05 40 00, COLD-FORMED METAL FRAMING, and Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

C. Glass Mat Water Resistant Backing Board: SECTION 09 30 13, CERAMIC/PORCELAIN TILING.

D. Lead lined wallboard: Section 13 49 00, RADIATION PROTECTION.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Shop Drawings:

1. Typical gypsum board installation, showing corner details, edge trim details and the like.
2. Typical acoustical assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
3. Typical shaft wall assembly.
4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

5. Typical runner and gypsum board application that accommodates specified movement, maintains the wall fire rating, and maintains acoustical sealant integrity through repeated full deflection cycles over the life of the building.

D. Samples:
1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:
1. Fire rating test, each fire rating required for each assembly.

F. Certificates: Certify that gypsum board types, gypsum backing board types, and joint treating materials do not contain asbestos material.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

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

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

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

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-08.....Application and Finishing of Gypsum Board

C919-08.....Sealants in Acoustical Applications

C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness

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

C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing
C1658-06.....Glass Mat Gypsum Panels
C1396-06.....Gypsum Board
D3678-14.....Rigid Poly Vinyl Chloride (PVC) Interior Profile Extrusions
E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):
Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):
Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.

B. Coreboard or Shaft Wall Liner Panels.
1. ASTM C1396, Type X.
2. ASTM C1658: Glass Mat Gypsum Panels,
3. Coreboard for shaft walls 600 mm (24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.

C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.

2.2 GYPSUM SHEATHING BOARD

A. ASTM C1177, Type X, coated fiberglass mat facers with moisture-resistant core, 16 mm (5/8 inch) thick.

2.3 EXTERIOR GYPSUM SOFFIT BOARD

A. ASTM C 931/C 931M and ASTM C 1396/C 1396M, weather-, sag- and warp-resistant, Type X, with manufacturer's standard tapered edges.

2.4 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet. Provide rigid PVC plastic for exterior locations.

B. Flanges not less than 32 mm (1-1/4 inch) wide with punchouts or deformations as required to provide compound bond.

C. Casing beads shall have nose bead ground for compound finish.

D. Expansion (control) joints one-piece control joint formed with V-shaped slot and removable strip covering slot opening.

E. Exterior Soffit Termination Strip: ASTM D3678, UV stabilized, PVC, architectural Z-shadow bead for 16 mm (5/8 inch) thick exterior soffit board creating 32 mm (1-1/4 inch) reveal; 10 foot lengths.
   1. Basis-of-Design Product: Trim-Tex, Inc.; Architectural Z Shadow Bead, Model AS5960.

F. Aluminum Trim: ASTM B221, extruded aluminum trim with continuous integral fin for taping into drywall; provide end caps where trim terminates at door frames and other open locations; provide the following profiles for use with 16 mm (5/8 inch) thick board:
   1. Wall Reveal (B1/AS-521): Shall form 6.35 mm (1/4-inch) reveal in wall.
   2. Base Reveal (E1/AS-523): Shall form 12.7 mm (1/2-inch) damage-resistant reveal at bottom of wall.
   3. Finish: Clear anodized.

2.5 FASTENERS

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. For exterior application, provide non-corrosive screws.

E. For fire rated construction, type and size same as used in fire rating test.

F. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.6 FINISHING MATERIALS

A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC, complying with the following.
   1. Setting-Type Joint Compound: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
   2. For topping compound, use sandable formulation.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper reinforcing tape.
   2. Exterior Gypsum Soffit Board: Fiberglass tape, USG Sheetrock Brand with cross-laminated construction. Fiberglass tape that is not cross-laminated construction is not permitted.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:
   1. All partitions, unless indicated otherwise.
   2. One side of partitions or furring:
      a. All one sided partitions, unless indicated otherwise.
   3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.

3.2 INSTALLING GYPSUM BOARD

A. Coordinate installation of gypsum board with other trades and related work.
B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
C. Moisture and Mold–Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
   1. Provide for all walls in toilet rooms above tile backer board.
   2. Provide for walls behind or adjacent to sinks.
D. Use gypsum boards in maximum practical lengths to minimize number of end joints.
E. Bring gypsum board into contact, but do not force into place.
F. Ceilings:
   1. For single-ply construction, use perpendicular application.
G. Walls (Except Shaft Walls):
   1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
   2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
   3. Stagger screws on abutting edges or ends.
   4. Tops of walls shall accommodate structure deflection. Provide specialty track and gypsum board slip joints. Runners and gypsum board application shall accommodate movement, maintaining wall fire

ratings, and maintaining acoustical sealant integrity, through repeated full deflection cycles over the life of the building.

5. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
6. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply application requirements.
8. Control Joints ASTM C840 and as follows:
   a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
   b. Not required for wall lengths less than 9000 mm (30 feet).
   c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. Acoustical Partitions, Fire and Smoke Partitions:
1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
3. For acoustical partitions, use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes.

I. Electrical and Telecommunications Boxes:
1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:
1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:

a. Install at all vertical and horizontal external corners and where shown.
b. Use screws only. Do not use crimping tool.

4. Edge Trim (casings Beads):
   a. At both sides of expansion and control joints unless shown otherwise.
   b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
   c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
   d. Where shown.
5. Aluminum Trim (Reveals): Install in accordance with manufacturer's instructions where indicated.

3.3 INSTALLING GYPSUM SHEATHING

A. Install in accordance with ASTM C840, except as otherwise specified or shown.
B. Use screws of sufficient length to secure sheathing to framing.
C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.

3.4 CAVITY SHAFT WALL

A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing for two-hour fire rating.
C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
   1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
   2. Stagger joints top and bottom in adjacent panels.
D. Gypsum Board:
   1. Two hour wall:
      a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.

b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.

c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.

2. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.

E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

3.5 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.

1. Provide Level 5 finish for walls scheduled to receive dry erase coating and high-build glazed coating.

B. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.

2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of all gypsum board construction. On fire rated partitions, provide Level 2 finish on gypsum board extending above suspended ceilings. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the smoke barrier, fire rated and acoustical construction. Sanding is not required of non-decorated surfaces.

3.6 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non-decorated surface to provide smoke tight construction and fire protection equivalent to the fire rated construction.

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SECTION 09 30 13
CERAMIC/PORCELAIN TILING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies interior ceramic, porcelain and glass tile, marble thresholds, waterproofing membranes for thin-set applications, and tile backer board.

1.2 RELATED WORK:

A. Sealing of Joints: Section 07 92 00, JOINT SEALANTS.

B. Surface Prep and Leveling of Existing Roof that becomes the First Floor: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

1.3 SUBMITTALS:

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

B. Samples:

1. Glass mosaic tile panels, 305 by 305 mm (12 by 12 inches), each type, color, size and pattern.
2. Porcelain tile, each type, color, patterns and size.
3. Wall (or wainscot) tile, each color, size and pattern.
4. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
5. Marble threshold.

C. Product Data:

1. Ceramic, glass mosaic and porcelain tile, marked to show each type, size, and shape required.
2. Glass mat water resistant backing board.
3. Elastomeric membrane and bond coat.
4. Reinforcing tape.
5. Leveling compound.
6. Latex-portland cement mortar and grout.
7. Waterproofing isolation membrane.
8. Fasteners.

D. Certification:

1. Master grade certificate, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
   a. Elastomeric membrane and bond coat.

b. Reinforcing tape.

c. Latex-portland cement mortar and grout.

d. Leveling compound.

e. Waterproof isolation membrane.

E. Installer Qualifications:

1. Submit letter stating installer’s experience.

1.4 DELIVERY AND STORAGE:

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

B. Store material to prevent damage or contamination.

1.5 QUALITY ASSURANCE:

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

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

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

1.7 APPLICABLE PUBLICATIONS:

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

B. American National Standards Institute (ANSI):

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

A118.4-12.....Latex-Portland Cement Mortar

A118.7-10.....High Performance Cement Grouts for Tile Installation

A118.10-14.....Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation

A137.1-12.....American National Standard Specifications for Ceramic Tile

C. ASTM International (ASTM):

C109/C109M-13.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)

C241/C241M-13.....Abrasion Resistance of Stone Subjected to Foot Traffic
C954-11.....Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness
C979/C979M-10.....Pigments for Integrally Colored Concrete
C1002-14.....Steel Self-Piercing Tapping Screws for the Application of Panel Products
C1027-09.....Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
C1178/C1178M-13.....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
C1353/C1353M-09(R2013)..Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser

D. Code of Federal Regulation (CFR):
40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

E. Marble Institute of America (MIA): Design Manual III-2007

F. Tile Council of North America, Inc. (TCNA):
Handbook for Ceramic Tile Installation (2014)
DCOF AcuTest-2012.....Dynamic Coefficient of Friction Test

PART 2 - PRODUCTS

2.1 TILE:

A. General: Basis-of-design products are for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. Comply with ANSI A137.1, Standard Grade, except as modified:
1. Inspection procedures listed under the Appendix of ANSI A137.1.
2. Abrasion Resistance Classification:
a. Tested in accordance with values listed in Table 1, ASTM C1027.
b. Class IV, 6000 revolutions for remaining areas.
3. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and package so tile units taken from one (1) package show the same range

in colors as those taken from other packages and match approved samples.

C. Glazed Wall Tile, CT-1: Cushion edges, glazing.
   1. Module Size: 76 by 152 mm (3 by 6 inches).
   2. Thickness: 8 mm (5/16 inch).
   3. Finish: Semigloss, opaque.
   4. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
      a. Inside and Outside Corner Trim for Field Tile:
         1) Bullnose Outside Corner: 152 by 152 mm (6 by 6 inches); Daltile Shape No. SN-4669.
         2) Coved Inside Corner: 152 by 152 mm (6 by 6 inches); Daltile Shape No. A-3601.
      b. Cove Base for Thinset Mortar Installations: Coved with square top, face size 152 by 152 mm (6 by 6 inches); Daltile Shape No. A-3601.
         1) Outside Cove Corner: Daltile Shape No. SCR-L-3601.
      c. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, face size 51 by 152 mm (2 by 6 inches); Daltile Shape No. S-4269.
         1) Bullnose Outside Edge: Surface bullnose on horizontal and vertical edges, 152 by 152 mm (6 by 6 inches); Daltile Shape No. S-4669.
   5. Basis-of-Design Product: Daltile; Semi-Glass Wall & Counter Glazed Tile.
      a. Color: Biscuit K175.

D. Porcelain Paver Tile, PT: Porcelain tile produced by the dust pressed method are to be made of approximately 50% feldspar; the remaining 50% is to be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of between 176 to 181 kg (390 to 400 lbs.).
   1. Face Size: Nominal 305 by 610 mm (12 by 24 inches).
   2. Thickness: 9.5 mm (3/8-inch).
   3. Face: Plain with cushion edges.
   4. Dynamic Coefficient of Friction: Not less than 0.42.
   5. Basis-of-Design Product: Daltile; Portfolio.
      a. Color: Dove Grey.

E. Glass Mosaic Tile, CT-2: Paper faced, factory-mounted glass mosaic tile:
   1. Sheet Size: Nominal 305 by 305 mm (12 by 12 inches).
   2. Module Size: 25 by 76 mm (1 by 3 inches) and 76 by 76 mm (3 by 3 inches).
   3. Thickness: 8 mm (5/16 inch).
   4. Basis-of-Design Product: Daltile; Color Wave, Block Random Mosaic Tile.
      a. Color: Soft Cashmere CW22.

F. Trim Shapes:
   1. Conform to applicable requirements of adjoining floor and wall tile.
   2. Use trim shapes sizes conforming to size of adjoining field wall tile unless detailed on construction documents or specified otherwise.
   3. Internal and External Corners:
      a. Square internal and external corner joints are not acceptable.
      b. External corners including edges: Use bullnose shapes.
      c. Internal corners: Use cove shapes.
      d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
      e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
      f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
      g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
      h. For glazed wall tile installed in latex-portland cement mortar, (thin set methods), use cove and surface bullnose shapes as applicable. See paragraph 2.1.B above for trim profiles for Glazed Wall Tile CT-1.

2.2 BACKER UNITS:

A. Glass Mat Water Resistant Backing Board:
   1. Use behind wall tile.
   2. Conform to ASTM C1178/C1178M.
   3. Thickness and Type: 5/8 inch, Type X.
   4. Mold-Resistance Rating: ASTM D 3273, 10.

5. Use in maximum lengths available to minimize end to end butt joints.

2.3 JOINT MATERIALS FOR BACKER UNITS:

A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 50 mm (2 inches) wide. Tape with pressure sensitive adhesive backing will not be permitted.

B. Tape Embedding Material: Latex-portland cement mortar complying with ANSI A108.01.

C. Joint material, including reinforcing tape, and tape embedding material, are to be as specifically recommended by the backer unit manufacturer.

2.4 FASTENERS:

A. Screws for Glass Mat Backer Units.

1. Standard screws for gypsum board are not acceptable.
2. Minimum 11 mm (7/16 inch) diameter bugle head, corrosion resistant coated. Coating shall meet ASTM B-117 for salt spray corrosion.
3. ASTM C954 for steel 1 mm (0.033 inch) thick.
4. ASTM C1002 for steel framing less than 0.0329 inch thick.

2.5 SETTING MATERIALS OR BOND COATS:

A. Conform to TCNA Handbook for Ceramic Tile Installation.

B. Latex-Portland Cement Mortar: ANSI A118.4.

1. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4.
2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
   a. Use white mortar only behind glass tile.

C. Elastomeric Waterproofing Membrane:

1. TCNA F112A-14 (above ground concrete).
2. ANSI A118.10.
3. One component polyurethane, liquid applied material having the following additional physical properties:
   a. Hardness: Shore "A" between 40-60.
   b. Elongation: Between 300-600 percent.
   c. Tensile strength: Between .27 - .41 Newton per square millimeter (40-60 pounds per square inch gauge).
   d. No volatile compounds (VOC).

4. Coal tar modified urethanes are not acceptable.

2.6 GROUTING MATERIALS:

A. Coloring Pigments:
   1. Pure mineral pigments, lime proof and nonfading, complying with ASTM C979/C979M.
   2. Coloring pigments may only be added to grout by the manufacturer.
   3. Job colored grout is not acceptable.
   4. Use is required in Latex-Portland Cement Grout.

B. High Performance Tile Grout: ANSI A118.7 with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).
   1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
   2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

2.7 PATCHING AND LEVELING COMPOUND:

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Provide a patching and leveling compound with the following minimum physical properties:
   1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
   2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
   3. Tensile strength – 4.1 MPa (600 psi) per ANSI 118.7.
   4. Density – 1.9.

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 101 mm (4 inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.

D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

E. Ready for use in 48 hours after application.

2.8 MARBLE:

A. Soundness Classification in accordance with MIA Design Manual III Groups.

B. Thresholds:
   1. Group A, Minimum abrasive hardness (Ha) of 10.0 per ASTM C1353/C1353M or ASTM C241/C241M.
   2. Honed finish on exposed faces.

3. Fabricate from one piece without holes, cracks, or open seams; full width of wall or frame opening; 13 mm (5/8-inch) thickness and 10 mm 3/8-inch thickness at beveled edge.
   a. Threshold Style: Hollywood double bevel, 102 mm (4 inches) wide, with 35 mm (1-3/8 inch) bevel on each side.
5. One piece full width of door opening. Notch thresholds to match profile of door jambs.

2.9 WATER:

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

2.10 CLEANING COMPOUNDS:

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic Material are not acceptable.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

A. Maintain ambient temperature of work areas at not less than 16 degrees C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three (3) days after installation.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.

C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).

D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).

E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after third day of completion of tile work.

3.2 ALLOWABLE TOLERANCE:

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

B. Variation in Plane of Wall Surfaces:

1. Not more than 3 mm in 2438 mm (1/8 inch in 8 feet) where latex-portland cement mortar setting material is used.

3.3 SURFACE PREPARATION:

A. Cleaning New Concrete:

1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, paint and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete.
2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.

B. Patching and Leveling:

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

C. Walls:

3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces that are out of required plane.

3.4 GLASS MAT WATER-RESISTANT BACKING BOARD:

A. Install in accordance with manufacturer’s instructions.

B. Treat joints with tape and latex-portland cement mortar.

3.5 MARBLE:

A. Secure thresholds in position with minimum of two stainless steel dowels.

B. Set in dry-set portland cement mortar or latex-portland cement mortar bond coat.

C. Set threshold to finish 6 mm (1/4 inch) above ceramic tile floor unless shown otherwise on construction documents, with bevel edge joint top flush with adjacent floor similar to TCNA detail TR611-14.

1. Do not extend waterproofing under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoin tile set on waterproofing with elastomeric sealant as specified in Section 07 92 00, JOINT SEALANTS.

3.6 CERAMIC TILE – GENERAL:

A. Comply with ANSI A108/A118/A136 series of tile installation standards applicable to methods of installation and TCNA Installation Guidelines.

B. Setting Beds or Bond Coats:

1. Set floor tile over elastomeric waterproofing membrane per ANSI 108.13, TCNA System F122A-14 where indicated on construction documents.
   a. Provide elastomeric waterproofing membrane over entire floor and turned up walls 3 inches for all toilet rooms.
   b. Do not install tile over waterproofing until waterproofing has cured.
2. Set wall tile installed over glass mat water-resistant backer board in latex-portland cement mortar, TCNA W245-14.
3. Set trim shapes in same material specified for setting adjoining tile.

C. Workmanship:

1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise on construction documents.
3. Form intersections and returns accurately.
4. Cut and drill tile neatly without marring surface.
5. Cut edges of tile abutting penetrations, finish, or built-in items:
   a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
   b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work is to be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:

a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
b. In areas where floor drains occur, slope tile to drains.
c. Push and vibrate tiles over 203 mm (8 inches) square to achieve full support of bond coat.

9. Walls:
a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights as indicated in construction documents with tile.
b. Finish reveals of openings with tile, except where other finish materials are indicated in construction documents.
c. Finish wall surfaces behind and at sides of casework and equipment, except those units mounted in wall recesses, with same tile as scheduled for room proper.

10. Joints:
a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise on construction documents.
b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and glass mosaic tile work.
d. Make joints in paver tile, porcelain type; maximum 3 mm (1/8 inch) wide.

11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108/A118/A136 series of tile installation standards:
a. Tile wall installations composed of tiles 203 by 203 mm (8 by 8 inches) or larger.

3.7 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH LATEX-PORTLAND CEMENT MORTAR:

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

3.8 THIN SET CERAMIC TILE INSTALLED WITH LATEX-PORTLAND CEMENT MORTAR OVER GLASS MAT WATER-RESISTANT BACKING BOARD

A. TCNA W245-14.

3.9 PORCELAIN TILE INSTALLED WITH LATEX-PORTLAND CEMENT MORTAR OVER ELASTOMERIC WATERPROOFING COAT:

A. Surface Preparation: Prepare surfaces as specified.

B. Installation of Elastomeric Membrane: ANSI A118.10 and TCNA F122A-14 (above-ground concrete).

1. Prime surfaces, where required, in accordance with manufacturer's instructions.
2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.76 to 1.3 mm (30 to 50 mils).
3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 101 mm (3 inches) above finish floor surface. Install reinforcing fabric at horizontal to vertical joints.
4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).

C. Installation of Tile over Elastomeric Membrane:
1. TCNA F122A-14.

3.10 GROUTING:

A. Grout Type and Location:
1. Grout for glazed wall and base tile, paver tile latex-portland cement grout.

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

3.17 CLEANING:

A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.

B. Methods and materials used are not permitted to damage or impair appearance of tile surfaces.

C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.

3.18 PROTECTION:

A. Keep traffic off tile floor, until grout and setting material is fully set and cured.

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

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical units.
2. Metal ceiling suspension system for acoustical ceilings, seismic design category C.

1.2 RELATED REQUIREMENTS

A. Suspension system seismic requirements: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

1.3 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
4. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. E84-15b - Surface Burning Characteristics of Building Materials.
7. E413-16 - Classification for Rating Sound Insulation.
8. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
9. E1264-14 - Classification for Acoustical Ceiling Products.

1.4 PREINSTALLATION MEETINGS

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

1. Required Participants:
    a. Contracting Officer's Representative.
    b. Architect/Engineer.
    c. VA Interior Designer.
    d. Contractor.

e. Installer.

f. Other installers responsible for adjacent and intersecting work, including sprinkler, HVAC and lighting installers.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.

a. Installation schedule.

b. Installation sequence.

c. Preparatory work.

d. Protection before, during, and after installation.

e. Installation.

f. Terminations.

g. Transitions and connections to other work.

h. Other items affecting successful completion.

3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

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

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.

2. Ceiling suspension system indicating manufacturer recommendation for each application.

3. Installation instructions, including seismic design requirements.

4. Warranty.

D. Samples:

1. Acoustical units, 150 mm (6 inches) in size, each type,

a. Submit quantity required to show full color and texture range.

2. Suspension system, trim and molding, 300 mm (12 inches) long.

3. Colored markers for access service.

4. Approved samples may be incorporated into work.

E. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.6 DELIVERY

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

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

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

1.7 STORAGE AND HANDLING

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

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

1.8 FIELD CONDITIONS

A. Environment:

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

1.9 SEISMIC REQUIREMENTS

A. Project Seismic Category: Seismic Design Category C, Site Class C, and Occupancy Category IV. Installed ceiling systems shall comply with ASTM E580 Seismic Design Category C.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

2.2 SYSTEM PERFORMANCE

A. Design product complying with specified performance:

1. Maximum Deflection: 1/360 of span, maximum.

B. Surface Burning Characteristics: When tested according to ASTM E84.

1. Flame Spread Rating: 25 maximum.
2. Smoke Developed Rating: 50 maximum.

2.3 PRODUCTS - GENERAL

A. Basis-of-Design Products: Armstrong World Industries, Inc. This information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. Provide acoustical and wood panel units from one manufacturer.

1. Provide each product exposed to view from one production run.

C. Provide suspension system from same manufacturer.

2.4 ACOUSTICAL UNITS

A. General:

1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
    a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
2. Classification: Provide type and form as follows:
    a. Type IV Units - Mineral base with membrane-faced overlay, Form 2 - Water felted, Pattern E.

B. Acoustic Panel: AT-1.

1. Size: 24 inches x 24 inches x 3/4-inch thick.
2. Edge: Beveled tegular.
3. Surface Texture: Fine textured, DuraBrite acoustically transparent membrane w/factory applied latex paint.
4. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.75.
5. CAC (Ceiling Attenuation Class): ASTM E413, 35 range.
6. LR (Light Reflectance): Minimum 0.90.
7. Dimensional Stability: Sag resistant at high humidity.
8. Antimicrobial Treatment: BioBlock Coating based, front and back.
9. Suspension System Type: A.
10. Basis-of-Design Product: Armstrong; Ultima No. 1911.

C. Acoustic Panel: AT-2.

1. Size: 24 inches x 24 inches x 3/4-inch thick.
2. Edge: Square.
3. Surface Texture: Fine textured, DuraBrite acoustically transparent membrane w/factory applied latex paint.
4. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.75.
5. CAC (Ceiling Attenuation Class): ASTM E413, 35 range.
6. LR (Light Reflectance): Minimum 0.90.
7. Dimensional Stability: Sag resistant at high humidity.
8. Antimicrobial Treatment: BioBlock Coating based, front and back.
9. Suspension System Type: A.

10. Basis-of-Design Product: Armstrong; Ultima No. 1910.

D. Acoustic Panel: AT-3.
   1. Size: 24 inches x 24 inches x 7/8-inch thick.
   2. Edge: Beveled tegular.
   3. Surface Texture: Fine textured, DuraBrite acoustically transparent membrane w/factory applied latex paint.
   4. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.80.
   5. CAC (Ceiling Attenuation Class): ASTM E413, 35 range.
   6. LR (Light Reflectance): Minimum 0.87.
   7. Dimensional Stability: Sag resistant at high humidity.
   8. Antimicrobial Treatment: BioBlock Coating based, front and back.
   9. Suspension System Type: A.
   10. Basis-of-Design Product: Armstrong; High NRC No. 1941.

E. Acoustic Panel: AT-4.
   1. Size: 24 inches x 24 inches x 5/8-inch thick.
   2. Edge: Square.
   3. Surface Texture: Smooth, unperforated, vinyl-faced membrane.
   4. NRC (Noise Reduction Coefficient): ASTM C423, Not applicable.
   5. CAC (Ceiling Attenuation Class): ASTM E413, 40 range.
   6. LR (Light Reflectance): Minimum 0.80.
   7. Dimensional Stability: Sag resistant at high humidity.
   8. Antimicrobial Treatment: BioBlock Coating based, front and back.
   9. Suspension System Type: A.
   10. Basis-of-Design Product: Armstrong; Clean Room VL Unperforated No. 868.

F. Acoustic Panel, Deduct Alternate: AT-5.
   1. Size: 24 inches x 24 inches x 5/8-inch thick.
   2. Edge: Square.
   3. Surface Texture: Fine textured, DuraBrite acoustically transparent membrane w/factory applied latex paint.
   4. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.80.
   5. CAC (Ceiling Attenuation Class): ASTM E413, 35 range.
   6. LR (Light Reflectance): Minimum 0.83.
   7. Dimensional Stability: Sag resistant at high humidity.
   8. Antimicrobial Treatment: BioBlock Coating based, front and back.
   9. Suspension System Type: A.
   10. Basis-of-Design Product: Armstrong; Dune 1772.

G. Wood Ceiling Panel: WD.

1. Sizes:
   a. 24 inches x 72 inches x 3/4-inch thick.
   b. 24 inches x 24 inches x 3/4-inch thick.
2. Edge: Square tegular.
3. Surface Veneer: Real wood veneer.
4. Perforation Pattern: Pattern W2 – Round Straight.
5. Acoustic Backer: BioAcoustic Infill Panel, Black Matte, No. 5823.
6. NRC (Noise Reduction Coefficient): ASTM C423, minimum 0.40.
7. CAC (Ceiling Attenuation Class): ASTM E413, 28 range.
8. Fire Performance: ASTM E84 Flame Spread 25 or less, Smoke Developed Index 50 or less.
9. Suspension System Type: B; Color black.
10. Basis-of-Design Products: Armstrong; Woodworks Tegular No. 6487 and 5406.
    a. Color: Constants Redux Wood Wheat (CRW).

2.5 METAL SUSPENSION SYSTEM

A. General: ASTM C635, Heavy-duty system, except as otherwise specified.
   1. Suspension System: Provide the following:
      a. G60 hot-dipped galvanized cold-rolled steel, bonderized.
         1) Provide prefinished aluminum capping for Ceiling Grid Type A.
   2. Main and Cross Runner: Use same construction Do not use lighter-duty sections for cross runners.

B. Exposed Grid Suspension System: Support of lay-in panels.
   1. Ceiling Grid Type A: Grid Width 24 mm (15/16 inch).
      a. Basis-of-Design Product: Armstrong Prelude XL with aluminum cap.
      b. Seismic Category C. Locking main beam and cross tee connections.
      c. Color: White.
   2. Ceiling Grid Type B: Grid Width 14.2 mm (9/16 inch) minimum.
      a. Basis-of-Design Product: Armstrong Suprafine XL.
      b. Seismic Category C. Locking main beam and cross tee connections.
      c. Color: Black.
   3. Molding: Fabricate from the same material with same exposed width and finish.
      a. Wall Molding: Minimum 7/8 inch width.
   4. Finish: Baked-on enamel flat texture finish.

C. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.

D. Clips: Galvanized steel, designed to secure framing member in place.

E. Wire: ASTM A641.
   1. Size:
      a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
      b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

2.6 ACCESSORIES

A. Perimeter Seal: Vinyl, polyethylene or polyurethane open cell sponge material, density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
   1. Thickness: As required to fill voids between back of wall molding and finish wall.
   2. Size: Minimum 9 mm (3/8 inch) wide strip.
   3. Location: At Type AT-4 ceilings.

B. Hold-Down Clips: Grid manufacturer's standard hold-down clips designed to prevent acoustic panel uplift from air pressure, spaced 24 inches o.c. on all cross tees.
   1. Location: Entire ceiling of pressurized rooms.

C. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.
   1. Color Code: Provide the following color markers for service identification:

Color	Service
Red	Sprinkler System: Valves and Controls
Green	Domestic Water: Valves and Controls
Yellow	Chilled Water and Heating Water
Orange	Ductwork: Fire Dampers
Blue	Ductwork: Dampers and Controls
Black	Gas: Laboratory, Medical, Air and Vacuum

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Remove existing acoustical panels and suspension system to permit new installation.
   1. Retain existing acoustical panels and suspension system for reuse where indicated.

2. Dispose of other removed materials.

3.2 INSTALLATION - GENERAL

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

3.3 ACOUSTICAL UNIT INSTALLATION

A. Applications:
   1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Layout acoustical unit symmetrically, with minimum number of joints.

C. Installation:
   1. Install acoustic tiles after wet finishes have been installed and solvents have cured.
   2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
      a. Install tile to lay level and in full contact with exposed grid.
      b. Replace cracked, broken, stained, dirty, or tile.
   3. Markers:
      a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
      b. Attach colored markers to exposed grid on opposite sides of the units providing access.
      c. Attach marker on exposed ceiling surface of upward access acoustical unit.

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

3.4 CEILING SUSPENSION SYSTEM INSTALLATION

A. General: Install according to ASTM CE580 Seismic Design Category C.
   1. Use direct or indirect hung suspension system or combination of both.
   2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
   3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.

4. Provide additional hangers located at each corner of support components.
5. Provide minimum 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.
6. Provide main runners minimum 1200 mm (48 inches) in length.
7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
8. Suspension system shall not be attached to the wall molding. Provide minimum 3/8 inch overlap of the suspension system on the wall molding. Provide minimum 3/8 inch clearance of suspension system from wall, on all sides of room.
9. Provide safety wire at corners of light fixtures and diffusers.
10. Ends of main beams and cross tees shall be ties together to prevent their spreading.

B. Direct Hung Suspension System:
   1. Support main runners by hanger wires attached directly to the structure overhead.
   2. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

C. Anchorage to Structure:
   1. Concrete:
      a. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger wire. Install in sides of concrete beams or joists at mid height.
   2. Steel:
      a. Install carrying channels for attachment of hanger wires.
         1) Size and space carrying channels to support load within performance limit.
         2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
      b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fireproofing is installed. Weld or use steel clips for beam attachment.

c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

d. Do not hang suspension system from metal roof deck.

D. Indirect Hung Suspension System:

1. Space carrying channels for indirect hung suspension system maximum 1200 mm (4 feet) on center. Space hangers for carrying channels maximum 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) or center so as to insure that specified requirements are not exceeded.
2. Support main runners by specially designed clips attached to carrying channels.
3. Do not hang suspension system from metal roof deck.

3.5 CEILING TREATMENT

A. Moldings:

1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.

B. Perimeter Seal: Ceiling Type AT-4.

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

C. Hold-Down Clips: Where hold down clip are indicated, install clips for all tile in the entire room unless indicated otherwise.

1. Tile that receive markers requiring access to equipment above shall not have hold down clips. Weight tile down to prevent displacement by placing 20 by 20 inch by 5/8-inch thick piece of gypsum board with mold-and moisture resistant facers on top of tile. Tape perimeter edges to cover raw edge and prevent gypsum dust release.

D. Existing ceiling:

1. Where extension of existing ceilings occurs, match existing.
2. Where acoustical units are indicated to be salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and

salvaged units within a space which results in contrast between old and new acoustic units.

3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.6 CLEANING

A. Remove excess adhesive before adhesive sets.

B. Clean exposed surfaces. Remove contaminants and stains.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base (RB) adhered to interior walls and partitions.
2. Resilient stair treads (RST) adhered to interior stair treads.

1.2 RELATED REQUIREMENTS

A. Sheet Flooring Integral Base: Section 09 65 16, RESILIENT SHEET FLOORING.

1.3 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. F1861-08(2012)e1 - Resilient Wall Base.

C. Federal Specifications (Fed. Spec.):

1. RR-T-650E - Treads, Metallic and Non-Metallic, Skid-Resistant.

1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data:

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

C. Samples:

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

D. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.5 DELIVERY

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

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

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

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

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

1.7 FIELD CONDITIONS

A. Environment:

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

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Provide each product from one manufacturer and from one production run.

B. Basis-of-Design Product: This information is provided for reference only; it does not exclude other manufacturer’s that comply with specified product requirements.

2.2 STANDARD RESILIENT BASE

A. Resilient Base, RB-1 & RB-2: 3 mm (1/8 inch) thick, 100 mm (4 inches) high.

1. Type: Rubber.
2. ASTM F1861, Type TP thermoplastic rubber, Group 1 (Solid).
3. Lengths: Continuous coil.

B. Applications:

1. Resilient Flooring Locations: Style B - Cove.

C. Product Profile: DC-XX.

D. Basis-of-Design Product: Johnsonite; Traditional Wall Base.

1. Colors:
   a. RB-1: 47 Brown.
   b. RB-2: 40 Black.

2.3 CONTOURED RESILIENT BASE

A. Millwork Contoured Resilient Base, PRB: .375 inch thick, 4.5 inches high.

1. Lengths: 8 feet.

B. ASTM F1861, Type TP thermoplastic rubber, Group 1 (Solid).

C. Product Profile: Mandalay MW-XX-H.

D. Basis-of-Design Product: Johnsonite; Millwork Contoured Wall Base.

1. Color: 47 Brown.

2.4 RESILIENT STAIR TREADS

A. Resilient Stair Treads with Integral Risers: Rubber, with a black grit abrasive strip insert, 5 mm (3/16 inch) thick nosing wear surface tapered to 3 mm (1/8 inch) thick at riser.

1. Fed. Spec. RR-T-650, Composition A (rubber), Type 2 (designed).
   a. Pattern: Hammered on tread; smooth on riser.
2. Nosing: Flexible, accommodating angle between tread and riser; shape suiting sub-tread.
3. Size: Single piece full stair tread width and depth.
4. Integral Risers: Smooth, flat; in height that fully covers substrate.
5. Basis-of-Design Product: Nora Systems, Inc.; Norament Grano Stairtreads.
   a. Color: 4881 Hemotite.

2.5 ADHESIVES

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

1. Provide solvent based adhesive for wall base being adhered to epoxy paint wall finish, and non-porous surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Correct substrate deficiencies.

D. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

3.2 INSTALLATION GENERAL

A. Install products according to manufacturer's instructions.

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

3.3 RESILIENT BASE INSTALLATION

A. Applications:
   1. Install resilient base in rooms scheduled on Drawings.
   2. Install resilient base on casework toe spaces.
   3. Extend resilient base into closets, alcoves, and cabinet knee spaces, and around columns within scheduled room.

B. Lay out resilient base with minimum number of joints.
   1. Length: 600 mm (24 inches) minimum, each piece.
   2. Locate joints 150 mm (6 inches) minimum from corners and intersection of adjacent materials.

C. Installation:
   1. Apply adhesive uniformly for full contact between resilient base and substrate.
   2. Set resilient base with hairline butted joints aligned along top edge.

D. Field form corners and end stops, except as indicated otherwise.
   1. Provide factory formed corners and end stops for the contoured resilient base.

E. Roll resilient base ensuring complete adhesion.

3.4 RESILIENT STAIR TREAD INSTALLATION

A. Install resilient stair treads without joints on each stair tread substrate.

B. Apply adhesive uniformly for full contact between resilient stair tread and substrate.
   1. Roll resilient stair treads ensuring complete adhesion.

3.5 CLEANING

A. Remove excess adhesive before adhesive sets.

B. Clean exposed resilient base and resilient stair treads surfaces. Remove contaminants and stains.
   1. Clean with mild detergent. Leave surfaces free of detergent residue.

3.6 PROTECTION

A. Prohibit traffic on resilient stair treads 72 hours, minimum, after installation.

B. Protect products from construction traffic and operations.
   1. Cover resilient stair treads with reinforced kraft paper, and plywood or hardboard.

2. Maintain protection until directed by Contracting Officer's Representative.

C. Replace damaged products and re-clean.

1. Damaged Products include cut, gouged, scraped, torn, and unbonded products.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Welded seam sheet flooring (WSF) with heat welded seams; provide integral cove base where indicated.

1.2 RELATED REQUIREMENTS

A. Surface Preparation for Resilient Sheet Flooring: Section 09 05 16, Subsurface Preparation for Floor Finishes.

1. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment.
2. First floor level is existing concrete receiving self-leveling underlayment, and new concrete areas to receive moisture remediation coating and self-leveling underlayment.

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

1.3 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. E648-15e1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
2. E662-15a - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
3. F1303-04(2014) - Sheet Vinyl Floor Covering with Backing.
4. F1913-04(2014) - Vinyl Sheet Floor Covering Without Backing.

1.4 SUBMITTALS

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

1. Show size, configuration, and fabrication and installation details.

B. Manufacturer's Literature and Data:

1. Description of each product.
   a. Include VOC level for adhesives and primers.
2. Installation instructions.
3. Maintenance instructions for Owner.
4. Warranty.

C. Samples:

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

D. Certificates: Certify each product complies with specifications.
   1. Heat welded seaming is manufacturer's prescribed method of installation.

E. Qualifications: Substantiate qualifications comply with specifications.
   1. Installer with project experience list.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Regularly installs specified products and is approved by the manufacturer.

1.6 DELIVERY

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

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

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

1.7 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight, conditioned facility. √

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

C. Move flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.8 FIELD CONDITIONS

A. Environment:
   1. Work Area Ambient Temperature Range: Minimum 18 to 30 degrees C (65 to 85 degrees F) continuously, beginning 48 hours before installation. Maintain room temperature above 18 degrees C (65 degrees F) after installation.

2. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

1.9 WARRANTY

A. Manufacturer's Warranty: Warrant resilient sheet flooring against material and manufacturing defects.
   1. Warranty Period for WSF-1A & WSF-1B: 5–Year Commercial Resilient Limited Warranty.
   2. Warranty Period for WSF-2: 10-Year Commercial Resilient Limited Warranty.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

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

2.2 PRODUCTS - GENERAL

A. Basis-of-Design Products: Armstrong Commercial Flooring, Inc. This information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.
B. Provide vinyl sheet color and pattern from one production run.

2.3 RESILIENT SHEET FLOORING

A. Resilient Sheet Flooring, WSF-2: ASTM F1913; Vinyl, without backing; provide integral cove base where indicated.
   1. Wear Surface: Smooth.
   2. Thickness: 2 mm (0.080 inches).
   3. Wearing Surface: Smooth.
   4. Finish: Diamond-infused UV-cured polyurethane finish.
   5. Installation Method: Welded seams.
   6. Product: Armstrong Commercial Flooring, Inc.; ColorArt Medintech with Diamond 10 Coating.
      a. Color: Neutral H5312.
B. Resilient Sheet Flooring, WSF-1A: ASTM F1303; Type I, Grade 1, Class A backing, vinyl, with backing and integral base using resilient sheet flooring WSF-1B; see Detail D1/AS-523.
   1. Wear Surface: Smooth.
   2. Wear Layer Thickness: Minimum 0.55 mm (0.022 inches).

3. Total Thickness: 2 mm (0.080 inches).
4. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
5. Minimum Width: 1200 mm (48 inches).
6. Finish: UV-cured polyurethane.
7. Integral Cove Height: 4 inches.
8. Installation Method: Welded seams.
9. Product: Armstrong Commercial Flooring, Inc.; Rejuvenations TimberLine.
    a. Color: Oak, Level Headed No. 37358 with Welding Rod WO466 Thunder.

C. Resilient Sheet Flooring, WSF-1B: ASTM F1303; Type I, Grade 1, Class A backing, vinyl, with backing. This product is the integral base for resilient sheet flooring WSF-1A; see Detail D1/AS-523.
1. Wear Surface: Smooth.
2. Wear Layer Thickness: Minimum 0.55 mm (0.022 inches).
3. Total Thickness: 2 mm (0.080 inches).
4. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.
5. Minimum Width: 1200 mm (48 inches).
6. Finish: UV-cured polyurethane.
7. Installation Method: Welded seams.
8. Product: Armstrong Commercial Flooring, Inc.; Rejuvenations StoneRun.
    a. Color: Sidecar, Last Call No. 34349 with Welding Rod W0314 Coal Black.

2.4 ACCESSORIES

A. Welding Rod: Flooring manufacturer's standard, in color matching field color of sheet flooring.

B. Adhesives: Water resistant type recommended by flooring manufacturer to suit application. VOC content to be 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24).
1. Maximum Allowable MVER: 5.0 lbs. as measured by ASTM F 1869.
2. Maximum Allowable RH: 90 percent RH as measured by ASTM F 2170.
3. Alkalinity Level: Shall have a pH between 5.0 and 11.0.
4. Product: Armstrong Commercial Flooring; S-543 Premium Plus Commercial Vinyl Sheet Flooring Adhesive.
    a. Provide S-580 Flash Cove Adhesive for integral base.

C. Base Accessories:
   1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with flooring material.
   2. Cap Strip: J-Shape extruded flanged reducer strip compatible with flooring material approximately 25 mm (1 inch) exposed height with 13 mm (1/2 inch) flange.

D. Sealant:
   1. As specified in Section 07 92 00, JOINT SEALANTS.
   2. Compatible with flooring.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Ensure interior finish work such as drywall finishing, concrete, ceiling work, and painting work is complete and dry before installation.
   1. Complete mechanical, electrical, and other work above ceiling line.
   2. Ensure heating, ventilating, and air conditioning systems are installed and operating in order to maintain temperature and humidity requirements.

D. Preparation: Concrete substrates prepared in Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.
   1. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment.
   2. First floor level is existing concrete receiving self-leveling underlayment, and new concrete areas to receive moisture remediation coating and self-leveling underlayment.

3.2 INSTALLATION - GENERAL

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

3.3 INSTALLATION OF FLOORING

A. Flooring Layout:
   1. Extend flooring wall-to-wall, under cabinets, casework, and other equipment for seamless flooring installation.

2. Arrange sheets to minimize seams.
3. Locate seams in inconspicuous and low traffic areas, minimum 150 mm (6 inches) away from parallel joints in flooring substrates.

B. Match edges of flooring for color shading and pattern at seams.
C. Install flooring flush with adjacent floor finishes.
D. Extend flooring into toe spaces, door reveals, closets, and similar openings.
E. Install flooring fully adhered to substrate.
1. Air pockets or loose edges are not acceptable.
2. Trim sheet materials tight to flooring penetrations; seal joints at pipe with waterproof sealant specified in Section 07 92 00, JOINT SEALANTS.
F. Butt joints tight, without gaps and bulges.
G. Roll flooring within 30 minutes of installation process with an articulated 45 kg (100 lb.) roller lengthwise and then again at a right angle to first line of direction per resilient flooring and adhesive manufacturers' instructions.

3.4 INTEGRAL COVE BASE INSTALLATION

A. Set preformed fillet strip at floor intersection with walls and other vertical surfaces.
B. Extend flooring over fillet strip and 100 mm (4 inches) up wall surface.
C. Form straight or radius internal and external corners to suit Application.
D. Adhere base to wall surface.
E. Terminate base exposed top edge with cap strip. Seal cap strip to wall with sealant.
F. Weld joints as specified for flooring.

3.5 HEAT WELDING

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

3.6 CLEANING

A. Remove excess adhesive before adhesive sets.
B. Clean and polish materials.

C. Vacuum floor thoroughly.

D. Perform initial maintenance according to flooring manufacturer's instructions.

1. Delay washing flooring until adhesive is fully set and welded joints can contain wash water.

3.7 PROTECTION

A. Protect flooring from traffic and construction operations.

B. Keep traffic off sheet flooring for minimum 24 hours after installation.

C. Cover flooring with reinforced kraft paper, and plywood or hardboard.

D. Remove protective materials immediately before acceptance.

E. Repair damage.

F. Buff flooring to uniform sheen.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the installation of solid vinyl tile flooring, vinyl composition tile, acoustic flooring underlayment and accessories required for a complete installation.

1.2 RELATED WORK:

A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
B. Subfloor Testing and Preparation: Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.
   1. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Adhesives, underlayment, and primers, including printed statement of VOC content.
   3. Application, installation and maintenance instructions.
C. Samples:
   1. Tile: Each type, color, thickness and finish.
   2. Edge Strips: Each type, color, thickness and finish.
D. Shop Drawings:
   1. Layout of patterns as shown on the construction documents.
   2. Edge strip locations showing types and detail cross sections.
E. Test Reports:
   1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory. Tested per ASTM F510/F510M.

1.4 DELIVERY:

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Materials from containers which have been distorted, damaged or opened prior to installation are not acceptable.

1.5 STORAGE:

A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

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

B. Furnish product type materials from the same production run.

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. ASTM International (ASTM):

D2047-11.....Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

E90-16.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

E492-09.....Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

E648-14c.....Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
E662-14.....Specific Optical Density of Smoke Generated by Solid Materials
E989-06.....Classification for Determination of Impact Insulation Class (IIC)
E2179-03.....Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
F1066-04(R2014).....Vinyl Composition Floor Tile
F1700-13a.....Solid Vinyl Floor Tile

C. Code of Federal Regulation (CFR):
40 CFR 59.....Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.
B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
C. Smoke Density: Less than 450 per ASTM E662.
D. Slip Resistance – Not less than 0.5 when tested with ASTM D2047.

2.2 PRODUCTS – GENERAL

A. Basis-of-Design Products: The information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

2.3 VINYL COMPOSITION TILE:

A. Tile Standard, VCT-1: ASTM F1066, Class 2, through-pattern tile.
   1. Wearing Surface: Smooth.
   2. Thickness: 3.2 mm (0.125 inch).
   3. Size: 305 x 305 mm (12 x 12 inches).
   4. Product: Armstrong Flooring, Inc.; Standard Exelon MultiColor.
      a. Color: Coaster Greige No. 52515.
B. Tile Standard, VCT-2: ASTM F1066, Class 2, through-pattern tile.
   1. Wearing Surface: Smooth.

2. Thickness: 3.2 mm (0.125 inch).
3. Size: 305 x 305 mm (12 x 12 inches).
4. Product: Armstrong Flooring, Inc.; Standard Exelon Imperial Texture.
   a. Color: Mid Grayed Blue No. 51875.

2.4 SOLID VINYL-TILE:

A. Solid Vinyl Tile (Plank), SVT-1: ASTM F1700, Class III, Printed Film Vinyl Tile, Type B, embossed surface; FloorScore Certified.
   1. Total Thickness: 3.0 mm (0.120 inch).
   2. Wear Layer Thickness: 32 mil.
   3. Size: 152 mm by 915 mm (6 by 36 inches).
   4. Edge Treatment: Square Edge.
   5. Installation Direction: Undirectional.
   6. Product: Tandus Centiva; Contour Collection, Event Series, Classic Plank.
      a. Color: Ash No. 3308.

B. Solid Vinyl Tile (Plank), SVT-2: ASTM F1700, Class III, Printed Film Vinyl Tile, Type B, embossed surface; FloorScore Certified.
   1. Total Thickness: 3.0 mm (0.120 inch).
   2. Wear Layer Thickness: 32 mil.
   3. Size: 152 mm by 915 mm (6 by 36 inches).
   4. Edge Treatment: Square Edge.
   5. Installation Direction: Undirectional.
   6. Product: Tandus Centiva; Contour Collection, Exotic Wood Series.
      a. Color: Crestwood No. 3625.

C. Solid Vinyl Tile, SVT-3: ASTM F1700, Class III, Printed Film Vinyl Tile, Type B, embossed surface; FloorScore Certified.
   1. Total Thickness: 3.0 mm (0.120 inch).
   2. Wear Layer Thickness: 32 mil.
   3. Size: 457 mm by 457 mm (18 by 18 inches).
   4. Edge Treatment: Square Edge.
   5. Installation Direction: As directed by Architect.
   6. Product: Tandus Centiva; Contour Collection, Modern Stone Series.
      a. Color: Camino No. 0612.

2.5 ACOUSTIC FLOORING UNDERLAYMENT

A. Acoustic Flooring Underlayment: Low VOC emitting, impermeable, high-density synthetic rubber acoustic underlayment.

1. Density: 42 oz./sq. yd.

2. Thickness: 0.056 inch.

3. Acoustical Sound Reduction:

   a. ASTM E492 & E989, IIC (Impact Insulation Class) of 66.

   b. ASTM E2179l, IIC Delta 17.

   c. ASTM E90 & ASMT E413: STC (Sound Transmission Class) 63.

4. Moisture Impermeable: ASTM E96, less than 1.0 perm.

5. Roll Size: 54 inches by 44.4 feet.

6. Weight per Roll: 58 lbs.

7. Basis-of-Design Product: Tarkett; SureStart Underlayment.

B. Installation Tape: Self adhering, waterproof flashing tape, 9.9 mil thick, with acrylic pressure sensitive adhesive.

1. Basis-of-Design Product: 3M Manufacturing; 3M All Weather Flashing Tape 8067.

2.6 ADHESIVE SYSTEM:

A. Adhesives for VCT-1 & VCT-2: Provide water-baes, latex resin adhesive for flooring and accessories as recommended by the flooring manufacturer to suit substrate conditions. VOC content to be less than the 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24). Submit manufacturer’s descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics. Adhesive shall be by flooring manufacturer.
   1. Maximum Allowable MVER: 7.0 lbs. as measured by ASTM F 1869.
   2. Maximum Allowable RH: 90 percent RH as measured by ASTM F 2170.
   3. Alkalinity Level: Shall have a pH between 5.0 and 11.0.
   4. Product: Armstrong Commercial Flooring; S-515 Floor Tile Adhesive Thin Spread.

B. Adhesives for SVT-1, SVT-2 & SVT-3: Solvent free adhesive as recommended by the flooring manufacturer to suit substrate conditions. VOC content shall be less than 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24). Submit manufacturer’s descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics. Adhesive shall be by flooring manufacturer.

1. Maximum Allowable MVER: 8.0 lbs. as measured by ASTM F 1869.
2. Maximum Allowable RH: 90 percent RH as measured by ASTM F 2170.
3. Alkalinity Level: Shall have a pH between 7.0 and 10.0.
4. Product: Tarkett; RollSmart Adhesive.

2.9 LEVELING COMPOUND FOR CONCRETE FLOORS:

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directly by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

B. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

3.2 SUBFLOOR PREPARATION:

A. Preparation: Prepare surfaces to receive resilient tile and adhesive as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.
   1. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment.
   2. First floor level is existing concrete receiving self-leveling underlayment, and new concrete areas to receive moisture remediation coating and self-leveling underlayment.

C. Preparation for Acoustic Flooring Underlayment:
   1. Due to phasing and scheduling of project, all new concrete shall receive moisture remediation coating and self-leveling underlayment. First floor level is existing concrete receiving self-leveling underlayment.

3.3 INSTALLATION OF ACOUSTIC FLOORING UNDERLAYMENT:

A. General: Install in accordance with manufacturer's written instructions for application and installation, unless specified otherwise. Underlayment is not adhered to substrate.
B. Unroll underlayment so seams run perpendicular to the tile (plank format) flooring materials (SVT-1 & SVT-2) and at a 45 degree angle to solid vinyl tile (SVT-3).
C. Butt factory seams together to achieve net fit. If a net fit cannot be achieved because of edge damage of undulations in the substrate, overlap material and double cut the underlayment.
D. Trim underlayment to fit area, leaving a 1/4-inch space at all walls and vertical obstructions.
E. Secure all seams, cuts and breaks in underlayment.
F. Remove all dust, dirt, grit, debris and scrape material for surface of underlayment prior to installing flooring material.

3.4 INSTALLATION OF FLOOR COVERINGS:

A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.
B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.
C. Tile Layout:
    1. If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned.
    2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.
    3. Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.
    4. At locations where flooring abuts products installed over acoustic flooring underlayment, shim flooring on concrete substrate with leveling compound to achieve level flooring. Slope compound not less than 12 inches, providing a gradual transition.
D. Application:
    1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate at manufacturer’s required spread rate to produce a completed installation without open cracks, voids,

raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
4. Roll tile floor with a minimum 45 kg (100 pound) roller length wise, and then again at right angle to the first line of direction per resilient flooring and adhesive manufacturers' instructions.

E. Seal joints at pipes with sealants in accordance with Section 07 92 00, JOINT SEALANTS.

F. Installation of Edge Strips:

1. Locate edge strips under center line of doors unless otherwise shown on construction documents.
2. Set resilient edge strips in adhesive.
3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION:

A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.

B. Keep traffic off resilient material for a minimum 72 hours after installation.

C. Clean flooring as recommended in accordance with manufacturer’s printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer’s written instructions.

D. When construction traffic occurs over resilient flooring, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by COR.

E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and mouldings, re-clean resilient materials.

3.5 LOCATION:

A. Unless otherwise indicated in construction documents, install tile flooring, under areas where casework and other equipment occur.

B. Extend tile flooring for room into adjacent closets and alcoves.

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SECTION 09 67 23.20
RESINOUS (EPOXY BASE) WITH QUARTZ AGGREGATE BROADCAST

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies Resinous (Resinous elastomer-modified waterproof epoxy base with natural quartz aggregate broadcast) flooring with integral cove base.

1.2 RELATED WORK

A. Floor Drains: Division 22, PLUMBING.

1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Description of each product to be provided.
2. Application and installation instructions, including surface preparation requirements.
3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.

C. Qualification Data: For Installer.

D. Samples:

1. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.

E. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:

1. Edge configurations.

F. Certifications and Approvals:

1. Manufacturer's approval of installers.
2. Contractor's certificate of compliance with Quality Assurance requirements.

1.4 QUALITY ASSURANCE

A. Manufacture Certificate: Manufacture shall certify that a particular resinous flooring system has been manufactured and in use for a minimum of five (5) years.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a

minimum period of five (5) years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
2. Contractor shall have completed at least ten (10) projects of similar size and complexity. Include list of at least five (5) projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
3. Installer's Personnel: Employ persons trained for application of specified product.

C. Source Limitations:
   1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
   2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from manufacturer of primary materials.

D. Pre-Installation Conference:
   1. Convene a meeting not less than thirty days prior to starting work.
   2. Attendance:
      a. Contractor
      b. Contracting Officer's Representative (COR)
      c. Manufacturer and Installer's Representative
   3. Review the following:
      a. Environmental requirements
         1) Air and surface temperature
         2) Relative humidity
         3) Ventilation
         4) Dust and contaminates
      b. Protection of surfaces not scheduled to be coated
      c. Inspect and discuss condition of substrate and other preparatory work performed
      d. Review and verify availability of material; installer’s personnel, equipment needed
      e. Edge conditions.

f. Performance of the coating with chemicals anticipated in the area receiving the resinous (elastomer-modified epoxy) flooring system
g. Application and repair
h. Field quality control
i. Cleaning
j. Protection of coating systems
k. One-year inspection and maintenance
l. Coordination with other work

E. Manufacturer’s Field Services: Manufacturer’s representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.

F. Contractor Job Site Log: Contractor shall document daily; the work accomplished, environmental conditions and any other condition event significant to the long term performance of the elastomer-modified, epoxy flooring materials installation. The Contractor shall maintain these records for one year after Substantial Completion.

1.5 MATERIAL PACKAGING DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, and other conditions detrimental to materials.

C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).

D. Keep containers sealed until ready for use.

E. Do not use materials beyond manufacturer’s shelf life limits. Materials that have exceeded their shelf life shall be replaced at no additional cost to the Owner.

F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages. No On site weighing or volumetric measurements are allowed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.7 APPLICABLE PUBLICATIONS

A. The publication 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 Standard C722-04 (2012), "Standard Specification for Chemical-Resistant Monolithic Floor Surfacings," ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/C0722-04R12, www.astm.org.

1. Specification covers the requirements for aggregate-filled, resin-based, monolithic surfacings for use over concrete.

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

C413 (2012).....Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

D638 (2010).....Tensile Properties of Plastics

D790 (2010).....Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D1308 (2013).....Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D2240 (2010).....Rubber Property—Durometer Hardness

D4060(2010).....Abrasion Resistance of Organic Coatings by the Taber Abraser

D4259 (2012).....Abrading Concrete to Alter the Surface Profile of the Concrete and to Remove Foreign Materials and Weak Surface Laitance

E96/E96M (2013).....Water Vapor Transmission of Materials

F1679.....Variable Incidence Tribometer for determining the slip resistance

F2170 (2011).....Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Basis-of-Design Products: This information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. System Descriptions:

1. Monolithic, multi-component, elastomer-modified, waterproof epoxy resinous flooring system. Primer; high performance, multi-component, solvent free epoxy undercoat with natural quartz aggregate broadcast media; and high performance, multi component epoxy and solvent free grout coat.

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

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

1. Waterproofing Membrane (primer coat):
   a. Resin: Modified epoxy resin, clear.
   b. Formulation Description: 100 percent solids.
   c. Application Method: squeegee and back roll.
   d. Thickness of coat(s): 20 mils DFT.
   e. Number of Coats: One.
   f. Floor to Wall Joints: Provide fiberglass mat imbedded in membrane coat and turned up wall 3 inches minimum.
   g. VOC Content: 4.34 grams/Liter.
   h. Elongation: ASTM D412, 150 percent.
   i. Tensile Strength: ASTM D412, 2,400 psi.
   j. Water Vapor Transmission: ASTM E96, Method B, 0.252 perm.
   k. Hardness: ASTM D2240, 90 Shore A.
   l. Basis-of-Design Product: Dur-A-Flex, Inc.; Elast-O-Coat.
2. Broadcast Coat (Undercoat):
   a. Resin: Elastomer-modified, waterproof epoxy.
   b. Formulation Description: Pigmented multi-component, 100 percent solids.

c. Application Method: Notched squeegee and Back roll
d. Number of Coats: Two.
e. Aggregates: Natural quartz aggregate broadcast into wet Undercoat.
f. Basis-of-Design Product: Dur-A-Flex, Inc.; Shop Floor with Flintshot.

3. Broadcast, Grout Coat and Topcoat:
a. Resin: Elastomer-modified, waterproof epoxy.
b. Formulation Description: Pigmented multi-component, 100 percent solids.
c. Application Method: Notched squeegee and Back roll.
d. Number of Coats: One.
f. Basis-of-Design Product: Dur-A-Flex, Inc.; Dur-A-Glaze Shop Floor.
1) Color: Medium Gray.
f. Application: Squeegee and finish roll.

E. System Characteristics:
1. Color and Pattern: As selected by COR from manufacturer's standard colors.
2. Integral cove base: 1 inch (25.4 mm) radius epoxy mortar cove keyed into concrete substrate and or resinous flooring mortar system. No fillers integral cove base must be troweled in place with specified resinous mortar base.
3. Overall System Thickness: Nominal 1/8 inch.

4. Finish: Standard slip-resistant.
5. Temperature Range: Systems vary by manufacturer; approximate range from a minimum of 45 to 150 degrees F.

F. Physical Properties:
1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Compressive Strength	ASTM D695	17,500 psi
Tensile Strength	ASTM D638	4,000 psi
Volatile Organic Compound Limits (V.O.C.)	EPA & LEED	7.9 g/l
Flexural Strength	ASTM D790	6,250 psi

Water Absorption	ASTM C413	0.04%
Coefficient of friction dry/slip index wet	ASTM F1679	>.79 dry >.65 wet
Impact Resistance	MIL D-3134	Pass
Abrasion Resistance	ASTM D4060 CS-10 Wheel	24 mg maximum weight loss
Thermal Coefficient of Linear Expansion	ASTM D696	2 x 10^{-5} in/in °F
Hardness Shore D	ASTM D2240	75 to 80
Bond Strength	ASTM D4541	400 psi substrate fails

G. Chemical Resistance in accordance ASTM D1308 - 02(2007) “Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes”. ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/D1308-02R07, www.astm.org. No effect to the following exposures:

1. Acetic acid (10%)
2. Ammonium hydroxide (30%)
3. Citric Acid (20%)
4. Motor Oil, 20W
5. Hydrochloric acid (20%), stains but resists degradation.
6. Sodium Chloride
7. Sodium Hypochlorite (5%)
8. Sodium Hydroxide (50%)
9. Sulfuric acid (10%), stains but resists degradation.
10. Urine, Feces

2.2 SUPPLEMENTAL MATERIALS

A. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resinous based materials only. Cementitious or single component products are not expectable.

1. Shallow Fill and Patching Product:
   a. Basis-of-Design Product: Dur-A-Flex, Inc.; Dur-A-Glaze #4 Cove Rez.
2. Deep Fill and Sloping Material (over 1/4-inch):
   a. Basis-of-Design Product: Dur-A-Flex, Inc.; Dur-A-Crete.

2.3 BASE CAP STRIP

A.—Zinc cove strip.

B. Shape for 2mm depth of base material, "J" or “L” configuration.

C. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where monolithic resinous system with integral base is to be installed with the COR.

3.2 PROJECT CONDITIONS

A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F (21 and 32 degrees C) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 70 degrees F (21 degrees C) during cure period.

B. Maintain relative humidity less than 75 percent and the surface temperature shall be at least 5 degrees F above the dew point.

C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

D. Maintain proper ventilation of the area during application and curing time period.

1. Comply with infection control measures of the VA Medical Center.

3.3 INSTALLATION REQUIREMENTS

A. The manufacturer's instructions for application and installation shall be reviewed with the COR for the seamless, epoxy resinous flooring system with integral cove base.

B. Substrate shall be approved by manufacture technical representative.

3.4 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Existing concrete substrate is the substrate for the existing roofing membrane. All contaminants incompatible with resinous flooring shall be removed.

2. Prepare concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re circulates the shot by vacuum pickup.
b. Concrete substrate shall be shot blasted to a bare concrete surface, free of contaminants, with a minimum profile of CSP 4-5 in accordance with the International Concrete Repair Institute.
c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The key cut shall also apply to drain perimeters.
d. Cracks and non-moving joints greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.
e. Comply with ASTM D4259 requirements, unless manufacturer's written instructions are more stringent.

3. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufacturer's instructions.
4. Verify that concrete substrates are dry.
   a. Perform one in situ probe test, ASTM F2170, in area to receive resinous flooring to confirm there were no roof leaks affecting concrete slab. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.
   b. Provide a written report showing test placement and results.
5. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for flooring manufacturer recommended joint fill material, and concrete crack treatment.

F. Prepare wall to receive integral cove base:
   1. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane, and fiberglass mesh) as recommended by resinous flooring manufacturer.
   2. Install base prior to flooring if required by resinous flooring manufacturer.
   3. Grind, cut or sand protrusions to receive base application.

3.5 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
   2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

B. Apply Primer for Cove Base: Apply over prepared substrate at manufacturer's recommended spreading rate for all areas to receive integrated cove base.

C. Apply Cove Base: Trowel to wall surfaces at a 1 inch radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners. Top of base shall be straight, uniform and of equal thickness along length of base.

D. Apply Waterproofing Membrane (Primer Coat): Apply over prepared substrate at manufacturer's recommended spreading rate.

E. Broadcast Coat:
   1. Broadcast coat shall be applied as a double broadcast system.
   2. Broadcast coat shall be comprised of a resin and hardener as supplied by manufacturer and mixed in accordance with their written instructions.
   3. Broadcast coat shall be applied over horizontal surfaces using “v” notched squeegee and back rolled at the rate of 90-100 sf/gal.
   4. Quartz aggregate shall be broadcast to excess into the wet material at the rate of 0.5 lbs/sf.

5. Allow material to fully cure. Vacuum and sweep to remove all loose aggregate.
6. Apply a second coat of resin with a coverage rate of 90-100 sf/gal and broadcast aggregate to excess at the rate of 0.5 lbs/sf.
7. Allow material to fully cure. Vacuum and sweep to remove all loose aggregate.

F. Grout Coat:
1. Grout coat shall be comprised of a liquid resin and a liquid hardener mixed in ratio indicated in manufacturer's installation instruction.
2. Grout coat shall be squeegee applied and back rolled with a coverage rate in compliance with manufacturer's installation instructions.

G. Topcoat Coat:
1. Topcoat shall be comprised of a liquid resin and a liquid hardener mixed in ratio indicated in manufacturer's installation instruction.
2. Topcoat shall be squeegee applied and back rolled with a coverage rate in compliance with manufacturer's installation instructions.

3.6 TOLERANCE

A. From Line of Plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base. Broadcast resinous flooring system will contour substrate. Deviation and tolerance are subject to concrete tolerance.
B. From Radius of Cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

3.7 ENGINEERING DETAILS

A. Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.
B. Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
C. Treat floor drains by chasing the flooring system to lock in place at point of termination.
D. Treat control joints to bridge potential cracks and to maintain monolithic protection. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

3.8 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous flooring materials from damage and wear during construction operation.

1. Cover flooring with kraft type paper.
2. Optional 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.

D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

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SECTION 09 84 33
SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the requirements for tackable, fabric covered acoustical wall panels (tackable acoustical panels) and tackable, fabric covered acoustical panels for installation in casework.

1.2 RELATED WORK:

A. Installation in casework of tackable, fabric wrapped acoustical panels from this Section: Section 06 20 00, Finish Carpentry.

1.3 SUBMITTALS:

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

B. Samples: Fabric covering as specified below, size 457 mm (18 inches). Submit four (4) each, full width of mill run for each color specified.

C. Manufacturer's Literature and Data: Complete instructions for installation of tackable, acoustical wall panels tackable, acoustical panels in casework. Include fabric facing, panel edge, core material and acoustical data for each sound-absorbing panel.

D. Certificate: Flame spread and smoke development index factors.

E. Maintenance Data: Include manufacturer's written cleaning and stain-removal instructions, including manufacturer's precautions for cleaning materials and methods that could be detrimental to acoustical panels and facings.

1.4 APPLICABLE PUBLICATIONS:

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

B. American Association of Textile Chemists and Colorists (AATCC):
TM 16-04.....Test Method: Colorfastness to Light

C. ASTM International (ASTM):
C423-09a.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
D5034-09(R2013).....Breaking Strength and Elongation of Textile Fabrics (Grab Test)
D6207-03.....Test Method for Dimensional Stability of Fabrics to Changes in Humidity and Teperature

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

E795-16.....Practices for Mounting Test Specimens During Sound Absorption Tests

D. Underwriter’s Laboratory (UL):

723-10(R2013).....Test for Surface Burning Characteristics of Building Materials

PART 2 - PRODUCTS

2.1 GENERAL:

A. General: Basis-of-design products are for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. Source Limitations: Obtain tackable acoustical panels through one source from a single manufacturer.

2.2 TACKABLE ACOUSTICAL PANELS, FWP:

A. Width: 610 mm (2 feet) unless shown otherwise on construction documents.

B. Height:

1. Tackable, Acoustical Wall Panels: As indicated on construction documents.
2. Tackable, Acoustical Panels in Casework: Coordinate size of panels, custom fit flush top of counter to underside of transaction shelf as shown in Detail C2/AS522, with a tolerance of 3 mm (1/8-inch) at top and bottom.

C. Thickness: As required to meet the indicated NRC range but not less than 28 mm (1.125 inch) nominal.

D. Fabric Covering:

1. Seamless, plain-woven, 2-ply 100 percent polyester, minimum 0.47 kg per linear meter (15 ounces per linear yard).
   a. Tear strength is to be a minimum 129 N (29 pounds).
   b. Tensile strength is to be 667 N (150 pounds) minimum in accordance with ASTM D5034.
   c. Dimensional Stability: Shall be compliant with ASTM D6207.
2. Fabric Finish: Shall contain silver ions that use a catalytic process to do the following:
   a. Shall transform violate organic compounds (VOCs) into carbon dioxide and water vapor that evaporates into the air.

b. Shall break down pollutants and odors into harmless, natural substances.
c. Shall protect against the growth and transmission of bacteria that comes into contact with panel fabric.

3. Provide fabric covering bonded directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. The fabric covering shall be flat and wrinkle free and fully tailored at corners with no exposed darting. Light fastness (fadeometer) is to be not less than 40 hours in accordance with AATCC TM 16.
4. Basis-of-Design Fabric: Decoustics Ltd.; Harmony with AirRenew Fabric Technology, Style 2D 501.
a. Color: Harmony 2D 501 79.

E. Fabric Covering at Health Care Areas: In addition to that indicated above, provide fabric that is flame resistant, stain resistant, and antimicrobial. Fabric is to be cleanable with water or solvent based cleaning agents.
F. Fire rating for the complete composite system: Class A, 200 or less smoke density and flame spread less than 25 when tested in accordance with ASTM E84 or UL 723. Identify products with appropriate markings of testing agency.
G. Substrate: High density, 256 to 320 kg/cu. m. (16 to 20 pcf), acoustically transparent, no urea formaldehyde added fiberglass layer, 3 mm (1/8-inch) thick.
H. Core Type: Acoustical/tackable, medium density, no urea formaldehyde added fiberglass core, 96 to 112 kg/cu. m. (6 to 7 pcf). Core shall be free of surface defects and sanded as required to a uniform thickness not varying by more than 1.0 mm (0.03 inch) plus or minus. Core dimensions shall have a tolerance of 1.6 mm (0.06 inch) plus or minus.
I. Noise Reduction Coefficient (NRC) Range: 0.80-0.90 in accordance with ASTM C423.
J. Sound Absorption Average (SSA): 0.89.
K. Edge Construction: Manufacturer’s standard chemically hardened core with no frame.
L. Edge Detail: Square edge.
M. Mounting of Acoustical Panels: Provide manufacturer’s standard mounting types as follows:
1. Tackable, Acoustical Wall Panels: Provide two-part metal “Z” clips.

2. Tackable, Acoustical Panels in Casework: Provide hook and loop strip mounting.

N. Basis-of-Design Product: Decoustics Ltd.; High Impact Resistant/Tackable, H.I.R. #1.

PART 3 - EXECUTION

3.1 WALL PREPARATION:

A. Walls are to be clean, smooth, oil free, contain no protrusions, and prepared in accordance with manufacturer’s printed instructions.

3.2 INSTALLATION:

A. Comply with manufacturer’s written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

B. Locate panels as shown on construction documents.

C. Unless indicated otherwise, install units with vertical surfaces and edge plumb, top edges level and in alignment with other units. Install faces flush, and scribed to fit adjoining work accurately at borders and at penetrations. Variation from plumb and level installation are to be no more than 1.6 mm in 1200 mm (1/16 inch in 48 inches).

3.3 CLEANING:

A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer’s written instructions.

B. Panels that are damaged, discolored, or improperly installed are to be removed and new panels provided as directed by Contracting Officer Representative (COR).

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SECTION 09 91 00
PAINTING

PART 1 – GENERAL

1.1 DESCRIPTION:

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

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

1.2 RELATED WORK:

A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS and Division 22 - PLUMBING.

B. Prefinished flush doors with transparent finishes: Section 08 14 00, WOOD DOORS.

C. Glazed wall surfacing or tile like coatings: Section 09 96 59, HIGH-BUILD GLAZED COATINGS.

1.3 SUBMITTALS:

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

B. Painter qualifications.

C. Manufacturer's Literature and Data:

1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. All coats on a particular substrate must be from a single manufacturer.

D. Sample Panels:

1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified. Prepare samples with proposed primer and same number of finish coats.
2. Panels to Show Each Color and Sheen: Composition board, 350 x 350 mm (12 x 12 inch).
3. Attach labels to panel stating the following:
   a. Manufacturers name, product number and mix code of each paint used.
   b. Product type, sheen level and color.
   c. Name of project.

E. Sample of wall identity markers.

1.4 DELIVERY AND STORAGE:

A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Color name and number. Mix code if custom mixed.
5. Contents by volume, for pigment and vehicle constituents.
6. VOC content.
7. Instructions for use.

8. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:

1. Surface upon which material is to be applied.

2. Specify Coat Types: Prime; barrier; body; or finish.

C. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

D. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

1.5 QUALITY ASSURANCE:

A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.

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

1.6 MOCK-UP PANEL:

A. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 3.05 m (10 feet) wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the COR.

B. Finish and texture approved by COR will be used as a standard of quality and workmanship for remainder of work.

C. Repaint individual areas which are not approved, as determined by the COR, until approval is received.

1.7 REGULATORY REQUIREMENTS:

A. Paint materials shall conform to the restrictions of the State of Maine Department of Environmental Protection Regulation, "Chapter 151: Architectural and Industrial Maintenance (AIM) Coatings."

1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed the limits of the Ozone Transport Commission (OTC).
2. Lead-Base Paint:
   a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
   b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
   c. Do not use coatings containing lead.
3. Asbestos: Provide materials that do not contain asbestos.
4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.

1.8 SAFETY AND HEALTH

A. Apply paint materials using safety methods and equipment in accordance with the following:

1. Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis (AHA) as specified in Section 01 35 26, SAFETY REQUIREMENTS. The AHA is to include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

B. Safety Methods Used During Paint Application: Comply with the requirements of SSPC PA Guide 10.

C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

1. The applicable manufacturer’s Material Safety Data Sheets (MSDS) or local regulation.
2. 29 CFR 1910.1000.
3. ACHIH-BKLT and ACGHI-DOC, threshold limit values.

1.9 APPLICABLE PUBLICATIONS:

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

B. American Conference of Governmental Industrial Hygienists (ACGIH):

ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

ACGIH TLV-DOC-2012......Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

C. ASME International (ASME):

A13.1-07(R2013).........Scheme for the Identification of Piping Systems

D. Code of Federal Regulation (CFR):

40 CFR 59...............Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

E. Society for Protective Coatings (SSPC):

SSPC SP 1-82(R2004).....Solvent Cleaning

SSPC SP 2-82(R2004).....Hand Tool Cleaning

SSPC SP 3-28(R2004).....Power Tool Cleaning

SSPC SP 10/NACE No.2....Near-White Blast Cleaning

SSPC PA Guide 10........Guide to Safety and Health Requirements

F. Underwriter’s Laboratory (UL)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: Subject to compliance with requirements, provide one of the products listed in Part 3 articles. The campus standard for paint is the Sherwin-Williams Company. Use of Benjamin Moore is approved for use on the project.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 3 articles:

1. Benjamin Moore & Company (Moore).
2. Sherwin-Williams Co. (S-W).

2.2 MATERIALS, GENERAL:

A. Material Compatibility: Provide primers, undercoats, barrier coats and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

2.3 PAINT PROPERTIES:

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.

D. VOC Content: For field applications that are inside the weatherproofing system, provide paints and coatings that are VOC compliant with the State of Maine Department of Environmental Protection Regulation, "Chapter 151: Architectural and Industrial Maintenance (AIM) Coatings" and the following VOC content limits expressed in grams per liter:

1. Flat Paints and Coatings: 50 g/L.
2. Non-flat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.

E. VOC test method for paints and coatings is to be in accordance with 40 CFR 59 (EPA Method 24). Part 60, Appendix A with the exempt compounds’ content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District’s (SCAQMD) “Laboratory Methods of Analysis for Enforcement Samples” manual.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
   1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
   2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day’s work.

B. Atmospheric and Surface Conditions:
   1. Do not apply coating when air or substrate conditions are:
      a. Less than 3 degrees C (5 degrees F) above dew point.
      b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.
      c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer’s printed instructions.
   2. Maintain interior temperatures until paint dries hard.
   3. Do no exterior painting when it is windy and dusty.
   4. Do not paint in direct sunlight or on surfaces that the sun will warm.
   5. Apply only on clean, dry and frost free surfaces.
   6. Varnishing:
      a. Apply in clean areas and in still air.
      b. Before varnishing vacuum and dust area.
      c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 INSPECTION:

A. Examine substrates, areas, and conditions, with paint Applicator and drywall subcontractor present, under which painting will be performed for compliance with paint application requirements.
   1. Inspect walls for dents and imperfections prior to painting. Inspect walls again after primer and first coat of paint applied, with Applicator and drywall subcontractor present. Drywall subcontractor shall touch-up as follows:

a. Touch-up visible gypsum board imperfections before priming of walls.
b. Touch-up imperfections found in field of boards and joints made visible from painting after first finish coat applied.
1) Apply primer and first finish coats to imperfection repairs. Corrections shall not telegraph through final coat of paint finish.

2. If unacceptable conditions are encountered, prepare written report, endorsed by Applicator, listing conditions detrimental to performance of work.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
4. Application of coating indicates Applicator's acceptance of surfaces and conditions within a particular area.
5. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of specified finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

A. Application may be by brush or roller. Spray application only upon acceptance from the COR in writing.
B. Furnish to the COR a painting schedule indicating when the respective coats of paint for the various areas and surfaces will be completed. This schedule shall be kept current as the job progresses.
C. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.
D. Remove prefinished items not to be painted such as escutcheon plates, hardware, trim, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface

preparation and painting. After completing painting operations in each space or area, carefully reinstall items removed using workers skilled in the trades involved.

E. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.

F. Materials are to be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.

G. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Government.

H. All coats are to be dry to manufacturer’s recommendations before applying succeeding coats.

I. All suction spots or “hot spots” in joint compound after the application of the first coat are to be touched up before applying the second coat.

J. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.4 SURFACE PREPARATION:

A. General:

1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
2. See other sections of specifications for specified surface conditions and prime coat.
3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer’s instructions and as herein specified, for each particular substrate condition.
4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do

not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

5. Where sanding is required to smooth existing surface during preparation, sand surfaces utilizing wet sanding methods to prevent creation of dust within the existing facility.
6. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   a. Concrete: 12 percent.
   b. Fiber-Cement Board: 12 percent.
   c. Masonry (Clay and CMU's): 12 percent.
   d. Wood: 15 percent.
   e. Gypsum Board: 12 percent.
   f. Plaster: 12 percent.

B. Provide barrier (bond) coats over incompatible primers or remove and reprime.

C. Existing Surfaces, Transparent Finishes: Prepare existing surfaces as follows:
1. Thoroughly clean existing surfaces to be recoated to remove build-up of dust, dirt, grease, oils, cleaning compounds and other surface contaminants that would affect the proper adhesion of the new coatings using a degreasing agent. Periodically change to clean wiping cloths to avoid redistribution of residue.
   a. Products:
      1) Zep Inc.; Enforcer Heavy-Duty Citrus Degreaser.
      2) Rust-Oleum Corp.; Krudkutter Pre-Paint Cleaner/TSP Substitute.
      3) Sunshine Makers, Inc.; Simple Green Cleaner and Degreaser.
2. Lightly sand entire surface to be refinished, remove dust and tack clean.

D. Existing Surfaces, All Substrates, Opaque Finishes: Prepare existing surfaces as follows:
1. Thoroughly clean existing surfaces to be recoated to remove dust, dirt, grease, oils, and other surface contaminants that would affect the proper adhesion of the new coatings.
2. Scrape loose paint from surfaces indicated to be recoated. Sand edges of remaining paint to smooth out surface. No "telegraphing" of lines, ridges, flakes, and similar conditions through new surfacing

is permitted. Where this occurs, sand smooth and re-finish until surface meets with COR's approval.

3. Existing painted surfaces shall be sanded to fully dull the surface.
4. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.
5. Provide barrier (bond) coats over all existing painted surfaces indicated to be refinished.

E. Ferrous Metals:

1. Remove oil, grease, soil, dirt, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
   a. Fill flat head countersunk screws used for permanent anchors.
   b. Do not fill screws of item intended for removal such as glazing beads.
4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

F. Zinc-Coated (Galvanized) Metal Surfaces Specified Painted:

1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items.

G. Hollow Metal Doors and Frames, New: Wipe down to remove oils and surface contaminates from shipping and installation.

1. Coating shall be applied within 8 hours of sanding and wipe down.

H. Gypsum Board:

1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for gypsum board.

3.5 PAINT PREPARATION:

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles. Do not stir surface film into material.
D. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 APPLICATION:

A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
B. Paint surface to match adjacent color, texture and sheen.
C. Where a wall requires paint and the room is not scheduled to be painted, paint wall to where nearest full height vertical break in plane occurs at an inside or outside corner, reveal or frame.
D. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
   1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure

that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. At existing surfaces, apply barrier coat to isolate incompatible coatings prior to applying finish coats.

E. Apply each coat evenly and cover substrate completely.

F. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion. Where sanding is required between coats, sand surfaces utilizing wet sanding methods to prevent creation of dust within the existing facility.

G. Apply by brush or roller. Spray application for new or existing occupied spaces only upon approval by acceptance from COR in writing.

1. Apply painting materials specifically required by manufacturer to be applied by spraying.
2. In new construction and in existing occupied spaces, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in “Building and Structural Work Field Painting”; “Work not Painted”; motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.

H. Do not paint in closed position operable items such as access doors and panels and similar items.

3.7 PRIME PAINTING:

A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel, hollow metal doors and hollow metal frames apply an additional prime coat.

D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.

3.8 PROTECTION:

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.9 REFINISHING EXISTING PAINTED SURFACES:

A. Clean, patch and repair existing surfaces as specified under “Surface Preparation”. No “telegraphing” of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, sand smooth and re-finish until surface meets with COR’s approval.

B. Remove and reinstall items as specified under “General Workmanship Requirements”.

C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.

D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

F. In existing rooms and areas where alterations occur, clean existing stained and natural finished wood retouch abraded surfaces and then give entire surface one (1) coat of MPI 31 (Polyurethane, Moisture Cured, Clear Gloss).

G. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.

H. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.

I. Sand or dull glossy surfaces prior to painting.

J. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.10 BUILDING AND STRUCTURAL WORK FIELD PAINTING:

A. Painting and finishing of interior and exterior work except as specified here-in-after.

1. Painting and finishing of new and existing work including colors and gloss of finish specified.
2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
3. Painting of ferrous metal and galvanized metal.
4. Painting of wood with fire retardant paint when used in mechanical, electrical and data equipment spaces for supports and backboards. (.
5. Identity painting and safety painting.

B. Building and Structural Work not Painted:

1. Prefinished items:
   a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
   b. Factory finished equipment.
2. Finished surfaces:
   a. Hardware except ferrous metal.
   b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
   c. Signs, fixtures, and other similar items integrally finished.
3. Concealed surfaces:
   a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
   b. Inside walls or other spaces behind access doors or panels.
   c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
   a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
   b. Tracks for overhead or coiling doors, shutters, and grilles.
5. Labels:
   a. Code required label, such as Underwriters Laboratories Inc., Intertek Testing Service or Factory Mutual Research Corporation.
   b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Galvanized metal:
   a. Exterior gratings, stairs and railings.

7. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
8. Face brick.
9. Structural steel encased in concrete, masonry, or other enclosure.
10. Structural steel to receive sprayed-on fire proofing.
11. Ceilings, walls, columns in interstitial spaces.

3.11 PAINT COLOR:

A. Schedule of Colors:
   1. Provide paint colors to match the following colors listed in the VISN 1 Standard; provide where indicated on the Drawings:
      P-1: White Birch.
      P-2: Sandstone.
      P-3: Boston Blue.
      P-4: Nutmeg.
      P-5: Green Mountain.
      P-6: Coastal Path.
   2. Provide the following colors from Sherwin-Williams where indicated on the Drawings:
      P-7: Extra White, SW7006.
      P-8: Ceiling Bright White, SW7007.
      P-9: Dry Erase Coating (to be applied over Extra White SW7006 for Sherwin Williams coating system).

B. Coat Colors:
   1. Color of priming coat: Lighter than body coat.
   2. Color of body coat: Lighter than finish coat.
   3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

C. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
   1. Paint to match color of casework where casework has a paint finish.
   2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.12 EXTERIOR FINISHES PAINT SCHEDULE:

A. Exterior Gypsum Soffit Board: Provide the following finish systems over exterior gypsum soffit board:
   1. Low-Luster Acrylic Finish: 2 finish coats over a primer.
      a. Primer: Exterior, alkali-resistant, acrylic-latex primer, as recommended by the manufacturer for this substrate, applied at

spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Fresh Start Multi-Purpose Latex Primer N023; 1.2 mils DFT.
2) S-W: Multi-Purpose Interior/Exterior Latex Primer/Sealer B51-450 Series; 1.4 mils DFT.

b. Body and Finish Coats: Low-luster (satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a dry film thickness per coat of not less than indicated for product.

1) Moore: Aura Waterborne Exterior Paint Satin Finish No. 631; 2.4 mils DFT per coat.
2) S-W: Duration Exterior Latex Satin K33-200 Series; 2.5 mils DFT per coat.

B. Galvanized Metal, New and Existing Doors: Provide the following finish systems over exterior galvanized metal. Primer is not required on shop-primed items, except doors and frames, which require an additional prime coat under this specification. Prime bare spots of galvanized metals, existing and new. Provide a barrier coat over existing coatings after preparation for painting. Galvanized single angle lintels do not require painting.

1. Semigloss, Direct-to-Metal (D.T.M.) Acrylic Finish: 1 body coat and 1 finish coat over a corrosion resistant primer.

a. Primer, New: VOC compliant, quick-drying, corrosion resistant, metal primer applied at spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Super Spec HP Acrylic Metal Primer P04; 2.0 mils DFT.
2) S-W: Pro-Industrial Pro-Cryl Universal Primer, B66-310 Series; 3.0 mils DFT.

b. Barrier Coat on Existing Surfaces: Low-odor, low VOC, exterior barrier coat applied at spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Stix Waterborne Bonding Primer, SXA-110; 1.9 mils DFT.
2) S-W: Extreme Bond Interior/Exterior Primer B51W00150 Series; 0.9 mils DFT.

c. Body and Finish Coats: Exterior, semigloss, low VOC, low odor, corrosion resistant, direct-to-metal coating applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than indicated for product.
   1) Moore: Super Spec HP D.T.M. Acrylic Semi-Gloss P29; 3.0 mils DFT per coat.
   2) S-W: Pro-Industrial DTM Acrylic Semi-Gloss B66W01150 Series; 3.5 mils DFT per coat.

3.13 INTERIOR FINISHES PAINT SCHEDULE:

A. Ferrous Metal Work, New and Existing: Provide the following finish systems over interior ferrous metal. Primer is not required on existing and shop-primed items, except steel doors and frames, which require an additional prime coat under this specification. Prime bare spots of ferrous metals, existing and new. Provide a barrier (bond) coat over existing coatings after preparation for painting.
   1. Apply to exposed surfaces.
   2. Omit body and finish coats on surfaces concealed after installation, except electrical conduit containing conductors over 600 volts
   3. Semigloss, Direct-to-Metal (D.T.M.) Acrylic Finish: 1 body coat and 1 finish coat over a corrosion resistant primer.
      a. Primer, New: VOC compliant, quick-drying, corrosion resistant, metal primer applied at spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.
         1) Moore: Super Spec HP Acrylic Metal Primer P04; 2.0 mils DFT.
         2) S-W: Pro-Industrial Pro-Cryl Universal Primer, B66-310 Series; 3.0 mils DFT.
      b. Barrier (Bond) Coat on Existing Surfaces: Low-odor, low VOC, exterior barrier coat applied at spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.
         1) Moore: Stix Waterborne Bonding Primer, SXA-110; 1.9 mils DFT.
         2) S-W: Extreme Bond Interior/Exterior Primer B51W00150 Series; 0.9 mils DFT.
      c. Body and Finish Coats: Exterior, semigloss, low VOC, low odor, corrosion resistant, direct-to-metal coating applied at spreading

rate recommended by the manufacturer to achieve a total dry film thickness of not less than indicated for product.

1) Moore: Super Spec HP D.T.M. Acrylic Semi-Gloss P29; 3.0 mils DFT per coat.

2) S-W: Pro-Industrial DTM Acrylic Semi-Gloss B66W01150 Series; 3.5 mils DFT per coat.

B. Gypsum Board, New and Existing: Provide the following finish systems over interior gypsum board surfaces:

1. Flat Acrylic Finish, GPDW Soffits and Ceilings, New and Existing: 1 body coat and 1 finish coat over a primer.

a. Primer, New and Patched Areas: Low or zero VOC, low odor, latex-based, interior primer applied at spreading rate recommended by manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Ultra Spec 500 Interior Latex Primer No. N534; 1.8 mils DFT.

2) S-W: ProMar 200 Zero VOC Interior Latex Primer B28W02600 Series; 1.0 mils DFT.

b. Body and Finish Coats: Flat, zero VOC, low odor, acrylic latex finish applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than indicated for product.

1) Moore: Ultra Spec 500 Interior Flat Finish No. N536; 1.8 mils DFT per coat.

2) S-W: ProMar 200 Zero VOC Interior Latex Flat, B30W2600 Series; 1.6 mils DFT per coat.

2. Low-Luster (Eggshell or Satin) Finish, Walls, New and Existing, Except in Bronchoscopy: 1 body coat and 1 finish coat over a primer.

a. Primer, New and Patched Areas: Low or zero VOC, low odor, latex-based, interior primer applied at spreading rate recommended by manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Ultra Spec 500 Interior Latex Primer No. N534; 1.8 mils DFT.

2) S-W: ProMar 200 Zero VOC Interior Latex Primer B28W02600 Series; 1.0 mils DFT.

b. Body and Finish Coats: Low-luster (eggshell or satin), zero VOC, low odor, acrylic latex finish applied at spreading rate

recommended by manufacturer to achieve a dry film thickness per coat of not less than indicated for product.

1) Moore: Ultra Spec 500 Low Sheen Finish No. N537; 1.8 mils DFT per coat.

2) S-W: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2600 Series; 1.7 mils DFT per coat

3. Dry Erase Coating, High Gloss Finish, Walls: 1 coat of dry erase coating over 1 finish coat (for S-W) over a primer.

a. Primer: Low or zero VOC, low odor, latex-based, interior primer applied at spreading rate recommended by manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Fresh Start Mulit-Purpose Latex Primer No. N023; 1.2 mils DFT.

2) S-W: ProMar 200 Zero VOC Interior Latex Primer B28W02600 Series; 1.0 mils DFT.

b. Finish Coats: Low-luster (eggshell or satin), zero VOC, low odor, acrylic latex finish applied at spreading rate recommended by manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Not required.

2) S-W: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2600 Series; 1.7 mils DFT per coat.

C. Dry Erase Coating: High gloss, two component, silicone epoxy hybrid or water based polyurethane coating applied at spreading rate recommended by manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Notable Dry Erase Paint No. 0500; 3.5 mils DFT. (This product is white and only requires a prime coat.)

2) S-W: Dry Erase Clear Gloss Coating, KB652000 KIT; 2.0- 4.0 mils DFT. (This product is clear and requires a prime coat and a finish coat before application of coating.)

C. Wood, Existing Handrails:

1. Sanding: Lightly sand to dull existing finish.

a. Sand varnish between coats.

b. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level varnish, and to knock off "whiskers" of any raised grain as well as dust particles.

2. Transparent Finishes: Provide the following clear finishes over new, interior woodwork:
   a. Waterborne, Satin Polyurethane Finish: 3 finish coats of a waterborne, clear-satin polyurethane.
      1) First, Second and Third Finish Coats: Waterborne, polyurethane finish applied at spreading rate recommended by the manufacturer.
         a) Moore: Benwood Stays Clear Acrylic Polyurethane Low Lustre No. 423.
         b) S-W: Minwax Polycrylic Protective Finish Satin Clear.

D. Wood, Opaque Finish: Provide the following paint finish systems over interior wood surfaces:
   1. Semigloss, Acrylic-Latex Finish: 1 finish coat over 1 body coat over a wood undercoater/primer.
      a. Undercoater/Primer: Low ordor, low or zero VOC, stain-blocking, acrylic-latex-based, interior wood undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.
         1) Moore: Fresh Start High-Hiding All-Purpose Primer No. 056; 1.4 mils DFT.
         2) S-W: Premium Wall & Wood Primer B28W08111 Series; 1.8 mils DFT.
      b. Body and Finish Coats: Low odor, low or zero VOC, semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a dry film thickness per coat of not less than indicated for product.
         1) Moore: Ultra Spec 500 Semi-Gloss Finish No. N539; 1.8 mils DFT per coat.
         2) S-W: ProGreen 200 Zero VOC Interior Latex Semi-Gloss B31W2600 Series; 1.6 mils DFT per coat.

E. Data, Telecommunication and Electrical Backboards: Provide the following finish over fire-retardant plywood:
   1. Flat Intumescent Finish, New: 1 body coat and 1 finish coat over a wood undercoater/primer.
      a. Undercoater/Primer: Low ordor, low or zero VOC, stain-blocking, acrylic-latex-based, interior wood undercoater/primer, as recommended by the manufacturer for this substrate, applied at

spreading rate recommended by the manufacturer to achieve a dry film thickness of not less than indicated for product.

1) Moore: Fresh Start High-Hiding All-Purpose Primer No. 056; 1.4 mils DFT.
2) S-W: Preprite Problock Interior/Exterior Latex Primer\Sealer; 1.4 mils DFT.

b. Body and Finish Coats: Intumescent-type, fire-retardant paint applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 4 mils; white color for telecommunication and black for electrical.

1) Moore: P59 220 Latex Fire-Retardant Coating.
2) S-W: FlameControl 20-20A Flat Latex Intumescent Coating.

3.14 IDENTITY PAINTING SCHEDULE:

A. Identify designated service in new buildings or projects with extensive remodeling in accordance with ASME A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels. For existing spaces where work is minor match existing.

1. Legend may be identified using snap-on coil plastic markers or by paint stencil applications.
2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12.2 M (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
3. Locate Legends clearly visible from operating position.
4. Use arrow to indicate direction of flow using black stencil paint.
5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on construction documents where asterisk appears for High, Medium, and Low Pressure designations as follows:
   a. High Pressure - 414 kPa (60 psig) and above.
   b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
   c. Low Pressure - 103 kPa (14 psig) and below.
6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND ABBREVIATIONS

Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Blue	White	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Green	White	H.P. _____*
High Pressure Condensate Return		Green	White	H.P. Ret ____*
Medium Pressure Steam		Green	White	M. P. Stm ____*
Medium Pressure Condensate Return		Green	White	M.P. Ret _____*
Low Pressure Steam		Green	White	L.P. Stm _____*
Low Pressure Condensate Return		Green	White	L.P. Ret _____*
Hot Water Heating Supply		Green	White	H. W. Htg Sup
Hot Water Heating Return		Green	White	H. W. Htg Ret
Gravity Condensate Return		Green	White	Gravity Cond Ret
Pumped Condensate Return		Green	White	Pumped Cond Ret
Pumped Condensate		Green	White	Pump Cond
Pump Recirculating		Green	White	Pump-Recirc.
Vent Line		Green	White	Vent
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Sanitary Waste		Green	White	San Waste
Sanitary Vacuum Waste	White	Yellow	Black	San Vac Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

***** List as “steam” or “condensate” and applicable pressure rating.

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

B. Fire and Smoke Partitions:
1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE BARRIER" or, "X-HOUR FIRE BARRIER" as applicable, where "X" is the hourly rating.
3. Locate not more than 6096 mm (20 feet) on center on corridor sides of partitions, and with a least one (1) message per room on room side of partition, located above acoustical ceiling line.
4. Use semi-gloss paint in red or orange color that contrasts with color of substrate.

3.15 PROTECTION, CLEAN UP, AND TOUCH-UP:

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

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SECTION 09 96 59
RESINOUS SPECIALTY GLAZED COATING SYSTEMS FOR WALLBOARD (RES-W1)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section includes surface preparation and application of high-performance seamless glazed wall coating system.
   1. Interior substrates:
      a. Wall board substrates in Bronchoscopy 208.

B. Wall systems consist of multi component epoxy resins, primer base and finishing coats.

1.2 SUBMITTALS

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

B. Manufacturer's Literature and Data:
   1. Description of each product to be provided.
   2. Application and installation instructions for each product.
   3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.

C. Qualification Data: For Installer.

D. Samples:
   1. Samples for verification: For each (color and texture) resinous wall/ceiling system required, 12 inches (304 mm) square, applied to a rigid backing by installer for this project.
   2. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished resinous coating must match the approved samples in color and texture.

E. Shop Drawings: Include plans, sections, component details, and attachment to other trades.

F. Certification and Approval:
   1. Manufacturer's certification of material and substrata compliance.
   2. Contractor's certificate of compliance with Quality Assurance requirements.

1.3 QUALITY ASSURANCE

A. Manufacture Certificate: Manufacture shall certify that a particular resinous coating for wall/ceiling system has been in use for a minimum of five years.

B. Source Limitations:

1. Obtain resinous coating materials including primers and finish coats from a single manufacturer.

D. Pre-Installation Conference
   1. Convene a meeting not less than thirty days prior to starting work.
   2. Attendance:
      a. Contractor
      b. VA COR
      c. Manufacturer and Installer's Representative
   3. Review the following:
      a. Environmental requirements
         1) Air and surface temperature
         2) Relative humidity
         3) Ventilation
         4) Dust and contaminates
      b. Protection of surfaces not scheduled to be coated
      c. Inspect and discus condition of substrate and other preparatory work performed
      d. Review and verify availability of material; installer’s personnel, equipment needed
      e. Performance of the coating with chemicals anticipated in the area receiving the resinous coating system
      f. Application and repair
      g. Field quality control
      h. Cleaning
      i. Protection of coating systems
      j. One-year inspection and maintenance
      k. Coordination with other work

1.4 MATERIAL PACKAGING DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number, date of manufacture and mixing/thinning instructions.
B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).
D. Keep containers sealed until ready for use.
E. Do not use materials beyond manufacturer’s shelf life limits.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous wall/ceiling manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous wall/ceiling applications.
   1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous wall/ceiling application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous wall/ceiling application.

C. Close spaces to traffic during resinous wall/ceiling application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION (RES-W1)

A. Epoxy resinous wall system includes: High performance, high solids, high gloss pigmented wall system consisting of two component epoxy primers, and base coats. Formulated for long service, cures to a hard tile like finish.
   1. Provide eggshell gloss for ceilings.

B. System Characteristics.
   1. Wearing Surface: Smooth
   2. Overall System Thickness: 10-12 mils DFT.

C. System Components: Manufactures standard components that are compatible with each other including primer and finish coats as standard with manufacture of resinous system and as follows:
   1. Primer Formulation Description: Vinyl acrylic.
      a. Basis-of-Design Product: Sherwin Williams; ProMar 200 Zero VOC Latex Primer B28W02600.
         1) Apply at spreading rate recommended by the manufacturer to achieve a dry film thickness on not less than 1.0 mils.
   2. Body Coat and Finish Coat:
      a. Resin: Polyamine epoxy.
      b. Formulation Description: Two component 50% solids.
      c. Coats: Two.
      d. Thickness: 10 mils (wet) per coat.
      e. Basis-of-Design Products:

1) Walls: Sherwin Williams; ProIndustrial Water Based Catalyzed Epoxy B73-300 Series (Gloss finish).
   a) Color, P1: Shall match VISN 1 Standard White Birch.
2) Ceilings: Sherwin Williams; ProIndustrial Water Based Catalyzed Epoxy B73-360 Series (Eg-Shel finish).
   a) Color, P8: Sherwin Williams, Ceiling Bright White SW7007.

D. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 150 g/L.
   3. Primers, Sealers: 200 g/L.

PART 3 – EXECUTION

3.1 EXAMINATION

A. General: Prepare and clean substrates according to manufacturer's written instructions for substrate indicated. Provide clean and dry substrate for resinous wall and ceiling coating application.
B. Clean sub-surface of all contaminants.
C. Examine substrates, areas, and conditions, with epoxy resinous system Applicator and drywall subcontractor present, under which coating will be performed for compliance with epoxy resinous system application requirements.
   1. Inspect walls for dents and imperfections prior to application of epoxy resinous system. Inspect walls again after primer is applied, with epoxy resinous system Applicator and drywall subcontractor present. Drywall subcontractor shall touch-up as follows:
      a. Touch-up visible gypsum board imperfections before priming of walls.
      b. Touch-up imperfections found in field of boards and joints made visible from coating after prime coat applied.
   2. If unacceptable conditions are encountered, prepare written report, endorsed by Applicator, listing conditions detrimental to performance of work.
D. Confirm gypsum board assemblies have a Level 5 finish.
E. Commencement of application implies acceptance of surface conditions.

3.2 PROJECT CONDITIONS

A. Maintain temperature of materials above 21^{o}C (70 degrees F), for 48 hours before installation.

B. Maintain temperature of rooms where work occurs, between 21°C and 32°C (70°F and 90°F) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 21°C (70 degrees F) thereafter.

C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

D. Area free of other trades during and for a period of 24 hours after installation.

3.3 INSTALLATION REQUIREMENTS

A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the COR.

B. Submit proposed installation deviation from this specification to the COR indicating the differences in the method of installation.

3.4 PREPARATION

A. General: Prepare and clean substrates according to manufacturer's written instructions for substrate indicated. Provide clean and dry substrate for resinous application.

B. Substrates: Provide sound surfaces free of dust, dirt, grease, oil, and other contaminants incompatible.

1. Repair damaged and deteriorated substrate according to manufacturer's written recommendations.
2. Verify that substrates are dry.

C. Resinous Materials: Mix components and prepare materials according to manufacturer's written instructions.

3.5 APPLICATION

A. General: Apply components of resinous wall and ceiling systems according to manufacturer's written instructions to produce a uniform, monolithic surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous system to substrate, and optimum inter-coat adhesion.
2. Cure resinous components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

B. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate.

C. Topcoat: Mix and roller apply the topcoat(s) with strict adherence to manufacturer's installation procedures and coverage rates.

3.6 CURING, PROTECTION AND CLEANING

A. Cure resinous materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous materials from damage and wear during construction operation.

- - - END - - -

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies interior signage for room numbers and identification, life safety and directional/wayfinding signs.

1.2 RELATED WORK:

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

1.3 QUALITY ASSURANCE:

A. Manufacturer: Provide signage that is the product of Creative Signage Systems 301-345-3700 to match Togus VAMC campus standard; Contact: Amy Blades, ablades@creativesignage.com.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Manufacturer's Literature: For each type of interior signs indicated.
   1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
   2. Printed specifications, anchorage details, installation and maintenance instructions.
   3. GSA Schedule information showing products and components are listed.

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

D. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
   1. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   2. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.

E. Samples: Physical sample of sign type D1A/F/W, showing all components and with the required finishes.

F. Certification of meeting environmental attributes required within specification.

G. Certification of variable dot UV printing for color and graphics.

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 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):

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

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

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

1.7 MINIMUM SIGN REQUIREMENTS

A. Permanent Rooms and Spaces (Refer Sign Standard Drawings):

1. Tactile and Braille Characters: Raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.
2. Type Styles: See Drawings.
3. Character Height: Minimum 16 mm (5/8 in) high, Maximum 50 mm (2 in).
4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.
5. Finish and Contrast: Signs shall be 2 ply construction with non-glare acrylic finish with adequate contrast. Refer to Drawing Standards for Approved Design.

6. Mounting Location and Height: To comply with ADA Regulations. Mount on wall adjacent to the latch side of door and to avoid door swing and protruding objects.
7. Aluminum frame shall be clear anodized with a minimum of 75 percent recycled aluminum content.
8. All wall mounted signs shall be mechanically fastened to wall with concealed screws and plugs.
9. Acrylic sign components holding inserts shall be magnetically mounted allowing sign messages to be easily slid out and changed.
10. Provide insert software program with unlimited license that auto scales the copy to fit each sign approximately allowing signs to be updated in house on any standard computer and printer.
11. Background color, non-tactile copy and graphics shall be subsurface digitally printed direct to substrate with variable dot pattern, UV ink containing no VOCs and LED curing. Painting and screen printing not permitted.

B. Overhead Signs (Refer Sign Standard Drawings):
1. Type Styles: As shown. Characters shall have a width-to-height ratio between 3:5 and 1:1. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
2. Character Height: Minimum 75 mm (3 in) high for overhead signs. As shown, for directional signs.
3. Finish and Contrast: Same as for signs of permanent rooms and spaces.
4. Mounting Location and Height: As indicated.
5. Background color, non-tactile copy and graphics shall be subsurface digitally printed direct to substrate with variable dot pattern, UV ink containing no VOCs and LED curing. Painting and screen printing not permitted.

1.8 COLORS AND FINISHES:

A. All acrylic shall be 2-Ply Non-Glare. Metal accents shall be anodized aluminum with 75 percent recycled content. Sign backing shall be an Environmental Preferable Product (EPP Downstream Certified). Overhead Signage shall have a 2 inch Solid Wood Header to match wood accents. Life Safety Signage color shall be Fire Red Background with White Copy & Graphics. Refer to Sign Standard Drawings.

1.9 REPLACEMENT AVAILABILITY

A. All products designed must be readily available non-proprietary items on GSA Schedule for ease in future procurement. All signs shall be American made and under standard GSA warranties.

PART 2 - PRODUCTS

2.1 SIGNAGE GENERAL:

A. Provide signs of type, size and design shown on the documents attached at the end of this section.

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. Contractor shall verify and be responsible for all dimensions and conditions shown; coordinate with field conditions. Notify Contracting Officer Representative (COR) of discrepancy in drawing, in field directions or conditions, or changes needed to satisfy the requirements of the construction documents.

2.2 INTERIOR SIGN MATERIALS:

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.

2.3 INTERIOR SIGN TYPES:

A. Conform to the VA Signage Design Guide.

B. Provide signage to match VAMC campus standard from proprietary vendor: Creative Signage Systems 301-345-3700; Contact: Amy Blades, ablades@creativesignage.com.

1. See Drawings for signage plans and legends.

2.4 CONSTRUCTION

A. Interior Signs: Shall be composed of a two ply construction; the first ply shall be 1/16-inch thick matte finish acrylic and the second ply

shall be 4 mm thick, closed cell PVC. The laminate adhesive shall be a double coated pressure sensitive polypropylene film rated at 56 oz/in minimum adhesion per PSTC-1. Pocket signs shall be created using No. 38 - 0.080 inch separating rib(s) to form insert space for custom computer generated acetate; the use of adhesive strips instead of acrylic is not acceptable.

1. Frames: Signs shall nest into Type OS22 custom extruded, precision mitered, aluminum frame composed of clear anodized aluminum with a minimum of 75 percent recycled content. Frame shall be assembled with a two part epoxy process using composite board back plate made of recycled content and EPP Downstream Certified.
2. Room Numbers: The room number component shall be injected molded ABS characters. Grade II Braille shall be produced with high pressure surface beading directly below tactile number 3/16 inch minimum. Braille translation via Duxbury Braille translator.
3. Wood Accents: Wood accents shall be fabricated from multi-layered, fire retardant, thermo-plastic sheet with a Class A decorative embossed film in the finish specified.
4. Color and graphics shall be subsurface digitally printed direct to substrate with a variable dot pattern, UV Ink containing no VOCs and LED curing. Painting, screen printing, and laminates shall not be used. Surface color or copy is not acceptable unless required for ADA compliance.

2.5 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 shall be flush to conceal reinforcement, or weld joints, where thickness or section permits.

D. Contact surfaces of connected members shall be true. Assemble so joints are hairline tight and practically unnoticeable, without use of 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 shall 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. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.

G. Finish extruded members to be free from extrusion marks. Fabricate square turns, sharp corners, and true curves.

H. Drill holes for bolts and screws. Provide concealed fastenings to extent possible. Exposed ends and edges mill smooth, with corners slightly rounded.

I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints shall be tightly mitered to give appearance of solid material.

J. All painted surfaces shall be primed prior to applying finish coats. Finish coat of paint shall have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface shall be smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.

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

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

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

M. No signs shall be manufactured until final sign message schedule and location review has been completed by the COR and forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Locate signs as shown on the construction documents.

B. Conform to the VA Signage Design Guide for installation requirements.

C. Verify 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. Protect products against damage during field handling and installation.
E. Mount signs in proper alignment, level and plumb according to the Sign Location Plan and the dimensions given on elevation and Sign Location Plans. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is not clear, contact COR for resolution.
F. All wall mounted signs shall be mechanically fastened to wall unless noted as an exception.
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.

- - - END - - -

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. 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.
3. 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.

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 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)

C. Aluminum Association (AA):

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

D. 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): Basis of Design Construction Specialties, Inc. C/S General Cubicle Track #6062N with General Carrier #1062N.
   a. Heavy extruded aluminum, ASTM B221M (B221), alloy 6063, temper T5, channel shaped minimum 1-3/8 inches wide by 3/4-inch high by 0.060 inch thickness, with smooth inside raceway slotted to receive roller for curtain carriers.
      1. Corner Bends: Shall have a 12" radius fabricated in one continuous “L” shape.

B. Curtain Carriers: Virgin nylon roller carriers, with nylon wheels on 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 shall be the same material and finish as the bead chain.
   3. Provide 2.2 carriers for every 305 mm (1 foot) of each section of each track length, plus one (1) additional carrier.

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

D. 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.

E. 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.

2.2 FASTENERS:

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

B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized.

C. cubicle Curtain track shall be screwed to the ceiling grid. Provide spacer for tegular tile.

2.3 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.

2.4 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. Form flat surface without distortion.

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

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

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

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

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SECTION 10 25 20
ACCESSORY RAILS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers surface mounted wall accessory rails.

1.2 SUBMITTALS

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

B. Manufacturer's Literature and Installation Data: Accessory Rails

PART 2 - PRODUCTS

2.1 ACCESSORY RAILS

A. Accessory Rails: Seamless, extruded aluminum profile with clear anodized finish containing a groove for attaching an adapter that supports hospital accessories and equipment.

1. Groove and adapters designed so adaptor requires a seven degree tilt for attachment.
   a. Pre-drilled mounting holes spaced sixteen-inches on.
   b. Rails shall be one piece without splices for runs less than 10 feet.
   c. Rail shall be designed to receive laminate decorative color inlay the length of the rail. Laminate if required, provided by VA.
2. End Caps: Injected molded thermoplastic, friction-fit, white through color, resistant to hospital cleaners and disinfectant chemicals.
   a. Provide ends caps for all ends of rail sections.
3. Fasteners: 1/4-inch by 2.5 inch long type 304 stainless steel sheet metal screw.
3. Product: Paladin Healthcare LLC, “EVOLUTION” Equipment Management Rail.

PART 3 - EXECUTION

A. Surface mount accessory and secure in accordance with manufacturer's instructions.

B. Position and level rails on the wall at the correct height and locations. Screw attach to concealed wood blocking, drawing rail tight to wall. Drywall mount is not permitted.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the following:

1. Handrails/wall guard (crash rail) combinations, corner guards, end-of-wall guards and high impact wall covering.
2. Installation of existing crash rails salvaged for relocation and re-installation.

1.2 RELATED WORK:

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

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 protection from a single source 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.

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Handrail/Wall Guard (Crash Rail) Combinations.
2. Corner Guards.
3. End-of-Wall Guards.
4. High Impact Wall covering.

D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

E. Manufacturer’s qualifications.

F. Installer’s qualifications.

G. 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.

1.7 APPLICABLE PUBLICATIONS:

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

B. ASTM International (ASTM):

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

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

D256-10.....Impact Resistance of Plastics

D543-14.....Practices for Evaluating the Resistance of Plastics to Chemical Reagents

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

F476-14.....Test Methods for Security of Swinging Door Assemblies

C. American Architectural Manufacturers Association (AAMA):

611-14.....Anodized Architectural Aluminum

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. SAE International (SAE):

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

F. Underwriters Laboratories Inc. (UL):

Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 GENERAL:

A. Basis-of-Design Products: The information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

B. Structural Performance: Handrails, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform load of 0.73 kN/m (50 lbf/ft.) applied in any direction.
2. Concentrated load of 0.89 kN (200 lbf) applied in any direction.
3. Uniform and concentrated loads need not be assumed to act concurrently.

2.3 MATERIALS:

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

B. Resilient Material:

1. Provide resilient material consisting of high impact resistant 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 A (1) fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
   c. Rated self-extinguishing when tested in accordance with ASTM D635.
   d. Provide material labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
   e. Provide integral color with colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

2.4 CORNER GUARDS AND END-OF-WALL GUARDS:

A. Resilient, Shock-Absorbing Corner Guards, CG-1, CG-3 & CG-6: Surface mounted type.

1. Snap-on corner guard formed from PVC-free, engineered PETG resilient material, minimum 1.98 mm (0.078-inch) thick, free floating on a continuous 1.52 mm (0.060-inch) thick extruded aluminum retainer. Provide appropriate mounting hardware, cushions and base plates as required.
   a. Resilient material shall be chemical and stain resistant per ASTM D543.
2. Profile: Minimum 76 mm (3 inch) long leg and 6 mm (1/4 inch) corner radius.
3. Height: 1.22 m (4 feet). Provide 3 feet tall at corridors so corner guard cap fits directly above the wall covering cap.
4. Retainer Clips: Provide manufacturer’s standard extruded aluminum, impact-absorbing clips, nominal 1.57 mm (0.062 inch) thick.
5. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards; color shall match snap on cover.
6. Basis-of-Design Product: Construction Specialties, Inc.; CS Acrovyn 4000 Model SM-20N.
   a. Colors:
      1) CG-1: Mission White No. 933 (used with paint color P-1).
      2) CG-3: Aspen No. 848 (used with paint color P-3).
      3) CG-6: Khaki Brown No. 531 (used with paint color P-6).

B. Resilient, Shock-Absorbing End-of-Wall Guards, EWG-1 & EWG-3: Surface mounted type formed by applying impact-resistant sheet material to end of wall and applying resilient, shock-absorbing corner guards over sheet material at each corner of wall end.
   1. Impact-Resistant Sheet Material: Same material as specified in Impact-Resistant Sheet Wall Covering below except for sheet thickness.
      a. Sheet Thickness: 0.040 inch.
   2. Corner Guards: Same corner guards as specified above.
   3. Height of End-of-Wall Guards: As indicated.
   4. Accessories: Provide factory fabricated end closure caps at top and bottom of surface mounted end-of-wall guards; color shall match snap on cover.
   5. Basis-of-Design Product: Construction Specialties, Inc.; CS Acrovyn 4000 Model SSM-25AN.
      a. Colors:
         1) EWG-1: Mission White No. 933 (used with paint color P-1).

2) EWG-3: Aspen No. 848 (used with paint color P-3).

2.5 HANDRAILS:

A. Handrails: Resilient Handrail/Wall Guard (Crash Rail) Combination

1. Handrails:
   a. Profile: Minimum 137.7 mm (5-1/2 inches) high with 76.4 mm (3 inch) wall offset.
      1) Lengths: 20 feet. Provide handrail runs without joint full length of run for runs that are less than 20 feet in length.
   b. Snap-on covers of PVC-free, engineered PETG resilient material, minimum 2 mm (0.078-inch) thick.
   c. Free-floating on a continuous, extruded aluminum retainer, minimum 1.82 mm (0.072-inch) thick.
   d. Wall Brackets: Shall be color matched to snap on cover.
   e. Anchor to wall at maximum 762 mm (30 inches) on center with concealed fasteners.
2. Provide handrails 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.
   a. Prefabricated end closure caps and inside and outside corners shall match color of snap on cover.
   b. Outside corners shall be one piece.
3. Basis-of Design Product: Construction Specialties, Inc.; CS Acrovyn 4000 Model HRB-4CN.
   a. Color: Color to match RWC clad wood doors specified in Section 08 14 00, INTERIOR WOOD DOORS.
   b. Deduct Alternate: Provide custom color to match wood veneer doors specified in Section 08 14 00, INTERIOR WOOD DOORS.

2.6 HIGH IMPACT WALL COVERING:

A. Impact-Resistant Sheet Wall Covering, RWC-1, RWC-4 & RWC-6: Provide wall covering consisting of high impact, semi-rigid PVC-free, engineered PETG plastic sheet material.

1. Wall covering shall not contain PVCs, PBTs (persistent bioaccumulative toxins) or BPA (bisphenol A).
2. Chemical and Stain Resistant: Shall be compliant with ASTM D543.

3. Impact Strength: Shall be compliant with the requirements of ASTM F476, Section 18.

B. Panel sizes to be 1.21 m (4 ft.) by longest length available. Provide height indicated at corridors.

C. Sheet Thickness: Nominal 1.52 mm (0.060 inch).

D. Submit fire rating and extinguishing test results for resilient material.

E. Submit statements attesting that the items comply with specified fire and safety code requirements.

F. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color. Trims shall be on piece without joints where runs do not exceed maximum lengths available.

1. Provide H-moldings for sheet vertical seam butt joints.
2. Provide continuous top trim cap.

G. Provide primer and adhesive as recommended by the wall covering manufacturer. Provide adhesive with VOC content of 250 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

H. Provide color matched caulk as recommended by the wall covering manufacturer.

I. Basis-of Design Product: Construction Specialties, Inc.; CS Acrovyn 4000 Sheet.

1. RWC-1: Mission White No. 933 (used with paint color P-1).
2. RWC-4: Peanut Brittle No. 322 (used with paint color P-4).
3. RWC-6: Khaki Brown No. 531 (used with paint color P-6).

2.7 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.

2.8 FINISH:

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

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

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

PART 3 - INSTALLATION

3.1 EXAMINATION

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

B. Examine walls to which wall protection will be attached for blocking and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

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

3.2 RESILIENT CORNER GUARDS AND END-OF-WALL GUARDS:

A. Install corner guards on walls in accordance with manufacturer's written instructions, level, plumb, and true to line without distortions.

1. At corridors, mount corner guards so corner guard cap fits directly above the top of the wall covering.

B. Install end-of-wall guard on wall ends with manufacturer's written instructions, level, plumb, and true to line without distortions.

1. Surfaces to receive protection to be clean, smooth and free of obstructions.
2. Apply impact-resistant sheet material to the full width of the wall end for full height without joints. Adhere sheet in same method as indicated below for High Impact Wall Covering.
3. After impact-resistant sheet material has been installed and adhesive has cured, install corners guards to each corner of the wall end.

3.3 RESILIENT HANDRAIL

A. Secure handrails to walls with mounting brackets and fasteners in accordance with manufacturer's details and written instructions, level, plumb, and true to line without distortions. Install in locations and at mounting heights indicated on Drawings. Install handrails in maximum available lengths without joints. No joints will be permitted in runs that are shorter in length than the maximum available handrail length.

3.4 HIGH IMPACT WALL COVERING

A. Install in accordance with manufacturer’s written instructions.

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

C. Apply with adhesive in controlled environment according to manufacturer’s recommendations. Sheet shall be smooth, flat and tight to wall substrate, free of bulges, bubbles and irregularities.

D. Install top and edge moldings, corners, and divider bars as required for a complete installation. Moldings shall be installed straight and true, level and plumb, free if wave and distortion. Butt ends shall align, with no variation in top or face alignment greater than 1/64-inch.

E. Install sheet and trim in maximum available lengths without joints. No joints will be permitted in runs that are shorter in length than the maximum available sheet. Where runs are longer than available product, locate joints in the most inconspicuous location. Do not install sheet or trims less than 24 inches in length. Where multiple joints are required along a wall, locate joints uniformly along the length of the run.

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SECTION 10 28 00
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. SUMMARY:

1. Section Includes:
   a. Toilet accessories at toilet rooms and other areas indicated on drawings.
   b. Coordination of blocking for VA supplied (OS) and contractor supplied (CS) toilet accessories.
   c. Installation of VA supplied (OS) toilet accessories.

1.2 RELATED REQUIREMENTS

A. Power for deck mounted, automatic soap dispensers: Division 26, ELECTRICAL.

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. C1036-11e1 - Flat Glass.
6. 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. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel:
   1. Plate or Sheet: ASTM A666, Type 304, 0.8 mm (0.031 inch) thick unless otherwise specified.
   2. Tubing: ASTM A269/A269M, Grade TP 304, seamless or welded.
   3. Pipe: ASTM A312/A312M; Grade TP 304.

B. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.

C. Glass:
   1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

2.2 PRODUCTS - GENERAL

A. Basis-of-Design Products: This information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. Provide each product from one manufacturer.

2.3 PAPER TOWEL DISPENSERS

A. VA Supplied (OS/CI) Paper Towel Dispenser, Equipment Item No. 17: Surface mounted dispensers supplied by VA.
   1. Provide concealed backing in stud framed walls of not less than 24 inch by 24 inch by 3/4 inch thick plywood at locations as directed by the COR.

B. (CS/CI) Z-Fold Paper Towel Dispensers, Equipment Item No. 44: ADA compliant, surface mounted unit fabricated of Type 304 stainless steel, 22 gage, all welded construction, satin finish; sized for 350 multifold paper towels; with continuous hinge at bottom; equipped with tumbler lockset, keyed alike; and with refill indicators that are pierced slots at sides or front. Height of unit shall be 203 mm (8 inches) or less.
   1. Basis-of-Design Product: Bardley Corporation; Model 252.
   2. Provide concealed backing in stud framed walls of not less than 24 inch by 24 inch by 3/4 inch thick plywood at locations as directed by the COR.

2.4 TOILET TISSUE DISPENSERS

A. VA Supplied (OS/CI) Toilet Tissue Dispensers, Equipment No. 52: Double roll surface mounted type dispensers supplied by VA.

1. Provide concealed backing in stud framed walls of not less than 24 inch by 24 inch by 3/4 inch thick plywood at locations as directed by the COR.

2.5 GRAB BARS

A. (CS/CI) Grab Bars, Equipment Item No. 50: Stainless steel grab bars of varying lengths; ICC/ANSI compliant for structural strength.

B. Basis of Design Product: Bobrick Model B-6806 Series x Indicated Length grab bar.

C. Fed. Spec. WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and complying with ASTM F446.

D. Fabricate from stainless steel, use one type throughout project:
   1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.

E. Mounting: Concealed type.

F. Bars:
   1. Fabricate to 38 mm (1-1/2 inch) outside diameter.
      a. Stainless steel, minimum 1.2 mm (0.05 inch) thick.
   2. Fabricate in one continuous piece with ends turned toward walls.
   3. Continuously weld intermediate support to grab bar.

G. 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.

H. 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.

I. Provide concealed blocking in stud walls of not less than 12 inch by 16 inch by 1-1/2 inch thick at each mounting flange location.

2.6 BARIATRIC GRAB BARS

A. (CS/CI) Bariatric Grab Bars, Equipment Item No. 6: Vinyl-coated bariatric grab bars, horizontal, with reinforced flanges.

B. Basis of Design Product: Bobrick Model B-980616 x Indicated Length grab bar.

1. Finish: White vinyl, antibacterial, biocompatible.
2. Size: As indicated.
3. Space between Flanges: 12 inch (306mm).
4. Diameter: 1-5/16 inches (33mm).

C. Compliance: Universal/accessibility design, including ADA-ABA and ICC/ANSI for structural strength.

1. Capacity: Designed to support 1102 lbs (500 kg) in compliant installations.

D. Description: Grab bar with 90 degree return to reinforced flanges. Clearance between grab bar and finished wall shall be 1-1/2 inches (38mm).

E. Grab Bar Materials: Seamless zinc-plated 3/4 inch (19mm) steel pipe with 1/8 inch (3mm) white vinyl coating. Cover sleeves polyamide 6 fiberglass reinforced nylon with glossy finish, attached with Type 304 set screws.

F. Snap Flange Covers: Polyamide 6 fiberglass reinforced nylon with gloss finish.

G. Provide concealed blocking in stud walls of not less than 12 inch by 16 inch by 1-1/2 inch thick at each mounting flange location. Coordinate stud reinforcement to prevent deflection and displacement of steel studs at maximum loading.

2.7 CLOTHES HOOKS (GARMET HOOKS)

A. (CS/CI) Clothes Hooks (Garment Hooks, Equipment Item No. 29: Stainless steel, double clothes hook.

B. Basis of Design Product: Bobrick Model B-76727.

C. Fabricate hook units from or stainless steel, with edges and corners rounded smooth to thickness of metal, or 3 mm (1/8 inch) minimum radius.

1. Projection from Wall: 2 inch (50mm).
2. Flange and Support Arm: All-welded, 18-8, Type 304, 22 gauge (0.8mm) stainless steel.

3. Mounting: Concealed bracket, 18-8, Type 304, 18 gauge (1.2mm) stainless steel; secured to wall plate with a stainless steel setscrew.
4. Concealed Wall Plate: 18-8, Type 304, 19 gauge (1.0mm) stainless steel.
5. Cap: 18-8, Type 304, 14 gauge (2.0mm) stainless steel; welded to support arm.

D. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to wall flange, provided with concealed fastenings.

E. Location:
1. Provide one coat hook at each Toilet Room.
2. Provide coat hook at patient areas at locations indicated.

F. Provide concealed backing in stud walls of not less than 12 inch by 16 inch by 3/4 inch thick plywood at locations as directed by the COR.

2.8 METAL FRAMED MIRRORS

A. (CS/CI) Metal Framed Mirror, Equipment Item No. 51: Mirror with stainless steel channel frame.

B. Basis of Design Product: Bobrick Model B-165 Series.

C. Fed. Spec. A-A-3002 metal frame; stainless steel.

D. Mirror Glass:
1. Minimum 6 mm (1/4 inch) thick.
2. Set mirror in a protective vinyl glazing tape.

E. Frames:
1. Channel 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.

F. 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.

G. Mounting Bracket:
   1. Designed to support mirror tight to wall.
   2. Designed to retain mirror with concealed set screw fastenings.

2.9 SOAP DISPENSERS

A. VA Supplied (OS/CI) Disposable Soap Dispenser, Equipment Item No. 8: Surface mounted dispensers provided by VA.
   1. Provide concealed backing in stud framed walls of not less than 24 inch by 24 inch by 3/4 inch thick plywood at locations as directed by the COR.

B. VA Supplied (OS/CI) Hands Free, Hand Sanitizer, Equipment No. 15: Surface mounted, hand sanitizer dispensers provided by VA.
   1. Provide concealed backing in stud framed walls of not less than 24 inch by 24 inch by 3/4 inch thick plywood at locations as directed by the COR.

C. (CS/CI) Deck Mounted Soap Dispenser, Equipment Item No. 43: Automatic, top-fill bulk liquid soap dispenser.
   1. Basis of Design Product: Bobrick Counter-Mounted Automatic Top-Fill Liquid Soap Dispenser, Model B-824 with AC Adapter No. 3974-57.
   2. Operation: When hand is placed under spout for approximately 1 second, soap is dispensed. Dispenser is top-filled through built-in funnel that is unlocked with special provided key and rotating lid 180 degrees.
      a. Shall dispense all-purpose bulk liquid hand soaps of various viscosities; do not use alcohol based sensitizers.
      b. Volume of soap dispensed shall be field adjustable from 0.4 to 3 ml.
   3. Spout and Cover Assembly: Bright polished, chrome plated ABS plastic with LED light indicators to show when unit has been activated. Unit shall be equipped with oversized funnel shape opening, covered by a 180 degree rotatable lid with concealed locking mechanism to all for top filling.
   4. Shank: Installs in countertops up to 51 mm (2 inches) maximum thickness; requires a 35 mm (1-3/8 inch) diameter mounting hole through countertop.
   5. Pump System: Plastic gear-type construction attached to bottom of soap container.
   6. Sensor: Infrared sensor located on single PC board housed in sealed ABS plastic container below the counter.

7. Power Supply Adaptor: Provide single 6V AC Adapter.
8. Container: Translucent, shatter-resistant polyethylene, 1.0 L (34 fl. oz.).
9. Unit shall be equipped with an automatic system flush button to allow for cleaning and maintenance.

2.10 FABRICATION - GENERAL

A. Welding, AWS D10.4.
B. Grind, dress, and finish welded joints to match finish of adjacent surface.
C. Form exposed surfaces from one sheet of stock, free of joints.
D. Provide steel anchors and components required for secure installation.
E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
F. 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. Provide templates and rough-in measurements.
J. Round and deburr edges of sheets to remove sharp edges.

2.11 FINISH

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

2.12 ACCESSORIES

A. Fasteners:
   1. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
   2. Concealed Fasteners:
      a. High Moisture Areas: Stainless steel.
      b. Other Locations: Steel, hot-dipped galvanized.
   3. Toggle Bolts: For use in hollow masonry or frame construction.
   4. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
   5. 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.
   2. Verify solid blocking for grab bars and bariatric grab bars has been installed to comply with specified loading requirements.

B. Verify location of accessories with Contracting Officer's Representative.

3.2 INSTALLATION

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

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. Screw attach to concealed wood blocking in frame partitions. Expansion bolt to solid masonry.

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

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

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

3.3 CLEANING

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

3.4 PROTECTION

A. Protect accessories from damage until project completion.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

A. 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):
C1048-12.....Heat-Strengthened and Fully Tempered Flat Glass

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

A. Recessed type with flat trim, non-rated, steel cabinet sized to accommodate a 4A:80-B:C, 10 lb. fire extinguisher and as follows:

1. Door Style: Vertical duo panel with frame.
2. Door Glazing: Clear, tempered float glass.
3. Accessories:
   a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for type fire extinguishers indicated.
   b. Identification: Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER"; vertical lettering in color as selected by Architect.
4. Basis of Design: Potter Roemer, Dana Cabinets-DV, Model 7210.

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 C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I (transparent flat glass), Quality q3 (glazing select), Class 1 (clear) glass.
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 semigloss white enamel.

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 10 51 13

LOCKERS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies knocked-down, metal quiet corridor lockers.

1.2 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Shop Drawings: Showing layout of tracks and method of anchorage.
C. Manufacturer's Literature and Data:
   1. Metal lockers.
      a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.3 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, conditioned and protected location.
C. Do not open packages until contents are needed for installation, unless verification inspection is required.

PART 2 - PRODUCTS

2.1 LOCKERS:

A. Basis-of-Design: Heavy Duty Corridor Lockers by Republic Storage Systems Company. This information is provided for reference only; it does not exclude other manufacturer’s that comply with specified product requirements.
B. Doors: One piece; fabricated from 0.075-inch, 14 gage, nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
   1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
   2. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch, 18 gage, nominal-thickness steel sheet; welded to inner face of doors.

3. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
4. Door Style: Unperforated panel with concealed vents.
   a. Concealed Vents: Slotted perforations in top and bottom horizontal door return flanges.

C. Body: Assembled by bolting body components together using shake-proof, permanent fasteners. Fabricate from unperforated steel sheet with thicknesses as follows:
   1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch, 24 gage, nominal thickness, with single bend at sides.
   2. Shelves: 0.024-inch, 24 gage, nominal thickness, with double bend at front and single bend at sides and back.

D. Frames: Channel formed; fabricated from 0.060-inch, 16 gage, nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
   1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; self-closing.
   1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.

F. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
   1. Multipoint Latching: Finger-lift latch control designed for use with padlocks; positive automatic latching and prelocking.
      a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.

b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

G. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
   1. Identification of ADA Lockers: Include handicapped symbol attached to door.
   2. Identification plates shall not contain advertising of manufacturer or distributor/vendor.

H. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.

I. Filler Panels: Fabricated from 0.048-inch, 18 gage, nominal-thickness steel sheet.

J. Sloped Tops: Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch thick, 22 gage.
   1. End Closures: Vertical-end type.

K. Continuous Zee Base: 4 inches high; fabricated from 0.075-inch nominal-thickness steel sheet.

L. Materials: Cold-Rolled Steel Sheet. ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

M. Finish: Manufacturer's standard finish; powder coat or baked enamel.
   1. Color: Republic Locker 20 Dove Gray.

2.2 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking, shake-proof nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts.

2.3 FABRICATION:

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate and the following equipment:
1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.

D. Knocked-Down Construction: Fabricate metal lockers using shake-proof nuts and bolts for nominal assembly at Project site. Factory weld frame members together to form a rigid, one-piece assembly.

E. Accessible (ADA) Lockers: Fabricate as follows:
1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, additional shelves are provided, locate no higher than 48 inches above the floor.

F. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

G. Size: Double tier lockers, 15 inches wide, 18 inches deep, 72 inches height (two 36 high lockers).

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor metal lockers to walls near top and bottom of lockers.

B. Knocked-Down Lockers: Assemble with shake-proof fasteners, with no exposed fasteners on door faces or face frames. Provide fillers, end panels and sloped tops.

C. Equipment:

1. Attach hooks with at least two fasteners.
2. Attach door locks on doors using security-type fasteners.
3. Identification Plates: Identify metal lockers with identification indicated on Shop Drawings.

3.2 ADJUSTING:

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.3 PROTECTION:

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

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SECTION 11 73 00
CEILING MOUNTED PATIENT LIFT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.

B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic requirements for non-structural equipment.

C. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

1.3 QUALITY ASSURANCE

A. Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by the manufacturer who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1.

B. Inspection of equipment after installation is required prior to use for patient movement. Inspection shall be in accordance with manufacturer’s installation checklist and the facilities installation checklist, Patient Safety Alert AL14-07, attached to this Section.

C. Certification of compliance with VA requirements shall be provided by an independent third party, Inspector of Record (IOR), who will observe installation and manufacturer’s testing to ensure that the ceiling structure, ceiling lift, and charging system is safe and compliance with shop drawings, structural calculations, specifications, ISO 10535 requirements, and code requirements. IOR shall be a registered structural engineer in the state of installation.

1.4 SUBMITTALS

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

1. Shop drawings shall show structural supports to the underside of structure. Structural calculations for the support of the track and its attachment to ceiling structure shall be submitted. Structural calculations shall include seismic requirements for Seismic Design Category C, Site Class C, and Occupancy Category IV. Shop drawings

shall be PDFs, and either 2D CAD files or 3D BIM files showing structural support to underside of structure. Shop drawings shall also provide general room layout with bed position and all obstructions to ceiling lift.

2. A set of stamped drawings shall be provided by the vendor. Shop drawings and structural calculations shall be signed and stamped by a registered structural engineer, and shall meet all code requirements in the jurisdiction having authority. Structural engineer shall ensure ceiling minimum structure capacity shall support the loads specified in the shop and installation drawings and be in compliance with local structural and seismic codes.
   a. Patient Lift System and Support Connections Seismic Restraint Requirements: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
3. Shop drawings shall show obstructions such as lights and sprinklers, and coordinate their relocation.
4. Manufacturer shall provide BIM (Building Information Model) for clash detection on the request of the COR or General Contractor.

B. Certificates of Compliance from Manufacturer.

C. Manufacturer's Literature and Data:
1. Lifting Capacity
2. Lifting Speed
3. Vertical Axis Motor
4. Emergency Brake
5. Emergency Lowering Device
6. Emergency Stopping Device
7. Electronic Soft-Start and Soft-Stop Motor Control
8. Current Limiter for Circuit Protection
9. Strap Length
10. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.

D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.

E. Manufacturer’s Checklist for after installation inspection.

1.5 APPLICABLE PUBLICATIONS

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

B. International Organization for Standardization (ISO):

10535-06.....Hoist for the Transfer of Disabled Persons-Requirements and Test Methods

C. Underwriters Laboratories (UL):

60601-1(2003).....Medical Electrical Equipment: General Requirements for Safety

94-2013.....UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):

60601-1-2(2015).....Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests.

E. VA Patient Safety Alert AL14-07

PART 2 - PRODUCTS

2.1 PATIENT LIFT SYSTEM

A. The existing patient lift system at the VAMC Togus is Arjohuntleigh U.S., Getinge Group. 800-323-1245; Contact: Tim Muchna. Provide the following lift system to integrate with existing facility operations, no substitution:

1. Track: KWIKtrack System in X-Y (Traverse) configuration.
2. Lift: MAXI SKY 600, Ceiling Lift System with a 2-Point Hanger Bar.

2.2 CEILING TRACK SYSTEM

A. The Ceiling Track shall be made from high strength extruded aluminum or VA approved equal. Provide anchor supports at ceiling substrate.

B. Installed rail shall be security tested for 1.5 times greater than the motor’s weight capacity and maximum allowable deflection of a horizontal rail is no more than 1mm (1/16th inch) per 200mm (7.87 inch) of track length. (As per ISO 10535 standards.) √

1. Track Capacity: 1000 lbs. (453.592 kg).

2.3 LIFT UNIT

A. The Lift Unit shall be constructed of a steel frame system driven by a gear reduced high torque motor.

B. The Lift system shall have the following features.

1. Lifting capacity: 600 lbs (272.1554 kg) for non-bariatric lifts.
2. Electronic soft-start and soft-stop motor control
3. Emergency lowering device
4. Emergency stopping device
5. Current limiter for circuit protection in case of overload.
6. Safety device that stops the motor to lift when batteries are low.
7. Horizontal axis motor:
8. Emergency brake (in case of mechanical failure)
9. Strap length: 90.6 inches (2300 mm).
10. Cab: VO plastic–fire retardant, UL 94.

2.4 MOTORS

A. Vertical Movement-DC Motor

2.5 BATTERIES

A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 6100-1-2.

B. Provide rechargeable batteries with up to 120 transfers with a load of 200lbs (74kg) (for repositioning) and a minimum of 40 transfers with its maximum load of 600lbs (272.1554 kg) for non-bariatric lifts.

2.6 CHARGER

A. Charger: Fixed charging station; corner location as indicated.

2.7 STRAPS AND SLING

A. The straps shall meet ISO 10535, Appendix A guidelines. The straps shall ensure the patient’s safety by preventing the patient from falling out of the sling.

B. The sling shall meet ISO 10535, Appendix A guidelines. The sling shall cradle the body of the patient.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on approved shop drawings.

B. If the distance in between the suspended ceiling and anchors is more than 18 inches, consult with manufacturer to determine if lateral braces will be required.

3.2 INSTRUCTION AND PERSONNEL TRAINING

A. Provide 4 hours of training for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

A. Conduct performance test, in the presence of the COR and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design, specification, and code requirements.

3.4 INSPECTION

A. Inspection of installed ceiling mounted patient lift systems shall be conducted in accordance with the manufacturer’s installation checklist and the facilities installation checklist (Patient Safety Alert AL14-07) prior to use for patient movement.

B. Periodic Inspection shall be provided by the manufacturer on a yearly basis in compliance with ISO 10535.

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Patient Safety Alert

Veterans Health Administration Warning System
Published by VA Central Office

AL14-07 **July 28, 2014**

This Patient Safety Alert AL14-07 replaces and supersedes Patient Safety Alert AL10-07 issued on March 22, 2010

Item: **Issues continue to occur due to improper ceiling mounted patient lift installation, maintenance and inspection**

Specific Incidents: Patient Safety Alert AL10-07, issued on March 22, 2010, instructed VA facilities to complete an after installation checklist for ceiling mounted patient lifts on all newly installed, ceiling mounted patient lift systems (see Reference 1). Since the release of AL10-07, VA medical centers have continued to report adverse events and close calls involving ceiling mounted patient lifts (see below). While no injuries have occurred, patients and staff can be seriously harmed when lifts collapse or fall. These reports have prompted the review of installation and maintenance procedures for ceiling mounted patient lift systems, which has resulted in the issuance of this Patient Safety Alert.

- A lift collapsed while a patient was being transferred from a wheelchair to a bed. Investigation revealed that a set screw, which secures the transverse rail to the rail trolley, had not been properly tightened during installation and the transverse rail was missing the proper end stops.

- A lift unit fell off the rail. It was determined that an end stop was missing from the system.

- A lift unit fell off the rail after preventive maintenance procedures were performed on the lift. It was established that the docking gate for the lift unit had not been secured.

- A lift bracket broke loose while lifting a patient from a bed to a wheelchair. It was revealed that a snap clip (“C”-clip) came off the end of a pin, allowing the strap that connects the lift bracket to the lift unit to detach.

- A lift unit fell off the rail when it was moved through a circular gate (transition gate). Investigation revealed that a safety block, which prevents the lift unit from exiting the open end of the track/rail, was not installed properly.

General Information: Due to the incidents described above, Patient Safety Alert AL10-07 is being replaced with this Patient Safety Alert, AL14-07. This replacement Patient Safety Alert notifies the field of updated actions and ensures parties responsible for ceiling mounted patient lifts are aware of the requirements for initial installations, maintenance and recurring inspections of ceiling mounted patient lifts.

Actions:

1. By Close of Business (COB) July 30, 2014, the **Medical Center Director (or designee)** shall ensure that the Nurse Executive, Safe Patient Handling Coordinator, Chief of Facilities Management, and Chief of Biomedical Engineering are made aware of this Patient Safety Alert AL14-07.

2. By COB September 5, 2014, **Manager of the service(s) responsible for maintaining ceiling mounted patient lifts (or designee)** shall determine if **any** ceiling mounted patient lift systems (of any brand or manufacturer) have been installed in the facility, including Community Based Outpatient Clinics (CBOCs), and ensure the following are completed:

   a. For ceiling mounted patient lifts within your facilities, verify that the facility has an “After Installation Checklist for Ceiling Mounted Patient Lifts” as required by Patient Safety Alert A10-07 (see Reference 1) on file.

      i. If so, continue to Action 2b.

      ii. If not, complete an “Installation or Relocation Checklist for Ceiling Mounted Patient Lifts” (see Additional Information) on the lift system(s) in question.

   b. Put a process in place to ensure inspection of ceiling mounted patient lifts upon installation or relocation, prior to permitting the equipment to be used for patient movement. The process must include, at minimum, the completion of the “Installation or Relocation Checklist for Ceiling Mounted Patient Lifts” (see Additional Information).

   NOTE: The “Installation or Relocation Checklist for Ceiling Mounted Patient Lifts” includes minimum requirements for inspection of ceiling mounted patient lifts; this list shall be <u>used</u>

in addition to manufacturer provided checklists prior to permitting the equipment to be used for patient movement.

3. By COB September 12, 2014, **Manager of the service(s) responsible for maintaining ceiling mounted patient lifts (or designee)** shall put a process in place to ensure that the items listed in the "Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts" (see Additional Information) are inspected and verified during corrective and preventive maintenance, prior to permitting equipment to be used for patient movement.

    - For preventive maintenance (PM) procedures, the entire "Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts" shall be completed.

    - For corrective maintenance (CM) procedures, the entire "Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts" shall be completed after:

        - Modifications to or replacement of the lift unit
        - Replacement of the lift strap
        - Modifications to the track/rail structure
        - Other major corrective maintenance procedures that may not be identified above

        For minor corrective maintenance procedures that do not fall into the above categories, the Manager of the service responsible for maintaining ceiling mounted patient lifts (or designee) shall determine the relevant sections of the "Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts" to be completed.

    NOTE: The "Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts" includes minimum requirements for inspection of ceiling mounted patient lifts; this list shall be used in addition to manufacturer provided checklists prior to permitting the equipment to be used for patient movement.

4. By COB September 19, 2014, the **Patient Safety Manager** must document on the VHA Alerts and Recalls Web site (http://vaww.recalls.ncps.med.va.gov/WebRecalls/Recalls.html) that medical center leadership has reviewed and implemented these actions. Facilities that do not have ceiling mounted patient lift systems may mark this Alert as 'not applicable', including their

justification.

NOTE: When closing out this Patient Safety Alert on the VHA Alerts and Recalls Web site and entering in the "estimated number of patients affected per month" field, it is recommended that sites enter the average number of patients that use ceiling mounted patient lift systems per month within their facility.

Additional Information:

1) Installation or Relocation Checklist for Ceiling Mounted Patient Lifts
2) Corrective and Preventive Maintenance Checklist for Ceiling Mounted Patient Lifts
3) Hazard Summary - Common Failure Modes of Overhead Ceiling Lifts
4) Ceiling Lift Hazards and Mitigations Presentation

Source: Patient Safety Reports submitted to NCPS from VA Medical Centers

References:

1) Patient Safety Alert AL10-07, Ceiling mounted patient lift installations, March 22, 2010 http://vaww.ncps.med.va.gov/Guidelines/alerts/Docs/AL10-07CeilingMountedLift.pdf
NOTE: This Alert has been retired, but is provided here as a reference for Action 2.
2) VA Handbook H-18-8 Seismic Design Requirements, August 2013 http://www.cfm.va.gov/til/etc/seismic.pdf
3) VA Directive 7512 Seismic Safety of VA Buildings, October 12, 2011 http://www.va.gov/vapubs/viewPublication.asp?Pub_ID=581&FType=2
4) VA Master Design Specification 13.05.041 Seismic Restraint Requirements for Non-Structural Components, January 1, 2014 http://www.cfm.va.gov/TIL/spec/130541.doc

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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.

1.2 RELATED WORK

A. Countertop brackets, supports, aprons, removable access panels and cabinetry supporting countertops: Section 06 20 00, FINISH CARPENTRY.

B. DIVISION 22, PLUMBING.

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 1/2 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.

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. Composite Panel Association (CPA):

A208.1-09.....Particleboard

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

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

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

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

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

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

1.5 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Standards, First Edition" for grades of

interior architectural woodwork, construction, finishes, and other requirements.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Provide each product from one manufacturer and from one production run.

B. Basis-of-Design Products: This information is provided for reference only; it does not exclude other manufacturer's that comply with specified product requirements.

2.2 MATERIALS

A. Plywood: PS 1, Exterior type, veneer grade AC not less than five ply construction.

B. Accessories:

1. Grommets for Cable Passage through Countertops: Molded-plastic grommets and matching plastic caps with slot for wire passage; color and size as selected by Architect.

C. Adhesive

1. For wood products: ASTM D4690, unextended urea resin or unextended melamine resin, phenol resin, or resorcinol resin.

D. Fasteners:

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

E. Solid Polymer Material:

1. Basis-of-Design Products:
   a. SSURF-1: Wilsonart LLC; Wilsonart Solid Surface.
      1) Color: Morning Ice 9204 CE.
   b. SSURF-2: DuPont Polymers; Corian.
      1) Color: Witch Hazel.
2. Products used in this Section and products used in Section 06 20 00, FINISH CARPENTRY shall be from the same manufacturer; Contractor to coordinate.
3. Filled Methyl Methacrylic Polymer.
4. Performance properties required:

Property	Result	Test
Elongation	0.4% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785

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

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

2.3 SINKS

A. Sinks of Methyl Methacrylic Polymer: ADA Compliant.
   1. Minimum 19 mm (3/4 inch) thick, cast into bowl shape with overflow to drain.
   2. Provide for integral installation to countertop.
   3. Provide openings for drain.
   4. Sink (Lavatory) Size: ADA compliant, 16-1/2 by 13-1/8 inches oval bowl by 6-1/4 overall inches deep.
   5. Basis-of-Design-Product: Corian Accessible Sink 810.
      a. Color: Glacier Ice.

2.4 TRAPS AND FITTINGS

A. Material as specified in DIVISION 22, PLUMBING.

2.5 COUNTERTOPS

A. Quality Standard: Comply with AWI's Standards Section 11 - Countertops requirements for countertops.
   1. Grade: Custom.
B. Fabricate in largest sections practicable.

C. Fabricate with joints flush on top surface.

D. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets.

E. Join edges integral chemically bonded to create inconspicuous, nonporous joints.

F. Fabricate with end splashes where against walls.

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. Integral cove where backsplash and end splashes meet the top, chemically bonded.

H. Drill or cutout for sinks, plumbing fittings, gromments and other indicated penetrations.

1. Accurately cut for size of penetration.

I. Methyl Methacrylic Polymer Tops:

1. Fabricate countertop of methyl methacrylic polymer cast sheet, 19 mm (3/4 inch) thick with 38 mm (1-1/2 inch) laminated straight front edge with 6.35 mm (1/4-inch) radius at top; provide concealed drip groove on bottom of front edge at countertops with sinks.
2. Fabricate back splash to height shown with eased top edge and continuous 10 mm (3/8-inch) deep scribe strip along top back edge and ends of back splash. Provide integral cove where backsplash meets the top, chemically bonded.
3. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
4. Join pieces with chemical bond.
5. Make cutouts for grommets.
6. Cut out countertop for sinks and plumbing trim. Make cutouts for faucets.
7. Secure methyl methacrylic polymer cast sinks to tops using manufacturer’s recommended adhesive to maintain warranty.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Install countertops level and plumb to a tolerance of 1/8 inch in 96 inches. Do not exceed 1/64-inch difference between planes of adjacent units.

C. Scribe back splashes to conform to wall.

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

1. Where type, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.

E. Sinks:

1. 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.

F. Install grommets where indicated.

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 October 1, 2016, http://www.cfm.va.gov/til/etc/seismic.pdf.

1. Category of Facility: Critical Facility.
2. Seismic Design Category: Seismic Design Category C, Site Class C, and Occupancy Category IV.

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.

1.2 RELATED WORK:

A. Section 03 45 00, Precast Architectural Concrete.
B. Section 04 20 00, Unit Masonry.
C. Section 05 40 00, Cold-Formed Metal Framing.
D. Section 09 22 16, Non-Structural Metal Framing.
E. Section 09 51 00, Acoustical Ceilings.
F. Section 11 73 00, Ceiling Mounted Patient Lift System.
G. Section 21 13 13, Wet-Pipe Sprinkler Systems.
H. Section 22 05 11, Common Work Results for Plumbing.

I. Section 22 11 00, Facility Water Distribution.
J. Section 22 13 00, Facility Sanitary and Vent Piping.
K. Section 22 14 00, Facility Storm Drainage.
L. Section 22 62 00, Vacuum Systems for Healthcare Facilities.
M. Section 22 62 50, Sanitary Waste Vacuum System.
N. Section 22 63 00, Gas Systems for Healthcare Facilities.
O. Section 23 05 11, Common Work Results for HVAC.
P. Section 23 21 13, Hydronic Piping.
Q. Section 23 22 13, Steam and Condensate Heating Piping.
R. Section 23 31 00, HVAC Ducts and Casings.
S. Section 23 34 00, HVAC Fans.
T. Section 23 36 00, Air Terminal Units.
U. Section 23 74 13, Packaged, Outdoor, Central-Station Air-Handling Units.
V. Section 23 82 00, Convection Heating and Cooling Units.

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

E488-15.....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 2-1/2 inches inside diameter.
4. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
5. All other piping less than 2-1/2 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 or A325 as applicable for connection design.

2.2 CAST-IN-PLACE CONCRETE:

A. Concrete: 28 day strength, f'c = 20.68 MPa (3,000 psi), 24.13 MPa (3,500 psi), or 34.47 MPa (5,000 psi) as applicable for field condition and seismic design.

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. Testing agency shall be retained by the General Contractor. Testing agency shall comply with requirements of Section 01 45 29, TESTING LABORATORY SERVICES.

2. 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.

3. 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; 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.

C. 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.

D. 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.

E. 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.

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. Tie brick veneers to ensure strength against applicable seismic forces at the project location.

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SECTION 13 49 00
RADIATION PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 RELATED REQUIREMENTS

A. RWC Color for RWC Doors: Section 08 14 00, INTERIOR WOOD DOORS.

B. Hardware for Doors: Section 08 71 00, DOOR HARDWARE.

C. Installation of Doors and Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, INTERIOR WOOD DOORS and Section 08 71 00, DOOR HARDWARE.

D. Joint treatment of Lead-Lined Gypsum Board: Section 09 29 00, GYPSUM BOARD.

1.3 APPLICABLE PUBLICATIONS

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

B. ASTM International (ASTM):

1. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
2. C1396/C1396M-14a - Gypsum Board.
3. D543-06 – Practices for Evaluating the Resistance of Plastics to Chemical Reagents
4. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

C. Federal Specifications (Fed. Spec.):

1. QQ-L-201F(2)-65 - Lead Sheet.

D. National Council on Radiation Protection & Measurements (NCRP):

1. Report No. 102-89 - Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies Up to 50 MeV (Equipment Design, Performance and Use).
2. Report No. 147-04 - Structural Shielding Design for Medical X-Ray Imaging Facilities.

1.4 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting minimum 30 days before beginning Work of this section.

1. Required Participants:
    a. Contracting Officer's Representative.
    b. Inspection and Testing Agency.
    c. Contractor.
    d. Installer.

1.5 SUBMITTALS

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

B. Submittal Drawings:
    1. Show size, configuration, and fabrication and installation details.
    2. Show type, location, and thickness of radiation protection.

C. Manufacturer's Literature and Data:
    1. Description of each product.
    2. Installation instructions for each product.
    3. Warranty.

D. Test Reports: Certify each product complies with specifications.
    1. Lead lined wood doors.
    2. Lead lined door frames.

E. Qualifications: Substantiate qualifications comply with specifications.
    1. Manufacturer.

F. Operation and Maintenance Data:
    1. Care instructions for each exposed finish product, including cleaning materials and methods that could be detrimental to impact-resistant cladding.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

A. Manufacturer's Warranty: Warrant lead lined doors against material and manufacturing defects.

1. Defects Include: Warp or twist exceeding 6 mm (1/4 inch) in any face dimension of door (including full diagonal), measured minimum six months after doors have been hung and finished.

2. Warranty Period:

a. Lead Lined RWC Wood Doors: Limited Lifetime.

1) Door Stile and Edge Cover: Lifetime.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lead Lined Gypsum Wallboard:

1. Gypsum Wallboard: ASTM C1396/C1396M, Type X, 16 mm (5/8 inch) thick.

2. Factory bond sheet lead to one side of wallboard.

3. Apply sheet lead in not less than thicknesses indicated, unpierced and in one piece.

a. Procedure Room Bronchoscopy 208: 1/32-inch thick.

b. Existing CT Room (existing window opening infill0: 1/16-inch thick.

B. Fasteners:

1. Standard Steel Drill Screws: ASTM C1002 for application of lead lined sheet materials to metal studs.

C. Lead Discs: Not required.

2.2 PRODUCTS - GENERAL

A. Basis-of-Design, General: The information is provided for reference only; it does not exclude other manufacturers that comply with specified product requirements.

B. Radiation Shielding Products: Conform to applicable requirements of NCRP Report No. 147 and NCRP Report No. 102.

C. Signs: As scheduled in this section.

1. Heavy white paper or cardboard.

2. Height of lettering and number minimum 3 mm (1/8 inch).

3. Fill in blank spaces on signs with millimeter thickness of lead as installed and total mm thickness of lead equivalent (determined by VA Physicist) and height of radiation protection above finished floor where required.

4. Provide manufacturer's standard stainless steel frame with clear acrylic plastic cover, 3 mm (1/8 inch) thick over sign, to hold card size 100 mm by 150 mm (4 inches by 6 inches).

D. Lead Lined, RWC Doors:

1. Basis-of-Design Products: Construction Specialties; Acrovyn Door Systems. Doors shall be from the same manufacturer as the door specified in Section 08 14 00, INTERIOR WOOD DOORS.
2. Refer to Section 08 14 00, INTERIOR WOOD DOORS for quality standards, finishing, installation and related requirements.
3. Flush wood construction with impact-resistant cladding.
4. Construction: Shall comply with WDMA I.S.1A-04 and the following:
   a. Performance Duty Level: WDMA I.S.1A, Extra Heavy Duty.
   b. Door Thickness: 44 mm (1-3/4 inches).
   c. Core: Structural composite lumber, 17.69 kg per cubic meter (39 lb/cu. ft.) with no added urea formaldehyde content; tops and bottoms factory sealed.
5. Construct doors with filler strips, crossbanding, and impact-resistant facers, bonded under heavy pressure.
6. Extend sheet lead lining to door edges; 1/32-inch thick lead sheet.
7. Face Sheets, Door Edge Covers and Color: Refer to Section 08 14 00, INTERIOR WOOD DOORS.
8. Clearance between Doors and Frames and Floors:
   a. Jambs and Heads: A maximum 3 mm (1/8 inch) clearance.
   b. Bottom of door to finish floor: Maximum 19 mm (3/4 inch) clearance.

E. Hardware:

1. Hardware for doors is specified in Section 08 71 00, DOOR HARDWARE.
2. Stagger bolts to door pulls on plates which penetrate lead lining relative to opposite plate and recess on side of door opposite pull.
3. Provide lead plugs or discs over recessed nut ends of bolts, unless otherwise shown.
4. Countersink nut ends of bolts for and automatic door operators and covered with lead lined 1.5 mm (0.06 inch) stainless steel pans.
5. Provide round head screws with dull chromium plated finish to secure stainless steel pans.
6. Recess lock and latch cases at mill and line with lead butted tightly to lead in door.

7. Protection and installation of doors and hardware as specified in Section, 08 11 13, HOLLOW METAL DOORS AND FRAMES, 08 14 00, INTERIOR WOOD DOORS, and 08 71 00, DOOR HARDWARE.

F. Lead Lining of Frames:

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

3.2 INSTALLATION OF LEAD LINED GYPSUM WALLBOARD PANELS

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

3.3 INSTALLATION OF SUPPLEMENTAL LEAD SHIELDING

A. Line or cover penetrations of wall lead, pipe chases, columns fasteners and other interruptions with sheet lead.
   1. Install sheet lead free of waves, lumps and wrinkles and with as few joints as possible.

2. Joints in sheet lead to provide radiation protection equivalent to adjacent sheet lead.
3. Finish joints smooth and neat.

B. Provide lead shielding for spaces around outlet boxes, junction boxes, film illuminators, and pipes, to achieve radiation protection equaling radiation protection specified for adjacent wall surface.

3.4 FIELD QUALITY CONTROL

A. Field Tests: Field tests will be performed by the VAMC CE..
1. Lead radiation shielding will be tested after radiation producing equipment is installed.
2. Additional testing required due to correction and replacement of defective work will be done by Government at Contractor's expense.

3.5 SIGNAGE SCHEDULE

A. Install signs on each wall of each room, maximum 300 mm (12 inches) above accessible ceilings, centered along length of each wall.
1. Space signs maximum 6000 mm (20 feet) on center.
2. Fasten signs with screws at each corner of sign.

B. Special Procedures Room Protected with sheet lead and lettered as follows:

SURFACES OF THIS ROOM HAVE BEEN PROTECTED WITH SHEET LEAD OF THE FOLLOWING THICKNESS TO A HEIGHT OF 2100 mm (7 feet) ABOVE FLOOR SLAB:		
COMPONENT	TOTAL LEAD	
	LEAD THICKNESS	EQUIVALENT PROTECTION
DOORS and FRAME	_____ mm	0.10 mm
PARTITIONS	_____ mm	0.10 mm

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SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Design, installation and testing shall be in accordance with NFPA 13.

B. The design and installation of a hydraulically calculated automatic wet-pipe system complete and ready for operation, for all portions of the new addition within Building 200E. C. Modification of the existing sprinkler system as indicated on the drawings and as further required by these specifications.

1.2 RELATED WORK

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

B. Section 07 84 00, FIRESTOPPING.

C. Section 09 91 00, PAINTING.

D. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 DESIGN CRITERIA

A. Design Basis Information: Provide design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system in accordance with the requirements of NFPA 13.

1. Perform hydraulic calculations in accordance with NFPA 13 utilizing the Area/Density method. Do not restrict design area reductions permitted for using quick response sprinklers throughout by the required use of standard response sprinklers in the areas identified in this section.
2. Sprinkler Protection: Sprinkler hazard classifications shall be in accordance with NFPA 13. The hazard classification examples of uses and conditions identified in the Annex of NFPA 13 shall be mandatory for areas not listed below. Request clarification from the Government for any hazard classification not identified. To determining spacing and sizing, apply the following coverage classifications:
   a. Light Hazard Occupancies: Patient care, treatment, and customary access areas.
   b. Ordinary Hazard Group 1 Occupancies: Laboratories, Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets, and Repair Shops.

c. Ordinary Hazard Group 2 Occupancies: Storage rooms, trash rooms, clean and soiled linen rooms, pharmacy and associated storage, laundry, kitchens, kitchen storage areas, retail stores, retail store storage rooms, storage areas, building management storage, boiler plants, energy centers, warehouse spaces, file storage areas for the entire area of the space up to 140 square meters (1500 square feet) and Supply Processing and Distribution (SPD).

3. Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve.

4. Water Supply: Base water supply on a flow test of:

   Static pressure: 75 psi
   Residual pressure: 68 psi
   Flow: 500 gpm
   Date: 23 Sept 2016

   If flow test data is older than one year, conduct new flow test data or request updated test data from the VA if available.

5. Zoning:

   a. For each sprinkler zone provide a control valve, flow switch, and a test and drain assembly with pressure gauge. For buildings greater than two stories, provide a check valve at each control valve.

   b. Sprinkler zones shall conform to the smoke barrier zones shown on the drawings.

6. Provide seismic protection in accordance with NFPA 13. Contractor shall submit load calculations for sizing of sway bracing for systems that are required to be protected against damage from earthquakes.

1.4 SUBMITTALS

A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Prepare detailed working drawings that are signed by a NICET Level III or Level IV Sprinkler Technician or stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering. As the Government review is for technical adequacy only, the installer remains responsible for correcting any conflicts with other trades and building construction that arise during installation. Partial submittals will not be accepted. Material submittals shall be approved prior to the purchase

or delivery to the job site. Suitably bind submittals in notebooks or binders and provide an index referencing the appropriate specification section. In addition to the hard copies, provide submittal items in Paragraphs 1.4(A)1 through 1.4(A)5 electronically in pdf format on a compact disc or as directed by the COR. Submittals shall include, but not be limited to, the following:

1. Qualifications:
   a. Provide a copy of the installing contractors fire sprinkler and state contractor’s license.
   b. Provide a copy of the NICET certification for the NICET Level III or Level IV Sprinkler Technician who prepared and signed the detailed working drawings unless the drawings are stamped by a Registered Professional Engineer licensed in the field of Fire Protection Engineering.
   c. Provide documentation showing that the installer has been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.
2. Drawings: Submit detailed 1:100 (1/8 inch) scale (minimum) working drawings conforming to the Plans and Calculations chapter of NFPA 13. Drawings shall include graphical scales that allow the user to determine lengths when the drawings are reduced in size. Include a plan showing the piping to the water supply test location.
3. Manufacturer’s Data Sheets: Provide data sheets for all materials and equipment proposed for use on the system. Include listing information and installation instructions in data sheets. Where data sheets describe items in addition to those proposed to be used for the system, clearly identify the proposed items on the sheet.
4. Calculation Sheets:
   a. Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of the Plans and Calculations chapter of NFPA 13.
   b. Submit calculations of loads for sizing of sway bracing in accordance with NFPA 13.
5. Valve Charts: Provide a valve chart that identifies the location of each control valve. Coordinate nomenclature and identification of control valves with COR. Where existing nomenclature does not exist, the chart shall include no less than the following: Tag ID

No., Valve Size, Service (control valve, main drain, aux. drain, inspectors test valve, etc.), and Location.

6. Final Document Submittals: Provide as-built drawings, testing and maintenance instructions in accordance with the requirements in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. In addition, submittals shall include, but not be limited to, the following:
   a. A complete set of as-built drawings showing the installed system with the specific interconnections between the system switches and the fire alarm equipment. Provide a complete set in the formats as follows. Submit items 2 and 3 below on a compact disc or as directed by the COR.
      1) One full size (or size as directed by the COR) printed copy.
      2) One complete set in electronic pdf format.
      3) One complete set in AutoCAD format or a format as directed by the COR.
   b. Material and Testing Certificate: Upon completion of the sprinkler system installation or any partial section of the system, including testing and flushing, provide a copy of a completed Material and Testing Certificate as indicated in NFPA 13. Certificates shall be provided to document all parts of the installation.
   c. Operations and Maintenance Manuals that include step-by-step procedures required for system startup, operation, shutdown, and routine maintenance and testing. The manuals shall include the manufacturer's name, model number, parts list, and tools that should be kept in stock by the owner for routine maintenance, including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization, including address and telephone number, for each item of equipment.
   d. One paper copy of the Material and Testing Certificates and the Operations and Maintenance Manuals above shall be provided in a binder. In addition, these materials shall be provided in pdf format on a compact disc or as directed by the COR.
   e. Provide one additional copy of the Operations and Maintenance Manual covering the system in a flexible protective cover and

mount in an accessible location adjacent to the riser or as directed by the COR.

1.5 QUALITY ASSURANCE

A. Installer Reliability: The installer shall possess a valid State of Maine fire sprinkler contractor's license. The installer shall have been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.

B. Materials and Equipment: All equipment and devices shall be of a make and type listed by UL or approved by FM, or other nationally recognized testing laboratory for the specific purpose for which it is used. All materials, devices, and equipment shall be approved by the VA. All materials and equipment shall be free from defect. All materials and equipment shall be new unless specifically indicated otherwise on the contract drawings.

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. National Fire Protection Association (NFPA):

13-13.....Installation of Sprinkler Systems

25-14.....Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

101-15.....Life Safety Code

170-15.....Fire Safety Symbols

C. Underwriters Laboratories, Inc. (UL):

Fire Protection Equipment Directory (2011)

D. Factory Mutual Engineering Corporation (FM):

Approval Guide

PART 2 - PRODUCTS

2.1 PIPING & FITTINGS

A. Piping and fittings for private underground water mains shall be in accordance with NFPA 13.

1. Pipe and fittings from inside face of building 300 mm (12 in.) above finished floor to a distance of approximately 1500 mm (5 ft.) outside building: Ductile Iron, flanged fittings and 316 stainless steel bolting.

B. Piping and fittings for sprinkler systems shall be in accordance with NFPA 13.

1. Plain-end pipe fittings with locking lugs or shear bolts are not permitted.
2. Piping sizes 50 mm (2 inches) and smaller shall be black steel Schedule 40 with threaded end connections.
3. Piping sizes 65 mm (2 ½ inches) and larger shall be black steel Schedule 10 with grooved connections. Grooves in Schedule 10 piping shall be rolled grooved only.
4. Use nonferrous piping in MRI Scanning Rooms.
5. Plastic piping shall not be permitted except for drain piping.
6. Flexible sprinkler hose shall be FM Approved and limited to hose with threaded end fittings with a minimum inside diameter or 1-inch and a maximum length of 6-feet.

2.2 VALVES

A. General:
   1. Valves shall be in accordance with NFPA 13.
   2. Do not use quarter turn ball valves for 50 mm (2 inch) or larger drain valves.

B. Control Valve: The control valves shall be a listed indicating type. Control valves shall be UL Listed or FM Approved for fire protection installations. System control valve shall be rated for normal system pressure but in no case less than 175 PSI.

C. Check Valve: Shall be of the swing type with a flanged cast iron body and flanged inspection plate.

D. Automatic Ball Drips: Cast brass 20 mm (3/4 inch) in-line automatic ball drip with both ends threaded with iron pipe threads.

2.3 STANDPIPE HOSE VALVE AND CABINET:

A. Cabinet: White glossy polyester coated 1 mm (20 gauge) steel box, tubular steel door and frame with continuous steel hinge with brass pin, welded and ground smooth steel corner seams, recess type, 18-inches by 18-inches by 8-inches deep. Finish door and frame with white prime polyester coating.

B. Valves: 2-1/2 inches screwed, brass hose angle valve, male hose threads same as local fire protection service, 2-1/2 inches by 1-1/2 inches reducer, with permanently attached polished brass cap and chain.

C. Face fire department hose connections in valve cabinets outward in a manner which prevents crimping of the hose.

2.4 SPRINKLERS

A. Provide FM approved quick response sprinklers in all areas, except that standard response sprinklers shall be provided in freezers, refrigerators, elevator hoistways, elevator machine rooms, and generator rooms.

B. Temperature Ratings: In accordance with NFPA 13 except that sprinklers in elevator shafts and elevator machine rooms shall be no less than intermediate temperature rated and sprinklers in generator rooms shall be no less than high temperature rated.

C. Provide sprinkler guards in accordance with NFPA 13 and when the elevation of the sprinkler head is less than 7 feet 6 inches above finished floor. The sprinkler guard shall be UL listed or FM approved for use with the corresponding sprinkler.

2.5 SPRINKLER CABINET

A. Provide sprinkler cabinet with the required number of sprinkler heads of all ratings and types installed, and a sprinkler wrench for each type of sprinkler in accordance with NFPA 13. Locate adjacent to the riser.

B. Provide a list of sprinklers installed in the property in the cabinet. The list shall include the following:

1. Manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure for each type of sprinkler in the cabinet.
2. General description of where each sprinkler is used.
3. Quantity of each type present in the cabinet.
4. Issue or revision date of list.

2.6 SPRINKLER SYSTEM SIGNAGE

A. Rigid plastic, steel or aluminum signs with white lettering on a red background with holes for easy attachment. Sprinkler system signage shall be attached to the valve or piping with chain.

2.7 SWITCHES:

A. OS&Y Valve Supervisory Switches shall be in a weatherproof die cast/red baked enamel, oil resistant, aluminum housing with tamper resistant screws, 13 mm (1/2 inch) conduit entrance and necessary facilities for attachment to the valves. Provide two SPDT switches rated at 2.5 amps at 24 VDC.

B. Water flow Alarm Switches: Mechanical, non-coded, non-accumulative retard and adjustable from 0 to 60 seconds minimum. Set flow switches at an initial setting between 20 and 30 seconds.

C. Valve Supervisory Switches for Ball and Butterfly Valves: May be integral with the valve.

2.8 GAUGES

A. Provide gauges as required by NFPA 13. Provide gauges where the normal pressure of the system is at the midrange of the gauge.

2.9 PIPE HANGERS, SUPPORTS AND RESTRAINT OF SYSTEM PIPING

A. Pipe hangers, supports, and restraint of system piping shall be in accordance with NFPA 13.

2.10 WALL, FLOOR AND CEILING PLATES

A. Provide chrome plated steel escutcheon plates.

2.11 VALVE TAGS

A. Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 8 mm (1/4 inch) for service designation on 19 gage, 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook, brass chain, or nylon twist tie.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be accomplished by the licensed contractor. Provide a qualified technician, experienced in the installation and operation of the type of system being installed, to supervise the installation and testing of the system.

B. Installation of Piping: Accurately cut pipe to measurements established by the installer and work into place without springing or forcing. In any situation where bending of the pipe is required, use a standard pipe-bending template. Concealed piping in spaces that have finished ceilings. Where ceiling mounted equipment exists, such as in operating and radiology rooms, install sprinklers so as not to obstruct the movement or operation of the equipment. Sidewall heads may need to be utilized. In stairways, locate piping as near to the ceiling as possible to prevent tampering by unauthorized personnel and to provide a minimum headroom clearance of 2250 mm (seven feet six inches). Piping shall not obstruct the minimum means of egress clearances required by NFPA 101. Pipe hangers, supports, and restraint of system piping, and seismic bracing shall be installed accordance with NFPA 13.

C. Welding: Conform to the requirements and recommendations of NFPA 13.

D. Drains: Provide drips and drains, including low point drains, in accordance with NFPA 13. Pipe drains to discharge at safe points outside of the building or to sight cones attached to drains of

adequate size to readily carry the full flow from each drain under maximum pressure. Do not provide a direct drain connection to sewer system or discharge into sinks. Install drips and drains where necessary and required by NFPA 13. The drain piping shall not be restricted or reduced and shall be of the same diameter as the drain collector.

E. Supervisory Switches: Provide supervisory switches for sprinkler control valves.

F. Waterflow Alarm Switches: Install waterflow alarm switches and valves in stairwells or other easily accessible locations.

G. Inspector's Test Connection: Install and supply in accordance with NFPA 13, locate in a secured area, and discharge to the exterior of the building.

H. Affix cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections to the respective waterflow switch or pipe connection near to the pipe from where they were cut.

I. Provide escutcheon plates for exposed piping passing through walls, floors or ceilings.

J. Clearances: For systems requiring seismic protection, piping that passes through floors or walls shall have penetrations sized 50 mm (2 inches) nominally larger than the penetrating pipe for pipe sizes 25 mm (1 inch) to 90 mm (3 ½ inches) and 100 mm (4 inches) nominally larger for penetrating pipe sizes 100 mm (4 inches) and larger.

K. Sleeves: Provide for pipes passing through masonry or concrete. Provide space between the pipe and the sleeve in accordance with NFPA 13. Seal this space with a UL Listed through penetration fire stop material in accordance with Section 07 84 00, FIRESTOPPING. Where core drilling is used in lieu of sleeves, also seal space. Seal penetrations of walls, floors and ceilings of other types of construction, in accordance with Section 07 84 00, FIRESTOPPING.

L. Provide pressure gauges at each water flow alarm switch location and at each main drain connection.

M. Firestopping shall be provided for all penetrations of fire resistance rated construction. Firestopping shall comply with Section 07 84 00, FIRESTOPPING.

N. Painting of Pipe: In finished areas where walls and ceilings have been painted, paint primed surfaces with two coats of paint to match

adjacent surfaces, except paint valves and operating accessories with two coats of gloss red enamel. Exercise care to avoid painting sprinklers. Painting of sprinkler systems above suspended ceilings and in crawl spaces is not required. Painting shall comply with Section 09 91 00, PAINTING. Any painted sprinkler shall be replaced with a new sprinkler.

O. Sprinkler System Signage: Provide rigid sprinkler system signage in accordance with NFPA 13 and NFPA 25. Sprinkler system signage shall include, but not limited to, the following:
   1. Identification Signs:
      a. Provide signage for each control valve, drain valve, sprinkler cabinet, and inspector’s test.
      b. Provide valve tags for each operable valve. Coordinate nomenclature and identification of operable valves with COR. Where existing nomenclature does not exist, the Tag Identification shall include no less than the following: (FP-B-F/SZ-#) Fire Protection, Building Number, Floor Number/Smoke Zone (if applicable), and Valve Number. (E.g., FP-500-1E-001) Fire Protection, Building 500, First Floor East, Number 001.)
   2. Instruction/Information Signs:
      a. Provide signage for each control valve to indicate valve function and to indicate what system is being controlled.
      b. Provide signage indicating the number and location of low point drains.
   3. Hydraulic Placards:
      a. Provide signage indicating hydraulic design information. The placard shall include location of the design area, discharge densities, required flow and residual pressure at the base of riser, occupancy classification, hose stream allowance, flow test information, and installing contractor. Locate hydraulic placard information signs at each alarm check valve.

P. Repairs: Repair damage to the building or equipment resulting from the installation of the sprinkler system by the installer at no additional expense to the Government.

Q. Interruption of Service: There shall be no interruption of the existing sprinkler protection, water, electric, or fire alarm services without prior permission of the COR. Contractor shall develop an interim fire

protection program where interruptions involve occupied spaces. Request in writing at least two weeks prior to the planned interruption.

3.2 INSPECTION AND TEST

A. Preliminary Testing: Flush newly installed systems prior to performing hydrostatic tests in order to remove any debris which may have been left as well as ensuring piping is unobstructed. Hydrostatically test system, including the fire department connections, as specified in NFPA 13, in the presence of the Contracting Officers Representative (COR) or his designated representative. Test and flush underground water line prior to performing these hydrostatic tests.

B. Final Inspection and Testing: Subject system to tests in accordance with NFPA 13, and when all necessary corrections have been accomplished, advise COR to schedule a final inspection and test. Connection to the fire alarm system shall have been in service for at least ten days prior to the final inspection, with adjustments made to prevent false alarms. Furnish all instruments, labor and materials required for the tests and provide the services of the installation foreman or other competent representative of the installer to perform the tests. Correct deficiencies and retest system as necessary, prior to the final acceptance. Include the operation of all features of the systems under normal operations in test

3.3 INSTRUCTIONS

A. Furnish the services of a competent instructor for not less than four hours for instructing personnel in the operation and maintenance of the system, on the dates requested by the COR.

- - - E N D - - -

SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section shall apply to all sections of Division 22.

B. Definitions:

1. Exposed: Piping and equipment exposed to view in finished rooms.

C. Abbreviations/Acronyms:

1. ABS: Acrylonitrile Butadiene Styrene
2. AC: Alternating Current
3. ACR: Air Conditioning and Refrigeration
4. AI: Analog Input
5. AISI: American Iron and Steel Institute
6. AO: Analog Output
7. AWG: American Wire Gauge
8. BACnet: Building Automation and Control Network
9. BAg: Silver-Copper-Zinc Brazing Alloy
10. BAS: Building Automation System
11. BCuP: Silver-Copper-Phosphorus Brazing Alloy
12. CDA: Copper Development Association
13. C: Celsius
14. CLR: Color
15. CO: Carbon Monoxide
16. COR: Contracting Officer’s Representative
17. CPVC: Chlorinated Polyvinyl Chloride
18. CR: Chloroprene
19. CRS: Corrosion Resistant Steel
20. CWP: Cold Working Pressure
21. CxA: Commissioning Agent
22. db(A): Decibels (A weighted)
23. DDC: Direct Digital Control
24. DI: Digital Input
25. DISS: Diameter Index Safety System
26. DO: Digital Output
27. DVD: Digital Video Disc
28. DN: Diameter Nominal
29. DWV: Drainage, Waste and Vent

30. ECC: Engineering Control Center
31. EPDM: Ethylene Propylene Diene Monomer
32. EPT: Ethylene Propylene Terpolymer
33. ETO: Ethylene Oxide
34. F: Fahrenheit
35. FAR: Federal Acquisition Regulations
36. FD: Floor Drain
37. FED: Federal
38. FG: Fiberglass
39. FNPT: Female National Pipe Thread
40. FPM: Fluoroelastomer Polymer
41. GPM: Gallons Per Minute
42. HDPE: High Density Polyethylene
43. Hg: Mercury
44. HOA: Hands-Off-Automatic
45. HP: Horsepower
46. HVE: High Volume Evacuation
47. ID: Inside Diameter
48. IPS: Iron Pipe Size
49. Kg: Kilogram
50. kPa: Kilopascal
51. lb: Pound
52. L/s: Liters Per Second
53. L/min: Liters Per Minute
54. MAWP: Maximum Allowable Working Pressure
55. MAX: Maximum
56. MED: Medical
57. m: Meter
58. MFG: Manufacturer
59. mg: Milligram
60. mg/L: Milligrams per Liter
61. ml: Milliliter
62. mm: Millimeter
63. MIN: Minimum
64. NF: Oil Free Dry (Nitrogen)
65. NPTF: National Pipe Thread Female
66. NPS: Nominal Pipe Size
67. NPT: Nominal Pipe Thread

68. OD: Outside Diameter
69. OSD: Open Sight Drain
70. OS&Y: Outside Stem and Yoke
71. OXY: Oxygen
72. PBPU: Prefabricated Bedside Patient Units
73. PH: Power of Hydrogen
74. PLC: Programmable Logic Controllers
75. PP: Polypropylene
76. PPM: Parts per Million
77. PSIG: Pounds per Square Inch
78. PTFE: Polytetrafluoroethylene
79. PVC: Polyvinyl Chloride
80. PVDF: Polyvinylidene Fluoride
81. RAD: Radians
82. RO: Reverse Osmosis
83. RPM: Revolutions Per Minute
84. RTRP: Reinforced Thermosetting Resin Pipe
85. SCFM: Standard Cubic Feet Per Minute
86. SDI: Silt Density Index
87. SPEC: Specification
88. SPS: Sterile Processing Services
89. STD: Standard
90. SUS: Saybolt Universal Second
91. SWP: Steam Working Pressure
92. TEFC: Totally Enclosed Fan-Cooled
93. TFE: Tetrafluoroethylene
94. THHN: Thermoplastic High-Heat Resistant Nylon Coated Wire
95. THWN: Thermoplastic Heat & Water Resistant Nylon Coated Wire
96. T/P: Temperature and Pressure
97. USDA: U.S. Department of Agriculture
98. V: Volt
99. VAC: Vacuum
100. VA: Veterans Administration
101. VAMC: Veterans Administration Medical Center
102. VAC: Voltage in Alternating Current
103. WAGD: Waste Anesthesia Gas Disposal
104. WOG: Water, Oil, Gas

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.

D. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.

E. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

F. Section 03 30 00, CAST-IN-PLACE CONCRETE: Concrete and Grout.

G. Section 05 31 00, STEEL DECKING: Building Components for Attachment of Hangers.

H. Section 05 50 00, METAL FABRICATIONS.

I. Section 07 60 00, FLASHING AND SHEET METAL: Flashing for Wall and Roof Penetrations.

J. Section 07 84 00, FIRESTOPPING.

K. Section 07 92 00, JOINT SEALANTS.

L. Section 09 91 00, PAINTING.

M. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

N. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.

O. Section 22 07 11, PLUMBING INSULATION.

P. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

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

R. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

S. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

T. Section 26 29 11, MOTOR CONTROLLERS.

U. Section 31 20 00, EARTH MOVING: Excavation and Backfill.

1.3 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

ASME Boiler and Pressure Vessel Code -
BPVC Section IX-2013....Welding, Brazing, and Fusing Qualifications
B31.1-2012.....Power Piping

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

A36/A36M-2012.....Standard Specification for Carbon Structural Steel
A575-96(R2013)e1.....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

E84-2013a.....Standard Test Method for Surface Burning Characteristics of Building Materials

E119-2012a.....Standard Test Methods for Fire Tests of Building Construction and Materials

F1760-01(R2011).....Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content

D. International Code Council, (ICC):

IBC-2015.....International Building Code

IPC-2015.....International Plumbing Code

E. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:

SP-58-2009.....Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation

SP-69-2003.....Pipe Hangers and Supports - Selection and Application

F. Military Specifications (MIL):

P-21035B.....Paint High Zinc Dust Content, Galvanizing Repair (Metric)

G. National Electrical Manufacturers Association (NEMA):

MG 1-2011.....Motors and Generators

H. National Fire Protection Association (NFPA):

51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

54-2012.....National Fuel Gas Code

70-2014.....National Electrical Code (NEC)

I. NSF International (NSF):

5-2012.....Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment

14-2012.....Plastic Piping System Components and Related Materials

61-2012.....Drinking Water System Components – Health Effects

372-2011.....Drinking Water System Components – Lead Content

J. Department of Veterans Affairs (VA):

PG-18-10.....Plumbing Design Manual

PG-18-13-2011.....Barrier Free Design Guide

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.

C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.

D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

E. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.

F. Installing Contractor shall provide lists of previous installations for selected items of equipment. Contact persons who will serve as references, with telephone numbers and e-mail addresses shall be submitted with the references.

G. Manufacturer's Literature and Data: Manufacturer’s literature shall be submitted under the pertinent section rather than under this section.
   1. Electric motor data and variable speed drive data shall be submitted with the driven equipment.
   2. Equipment and materials identification.
   3. Firestopping materials.
   4. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
   5. Wall, floor, and ceiling plates.

H. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and

efficient installation. Final review and approvals will be made only by groups.

I. Coordination Drawings: Complete consolidated and coordinated layout drawings shall be submitted for all new systems, and for existing systems that are in the same areas. The drawings shall include plan views, elevations and sections of all systems and shall be on a scale of not less than 1:32 (3/8 inch equal to one foot). Clearly identify and dimension the proposed locations of the principal items of equipment. The drawings shall clearly show the proposed location and adequate clearance for all equipment, controls, piping, pumps, valves and other items. All valves, trap primer valves, water hammer arrestors, strainers, and equipment requiring service shall be provided with an access door sized for the complete removal of plumbing device, component, or equipment. Equipment foundations shall not be installed until equipment or piping layout drawings have been approved. Detailed layout drawings shall be provided for all piping systems. In addition, details of the following shall be provided.

1. Mechanical equipment rooms.
3. Hangers, inserts, supports, and bracing.
4. Pipe sleeves.
5. Equipment penetrations of floors, walls, ceilings, or roofs.

J. Maintenance Data and Operating Instructions:

1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment. Include complete list indicating all components of the systems with diagrams of the internal wiring for each item of equipment.
2. Include listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment shall be provided. The listing shall include belts for equipment: Belt manufacturer, model number, size and style, and distinguished whether of multiple belt sets.

K. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.

L. Submit training plans, trainer qualifications and instructor qualifications in accordance with the requirements of Section 22 08 00 COMMISSIONING OF PLUMBING SYSTEMS.

1.5 QUALITY ASSURANCE

A. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least 5 years.
2. Equipment Service: There shall be permanent service organizations, authorized and trained by manufacturers of the equipment supplied, located within 160 km (100 miles) of the project. These organizations shall come to the site and provide acceptable service to restore operations within four hours of receipt of notification by phone, e-mail or fax in event of an emergency, such as the shut-down of equipment; or within 24 hours in a non-emergency. Names, mail and e-mail addresses and phone numbers of service organizations providing service under these conditions for (as applicable to the project): pumps, compressors, water heaters, critical instrumentation, computer workstation and programming shall be submitted for project record and inserted into the operations and maintenance manual.
3. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
4. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply. Any conflicts shall be brought to the attention of the Contracting Officers Representative (COR).

5. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
6. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
7. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
8. Asbestos products or equipment or materials containing asbestos shall not be used.
9. Bio-Based Materials: For products designated by the USDA’s Bio-Preferred Program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specifications section. For more information regarding the product categories covered by the Bio-Preferred Program, visit http://www.biopreferred.gov.

B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
3. Certify that each welder and welding operator has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
4. All welds shall be stamped according to the provisions of the American Welding Society.

C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

D. Execution (Installation, Construction) Quality:
   1. All items shall be applied and installed in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the COR for resolution. Printed copies or electronic files of manufacturer’s installation instructions shall be provided to the COR at least 10 working days prior to commencing installation of any item.
   2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to COR for resolution.
   3. Complete layout drawings shall be required by Paragraph, SUBMITTALS. Construction work shall not start on any system until the layout drawings have been approved by VA.
   4. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.
   5. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or additional time to the Government.

E. Guaranty: Warranty of Construction.

F. Plumbing Systems: IPC, International Plumbing Code. Unless otherwise required herein, perform plumbing work in accordance with the latest version of the IPC. For IPC codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word “should” shall be interpreted as “shall”. Reference to the “code official” or “owner” shall be interpreted to mean the COR.

G. Cleanliness of Piping and Equipment Systems:
   1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.

2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
3. The interior of all tanks shall be cleaned prior to delivery and beneficial use by the Government. All piping shall be tested in accordance with the specifications and the International Plumbing Code (IPC). All filters, strainers, fixture faucets shall be flushed of debris prior to final acceptance.
4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:
1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
2. Damaged equipment shall be replaced with an identical unit as determined and directed by the COR. Such replacement shall be at no additional cost or additional time to the Government.
3. Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.
4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

1.7 AS-BUILT DOCUMENTATION

A. Submit manufacturer’s literature and data updated to include submittal review comments and any equipment substitutions.
B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts

(manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them on Auto-Cad version 2016 provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

2.1 MATERIALS FOR VARIOUS SERVICES

A. Non-pressure PVC pipe shall contain a minimum of 25 percent recycled content. Steel pipe shall contain a minimum of 25 percent recycled content.

B. Plastic pipe, fittings and solvent cement shall meet NSF 14 and shall bear the NSF seal "NSF-PW". Polypropylene pipe and fittings shall comply with NSF 14 and NSF 61. Solder or flux containing lead shall not be used with copper pipe.

C. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF 61 or NSF 372.

D. In-line devices such as water meters, building valves, check valves, stops, valves, fittings, tanks and backflow preventers shall comply with NSF 61 and NSF 372.

E. End point devices such as drinking fountains, lavatory faucets, kitchen and bar faucets, ice makers supply stops, and end-point control valves used to dispense drinking water must meet requirements of NSF 61 and NSF 372.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.

1. All components of an assembled unit need not be products of same manufacturer.
2. Constituent parts that are alike shall be products of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.
4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly at no additional cost or time to the Government.

C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment, which serve the same function, shall be the same make and model.

2.3 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.4 SAFETY GUARDS

A. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gage sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 8 mm (1/4 inch) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.

B. All Equipment shall have moving parts protected from personal injury.

2.5 LIFTING ATTACHMENTS

A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered,

without bending or distortion of shape, such as rapid lowering and braking of load.

2.6 ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING

A. All material and equipment furnished and installation methods used shall conform to the requirements of Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT; Section 26 29 11, MOTOR CONTROLLERS; and, Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES. All electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems shall be provided. Premium efficient motors shall be provided. Unless otherwise specified for a particular application, electric motors shall have the following requirements.

B. Special Requirements:

1. Where motor power requirements of equipment furnished deviate from power shown on plans, provide electrical service designed under the requirements of NFPA 70 without additional cost or time to the Government.
2. Assemblies of motors, starters, and controls and interlocks on factory assembled and wired devices shall be in accordance with the requirements of this specification.
3. Wire and cable materials specified in the electrical division of the specifications shall be modified as follows:
   a. Wiring material located where temperatures can exceed 71° C (160° F) shall be stranded copper with Teflon FEP insulation with jacket. This includes wiring on the boilers and water heaters.
   b. Other wiring at boilers and water heaters, and to control panels, shall be NFPA 70 designation THWN.
   c. Shielded conductors or wiring in separate conduits for all instrumentation and control systems shall be provided where recommended by manufacturer of equipment.
4. Motor sizes shall be selected so that the motors do not operate into the service factor at maximum required loads on the driven equipment. Motors on pumps shall be sized for non-overloading at all points on the pump performance curves.
5. Motors utilized with variable frequency drives shall be rated “inverter-ready” per NEMA Standard, MG1.

C. Motor Efficiency and Power Factor: All motors, when specified as “high efficiency or Premium Efficiency” by the project specifications on

driven equipment, shall conform to efficiency and power factor requirements in Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT, with no consideration of annual service hours. Motor manufacturers generally define these efficiency requirements as “NEMA premium efficient” and the requirements generally exceed those of the Energy Policy Act (EPACT), revised 2005. Motors not specified as “high efficiency or premium efficient” shall comply with EPACT.

D. Single-phase Motors: Capacitor-start type for hard starting applications. Motors for centrifugal pumps may be split phase or permanent split capacitor (PSC).

E. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type. Each two-speed motor shall have two separate windings. A time delay (20 seconds minimum) relay shall be provided for switching from high to low speed.

F. Rating: Rating shall be continuous duty at 100 percent capacity in an ambient temperature of 40° C (104° F); minimum horsepower as shown on drawings; maximum horsepower in normal operation shall not exceed nameplate rating without service factor.

G. Insulation Resistance: Not less than one-half meg-ohm between stator conductors and frame shall be measured at the time of final inspection.

2.7 VARIABLE SPEED MOTOR CONTROLLERS

A. Refer to Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS and Section 26 29 11, MOTOR CONTROLLERS for specifications.

B. The combination of controller and motor shall be provided by the respective pump manufacturer, and shall be rated for 100 percent output performance. Multiple units of the same class of equipment, i.e. pumps, shall be product of a single manufacturer.

C. Motors shall be premium efficient type, “invertor duty”, and be approved by the motor controller manufacturer. The controller-motor combination shall be guaranteed to provide full motor nameplate horsepower in variable frequency operation. Both driving and driven motor sheaves shall be fixed pitch.

D. Controller shall not add any current or voltage transients to the input AC power distribution system, DDC controls, sensitive medical equipment, etc., nor shall be affected from other devices on the AC power system.

2.8 EQUIPMENT AND MATERIALS IDENTIFICATION

A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings, or shown in the maintenance manuals. Coordinate equipment and valve identification with local VAMC shops. In addition, provide bar code identification nameplate for all equipment which will allow the equipment identification code to be scanned into the system for maintenance and inventory tracking. Identification for piping is specified in Section 09 91 00, PAINTING.

B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 7 mm (3/16 inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING shall be permanently fastened to the equipment. Unit components such as water heaters, tanks, coils, filters, etc. shall be identified.

C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 7 mm (3/16 inch) high riveted or bolted to the equipment.

D. Control Items: All temperature, pressure, and controllers shall be labeled and the component’s function identified. Identify and label each item as they appear on the control diagrams.

E. Valve Tags and Lists:

1. Plumbing: All valves shall be provided with valve tags and listed on a valve list (Fixture stops not included).
2. Valve tags: Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 8 mm (1/4 inch) for service designation on 19 gage, 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
3. Valve lists: Valve lists shall be created using a word processing program and printed on plastic coated cards. The plastic coated valve list card(s), sized 215 mm (8-1/2 inches) by 275 mm (11 inches) shall show valve tag number, valve function and area of control for each service or system. The valve list shall be in a punched 3-ring binder notebook. An additional copy of the valve list shall be mounted in picture frames for mounting to a wall. COR shall instruct contractor where frames shall be mounted.
4. A detailed plan for each floor of the building indicating the location and valve number for each valve shall be provided in the

3-ring binder notebook. Each valve location shall be identified with a color coded sticker or thumb tack in ceiling or access door.

2.9 FIRESTOPPING

A. Section 07 84 00, FIRESTOPPING specifies an effective barrier against the spread of fire, smoke and gases where penetrations occur for piping. Refer to Section 22 07 11, PLUMBING INSULATION, for pipe insulation.

2.10 GALVANIZED REPAIR COMPOUND

A. Mil. Spec. DOD-P-21035B, paint.

2.11 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

A. In lieu of the paragraph which follows, suspended equipment support and restraints may be designed and installed in accordance with the International Building Code (IBC) and Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS. Submittals based on the International Building Code (IBC) and Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS requirements, or the following paragraphs of this Section shall be stamped and signed by a professional engineer registered in the state where the project is located. The Support system of suspended equipment over 227 kg (500 pounds) shall be submitted for approval of the COR in all cases. See the above specifications for lateral force design requirements.

B. Type Numbers Specified: For materials, design, manufacture, selection, application, and installation refer to MSS SP-58. For selection and application refer to MSS SP-69. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting.

C. For Attachment to Concrete Construction:
   1. Concrete insert: Type 18, MSS SP-58.
   2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 100 mm (4 inches) thick when approved by the COR for each job condition.
   3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 100 mm (4 inches) thick when approved by the COR for each job condition.

D. For Attachment to Steel Construction: MSS SP-58.
   1. Welded attachment: Type 22.
   2. Beam clamps: Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 23 mm (7/8 inch) outside diameter.

E. Attachment to Metal Pan or Deck: As required for materials specified in Section 05 31 00, STEEL DECKING.

F. For Attachment to Wood Construction: Wood screws or lag bolts.

G. Hanger Rods: Hot-rolled steel, ASTM A36/A36M or ASTM A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 40 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.

H. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 43 mm by 43 mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts.

1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).
2. Guide individual pipes on the horizontal member of every other trapeze hanger with 8 mm (1/4 inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 15 mm (1/2 inch) galvanized steel bands, or insulated calcium silicate shield for insulated piping at each hanger.

I. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping. Refer to Section 22 07 11, PLUMBING INSULATION for insulation thickness. To protect insulation, provide Type 39 saddles for roller type supports or insulated calcium silicate shields. Provide Type 40 insulation shield or insulated calcium silicate shield at all other types of supports and hangers including those for insulated piping.

1. General Types (MSS SP-58):
   a. Standard clevis hanger: Type 1; provide locknut.
   b. Riser clamps: Type 8.
   c. Wall brackets: Types 31, 32 or 33.
   d. Roller supports: Type 41, 43, 44 and 46.
   e. Saddle support: Type 36, 37 or 38.
   f. Turnbuckle: Types 13 or 15.
   g. U-bolt clamp: Type 24.
   h. Copper Tube:
      1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, copper-coated, plastic coated or taped with isolation tape to prevent electrolysis.

2) For vertical runs use epoxy painted, copper-coated or plastic coated riser clamps.
3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.
4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.

i. Supports for plastic: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp. Spring Supports (Expansion and contraction of vertical piping):
1) Movement up to 20 mm (3/4 inch): Type 51 or 52 variable spring unit with integral turn buckle and load indicator.
2) Movement more than 20 mm (3/4 inch): Type 54 or 55 constant support unit with integral adjusting nut, turn buckle and travel position indicator.

j. Spring hangers are required on all plumbing system pumps one horsepower and greater.

2. Plumbing Piping (Other Than General Types):
a. Horizontal piping: Type 1, 5, 7, 9, and 10.
b. Chrome plated piping: Chrome plated supports.
c. Hangers and supports in pipe chase: Prefabricated system ABS self-extinguishing material, not subject to electrolytic action, to hold piping, prevent vibration and compensate for all static and operational conditions.
d. Blocking, stays and bracing: Angle iron or preformed metal channel shapes, 1.3 mm (18 gage) minimum.

J. Pre-insulated Calcium Silicate Shields:
1. Provide 360 degree water resistant high density 965 kPa (140 psig) compressive strength calcium silicate shields encased in galvanized metal.
2. Pre-insulated calcium silicate shields to be installed at the point of support during erection.
3. Shield thickness shall match the pipe insulation.
4. The type of shield is selected by the temperature of the pipe, the load it must carry, and the type of support it will be used with.
a. Shields for supporting cold water shall have insulation that extends a minimum of 25 mm (1 inch) past the sheet metal.

b. The insulated calcium silicate shield shall support the maximum allowable water filled span as indicated in MSS SP-69. To support the load, the shields shall have one or more of the following features: structural inserts 4138 kPa (600 psig) compressive strength, an extra bottom metal shield, or formed structural steel (ASTM A36/A36M) wear plates welded to the bottom sheet metal jacket.

5. Shields may be used on steel clevis hanger type supports, trapeze hangers, roller supports or flat surfaces.

K. Seismic Restraint of Piping: Refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

2.12 PIPE PENETRATIONS

A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays.

B. Pipe penetration sleeve materials shall comply with all firestopping requirements for each penetration.

C. To prevent accidental liquid spills from passing to a lower level, provide the following:

1. For sleeves: Extend sleeve 25 mm (1 inch) above finished floor and provide sealant for watertight joint.
2. For blocked out floor openings: Provide 40 mm (1-1/2 inch) angle set in silicone adhesive around opening.
3. For drilled penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.

D. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges, with structural engineer prior approval. Any deviation from these requirements must receive prior approval of COR.

E. Sheet metal, plastic, or moisture resistant fiber sleeves shall be provided for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.

F. Cast iron or zinc coated pipe sleeves shall be provided for pipe passing through exterior walls below grade. The space between the sleeve and pipe shall be made watertight with a modular or link rubber seal. The link seal shall be applied at both ends of the sleeve.

G. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. A galvanized steel sleeve shall be provided for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, sleeves shall be connected with a floor plate.

H. Brass Pipe Sleeves shall be provided for pipe passing through quarry tile, terrazzo or ceramic tile floors. The sleeve shall be connected with a floor plate.

I. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 25 mm (1 inch) greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation plus 25 mm (1 inch) in diameter. Interior openings shall be caulked tight with firestopping material and sealant to prevent the spread of fire, smoke, water and gases.

J. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS. Bio-based materials shall be utilized when possible.

K. Pipe passing through roof shall be installed through a 4.9 kg per square meter copper flashing with an integral skirt or flange. Skirt or flange shall extend not less than 200 mm (8 inches) from the pipe and set in a solid coating of bituminous cement. Extend flashing a minimum of 250 mm (10 inches) up the pipe. Pipe passing through a waterproofing membrane shall be provided with a clamping flange. The annular space between the sleeve and pipe shall be sealed watertight.

2.13 TOOLS AND LUBRICANTS

A. Furnish, and turn over to the COR, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.

B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.

C. Tool Containers: metal, permanently identified for intended service and mounted, or located, where directed by the COR.

D. Lubricants: A minimum of 0.95 L (1 quart) of oil, and 0.45 kg (1 pound) of grease, of equipment manufacturer's recommended grade and type, in unopened containers and properly identified as to use for each different application. Bio-based materials shall be utilized when possible.

2.14 WALL, FLOOR AND CEILING PLATES

A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.

B. Thickness: Not less than 2.4 mm (3/32 inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025 inch) for up to 75 mm (3 inch) pipe, 0.89 mm (0.035 inch) for larger pipe.

C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Wall plates shall be used where insulation ends on exposed water supply pipe drop from overhead. A watertight joint shall be provided in spaces where brass or steel pipe sleeves are specified.

2.15 ASBESTOS

A. Materials containing asbestos are not permitted.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping, sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review.

B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.

C. Operating Personnel Access and Observation Provisions: All equipment and systems shall be arranged to provide clear view and easy access, without use of portable ladders, for maintenance, testing and operation of all devices including, but not limited to: all equipment items, valves, backflow preventers, filters, strainers, transmitters, sensors, meters and control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Maintenance and operating space and access provisions that are shown on the drawings shall not be changed nor reduced.

D. Structural systems necessary for pipe and equipment support shall be coordinated to permit proper installation.

E. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

F. Cutting Holes:

1. Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by COR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to COR for approval.
2. Waterproof membrane shall not be penetrated. Pipe floor penetration block outs shall be provided outside the extents of the waterproof membrane.
3. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by COR where working area space is limited.

G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other services are not shown but must be provided.

H. Protection and Cleaning:

1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the COR. Damaged or defective items in the opinion of the COR, shall be replaced at no additional cost or time to the Government.
2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Pipe openings, equipment, and plumbing fixtures shall be tightly covered against dirt or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

I. Concrete and Grout: Concrete and shrink compensating grout 25 MPa (3000 psig) minimum, specified in Section 03 30 00, CAST-IN-PLACE CONCRETE, shall be used for all pad or floor mounted equipment.

J. Gages, thermometers, valves and other devices shall be installed with due regard for ease in reading or operating and maintaining said devices. Thermometers and gages shall be located and positioned to be

easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

K. Interconnection of Controls and Instruments: Electrical interconnection is generally not shown but shall be provided. This includes interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations. Comply with NFPA 70.

L. Many plumbing systems interface with the HVAC control system. See the HVAC control points list and Section 23 09 23, DIRECT DIGITAL CONTROL SYSTEM FOR HVAC.

M. Work in Existing Building:

1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01 00 00, GENERAL REQUIREMENTS for relocation of existing equipment, alterations and restoration of existing building(s).
2. As specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will cause the least interfere with normal operation of the facility.

O. Work in bathrooms, restrooms, housekeeping closets: All pipe penetrations behind escutcheons shall be sealed with plumbers putty.

P. Switchgear Drip Protection: Every effort shall be made to eliminate the installation of pipe above data equipment, and electrical and telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum of joints. Drain valve shall be provided in low point of casement pipe.

Q. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost or additional time to the Government.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as electrical conduit, motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.2 TEMPORARY PIPING AND EQUIPMENT

A. Continuity of operation of existing facilities may require temporary installation or relocation of equipment and piping. Temporary equipment or pipe installation or relocation shall be provided to maintain continuity of operation of existing facilities.

B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The requirements of paragraph 3.1 shall apply.

C. Temporary facilities and piping shall be completely removed back to the nearest active distribution branch or main pipe line and any openings in structures sealed. Dead legs are not allowed in potable water systems. Necessary blind flanges and caps shall be provided to seal open piping remaining in service.

3.3 RIGGING

A. Openings in building structures shall be planned to accommodate design scheme.

B. Alternative methods of equipment delivery may be offered and will be considered by Government under specified restrictions of phasing and service requirements as well as structural integrity of the building.

C. All openings in the building shall be closed when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.

D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility.

E. Contractor shall check all clearances, weight limitations and shall provide a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.

F. Rigging plan and methods shall be referred to COR two weeks in advance for evaluation prior to actual work.

3.4 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure

that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Holes shall be drilled or burned in structural steel ONLY with the prior written approval of the COR.

B. The use of chain pipe supports, wire or strap hangers; wood for blocking, stays and bracing, or hangers suspended from piping above shall not be permitted. Rusty products shall be replaced.

C. Hanger rods shall be used that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. A minimum of 15 mm (1/2 inch) clearance between pipe or piping covering and adjacent work shall be provided.

D. For horizontal and vertical plumbing pipe supports, refer to the International Plumbing Code (IPC) and these specifications.

E. Overhead Supports:

1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.
3. Tubing and capillary systems shall be supported in channel troughs.

F. Floor Supports:

1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Concrete bases and structural systems shall be anchored and doweled to resist forces under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
2. Bases and supports shall not be located and installed until equipment mounted thereon has been approved. Bases shall be sized to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Structural drawings shall be reviewed for additional requirements. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a grout material to permit alignment and realignment.
4. For seismic anchoring, refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

3.5 LUBRICATION

A. All equipment and devices requiring lubrication shall be lubricated prior to initial operation. All devices and equipment shall be field checked for proper lubrication.

B. All devices and equipment shall be equipped with required lubrication fittings. A minimum of one liter (one quart) of oil and 0.45 kg (1 pound) of grease of manufacturer's recommended grade and type for each different application shall be provided. All materials shall be delivered to COR in unopened containers that are properly identified as to application.

C. A separate grease gun with attachments for applicable fittings shall be provided for each type of grease applied.

D. All lubrication points shall be accessible without disassembling equipment, except to remove access plates.

E. All lubrication points shall be extended to one side of the equipment.

3.6 PLUMBING SYSTEMS DEMOLITION

A. Rigging access, other than indicated on the drawings, shall be provided after approval for structural integrity by the COR. Such access shall be provided without additional cost or time to the Government. Where work is in an operating plant, approved protection from dust and debris shall be provided at all times for the safety of plant personnel and maintenance of plant operation and environment of the plant.

B. In an operating plant, cleanliness and safety shall be maintained. The plant shall be kept in an operating condition. Government personnel will be carrying on their normal duties of operating, cleaning and maintaining equipment and plant operation. Work shall be confined to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Dust and debris shall not be permitted to accumulate in the area to the detriment of plant operation. All flame cutting shall be performed to maintain the fire safety integrity of this plant. Adequate fire extinguishing facilities shall be available at all times. All work shall be performed in accordance with recognized fire protection standards including NFPA 51B. Inspections will be made by personnel of the VA Medical Center, and the Contractor shall follow all directives of the COR with regard to rigging, safety, fire safety, and maintenance of operations.

C. Unless specified otherwise, all piping, wiring, conduit, and other devices associated with the equipment not re-used in the new work shall

be completely removed from Government property per Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT. This includes all concrete equipment pads, pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. All openings shall be sealed after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.

D. All valves including gate, globe, ball, butterfly and check, all pressure gages and thermometers with wells shall remain Government property and shall be removed and delivered to COR and stored as directed. The Contractor shall remove all other material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from Government property expeditiously and shall not be allowed to accumulate. Coordinate with the COR and Infection Control.

3.7 CLEANING AND PAINTING

A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Government, the plant facilities, equipment and systems shall be thoroughly cleaned and painted. Refer to Section 09 91 00, PAINTING.

B. In addition, the following special conditions apply:

1. Cleaning shall be thorough. Solvents, cleaning materials and methods recommended by the manufacturers shall be used for the specific tasks. All rust shall be removed prior to painting and from surfaces to remain unpainted. Scratches, scuffs, and abrasions shall be repaired prior to applying prime and finish coats.
2. The following Material and Equipment shall NOT be painted:
   a. Motors, controllers, control switches, and safety switches.
   b. Control and interlock devices.
   c. Regulators.
   d. Pressure reducing valves.
   e. Control valves and thermostatic elements.
   f. Lubrication devices and grease fittings.
   g. Copper, brass, aluminum, stainless steel and bronze surfaces.

h. Valve stems and rotating shafts.

i. Pressure gages and thermometers.

j. Glass.

k. Name plates.

3. Control and instrument panels shall be cleaned and damaged surfaces repaired. Touch-up painting shall be made with matching paint type and color obtained from manufacturer or computer matched.
4. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same paint type and color as utilized by the pump manufacturer.
5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats per Section 09 91 00, Painting.
6. The final result shall be a smooth, even-colored, even-textured factory finish on all items. The entire piece of equipment shall be repainted, if necessary, to achieve this. Lead based paints shall not be used.

3.8 IDENTIFICATION SIGNS

A. Laminated plastic signs, with engraved lettering not less than 7 mm (3/16 inch) high, shall be provided that designates equipment function, for all equipment, switches, motor controllers, relays, meters, control devices, including automatic control valves. Nomenclature and identification symbols shall correspond to that used in maintenance manual, and in diagrams specified elsewhere. Attach by chain, adhesive, or screws.

B. Factory Built Equipment: Metal plate, securely attached, with name and address of manufacturer, serial number, model number, size, and performance data shall be placed on factory built equipment.

C. Pipe Identification: Refer to Section 09 91 00, PAINTING.

3.9 STARTUP AND TEMPORARY OPERATION

A. Startup of equipment shall be performed as described in the equipment specifications. Vibration within specified tolerance shall be verified prior to extended operation. Temporary use of equipment is specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.

B. The commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Contracting Officer’s Representative and Commissioning Agent. Provide a minimum of 2 weeks prior notice.

3.10 OPERATING AND PERFORMANCE TESTS

A. Prior to the final inspection, all required tests shall be performed as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TESTS and submit the test reports and records to the COR.

B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.

C. When completion of certain work or systems occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then conduct such performance tests and finalize control settings during the first actual seasonal use of the respective systems following completion of work. Rescheduling of these tests shall be requested in writing to COR for approval.

D. Perform tests as required for commissioning provisions in accordance with Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS and Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

3.11 OPERATION AND MAINTENANCE MANUALS

A. All new and temporary equipment and all elements of each assembly shall be included.

B. Data sheet on each device listing model, size, capacity, pressure, speed, horsepower, impeller size, and other information shall be included.

C. Manufacturer’s installation, maintenance, repair, and operation instructions for each device shall be included. Assembly drawings and parts lists shall also be included. A summary of operating precautions and reasons for precautions shall be included in the Operations and Maintenance Manual.

D. Lubrication instructions, type and quantity of lubricant shall be included.

E. Schematic diagrams and wiring diagrams of all control systems corrected to include all field modifications shall be included.

F. Set points of all interlock devices shall be listed.

G. Trouble-shooting guide for the control system troubleshooting shall be inserted into the Operations and Maintenance Manual.

H. The control system sequence of operation corrected with submittal review comments shall be inserted into the Operations and Maintenance Manual.

I. Emergency procedures for shutdown and startup of equipment and systems.

3.12 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

3.13 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for (2) four hour sessions to instruct VA Personnel in operation and maintenance of the system.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

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SECTION 22 05 12
GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the general motor requirements for plumbing equipment and applies to all sections of Division 22.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

D. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

E. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

F. Section 26 24 19, MOTOR-CONTROL CENTERS: Motor Control Centers.

G. Section 26 29 11, MOTOR CONTROLLERS: Starters, control and protection of motors.

1.3 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 Bearing Manufacturers Association (ABMA):
ABMA 9–1990 (R2008).....Load Ratings and Fatigue Life for Ball Bearings

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
841-2009.....IEEE Standard for Petroleum and Chemical Industry-Premium-Efficiency, Severe-Duty, Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors--Up to and Including 370 kW (500 HP)

D. International Code Council (ICC):
IPC-2012.....International Plumbing Code

E. National Electrical Manufacturers Association (NEMA):
MG 1-2011.....Motors and Generators
MG 2-2001 (R2007).....Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators
250-2008.....Enclosures for Electrical Equipment (1000 Volts Maximum)

F. National Fire Protection Association (NFPA):

70-2011.....National Electrical Code (NEC)

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT”, with applicable paragraph identification.

C. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Motor nameplate information shall be submitted including electrical ratings, dimensions, mounting details, materials, horsepower, power factor, current as a function of speed, current efficiency, speed as a function of load, RPM, enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.
3. Motor parameters required for the determination of the Reed Critical Frequency of vertical hollow shaft motors shall be submitted.

D. Operating and Maintenance Manuals: Companion copies of complete maintenance and operating manuals, including technical data sheets and application data shall be submitted simultaneously with the shop drawings. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:

1. Include complete list indicating all components of the systems.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

E. Certification: Two weeks prior to final inspection, unless otherwise noted, the following certification shall be submitted to the Contracting Officer’s Representative (COR).

1. Certification shall be submitted stating that the motors have been properly applied, installed, adjusted, lubricated, and tested.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MOTORS

A. For alternating current, fractional and integral horsepower motors, NEMA MG 1 and NEMA MG 2 shall apply.

B. For severe duty totally enclosed motors, IEEE 841 shall apply.

C. Voltage ratings shall be as follows:

1. Single phase:
   a. Motors connected to 120-volt systems: 115 volts.
   b. Motors connected to 208-volt systems: 200 volts.
   c. Motors connected to 240-volt or 480-volt systems: 230/460 volts, dual connection.
2. Three phase:
   a. Motors connected to 208-volt systems: 200 volts.
   b. Motors, less than 74.6 kW (100 HP), connected to 240-volt or 480-volt systems: 230/460 volts, dual connection.
   c. Motors, 74.6 kW (100 HP) or larger, connected to 240-volt systems: 230 volts.
   d. Motors, 74.6 kW (100 HP) or larger, connected to 480-volt systems: 460 volts.
   e. Motors connected to high voltage systems: Shall conform to NEMA MG 1 Standards for connection to the nominal system voltage shown on the drawings.

D. Number of phases shall be as follows:

1. Motors, less than 373 W (1/2 HP): Single phase.
2. Motors, 373 W (1/2 HP) and larger: 3 phase.
3. Exceptions:
   a. Hermetically sealed motors.
   b. Motors for equipment assemblies, less than 746 W (1 HP), may be single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.

E. Horsepower ratings shall be adequate for operating the connected loads continuously in the prevailing ambient temperatures in areas where the motors are installed, without exceeding the NEMA standard temperature rises for the motor insulation.

F. Motor designs, as indicated by the NEMA code letters, shall be coordinated with the connected loads to assure adequate starting, acceleration and running torque without exceeding nameplate ratings or considering service factor.

G. Motor Enclosures:
   1. Shall be the NEMA types shown on the drawings for the motors.
   2. Where the types of motor enclosures are not shown on the drawings, they shall be the NEMA types per NEMA 250, which are most suitable for the environmental conditions where the motors are being installed.
   3. Enclosures shall be primed and finish coated at the factory with manufacturer's prime coat and standard finish.
   4. All motors in hazardous locations shall be approved for the application and meet the Class and Group as required by the area classification.

H. Electrical Design Requirements:
   1. Motors shall be continuous duty.
   2. The insulation system shall be rated minimum of Class B, 130 degrees C (266 degrees F).
   3. The maximum temperature rise by resistance at rated power shall not exceed Class B limits, 80 degrees C (144 degrees F).
   4. The speed/torque and speed/current characteristics shall comply with NEMA Design A or B, as specified.
   5. Motors shall be suitable for full voltage starting, unless otherwise noted. Coordinate motor features with applicable motor controllers.
   6. Motors for variable frequency drive applications shall adhere to NEMA MG 1, Part 30, Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable Voltage or Adjustable Frequency Controls, or both, or NEMA MG 1, Part 31, Definite Purpose Inverter Fed Polyphase Motors.

I. Mechanical Design Requirements:
   1. Bearings shall be rated for a minimum fatigue life of 26,280 hours for belt-driven loads and 100,000 hours for direct-drive loads based

on L10 (Basic Rating Life) at full load direct coupled, except vertical high thrust motors which require a 40,000 hour rating. A minimum fatigue life of 40,000 hours is required for VFD drives.

2. Vertical motors shall be capable of withstanding a momentary up thrust of at least 30 percent of normal down thrust.
3. Grease lubricated bearings shall be designed for electric motor use. Grease shall be capable of the temperatures associated with electric motors and shall be compatible with Polyurea based greases.
4. Grease fittings, if provided, shall be Alemite type or equivalent.
5. Oil lubricated bearings, when specified, shall have an externally visible sight glass to view oil level.
6. Vibration shall not exceed 3.8 mm (0.15 inch) per second, unfiltered peak.
7. Noise level shall meet the requirements of the application.
8. Motors on 180 frames and larger shall have provisions for lifting eyes or lugs capable of a safety factor of 5.
9. All external fasteners shall be corrosion resistant.
10. Condensation heaters, when specified, shall keep motor windings at least 5 degrees C (9 degrees F) above ambient temperature.
11. Winding thermostats, when specified shall be normally closed, connected in series.
12. Grounding provisions shall be in the main terminal box.

J. Additional requirements for specific motors, as indicated in other sections, shall also apply.

K. NEMA Premium Efficiency Electric Motors, Motor Efficiencies: All permanently wired polyphase motors of 746 W (1 HP) or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 746 W (1 HP) or more with open, drip-proof or totally enclosed fan-cooled enclosures shall be NEMA premium efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

Minimum Efficiencies Open Drip-Proof				Minimum Efficiencies Totally Enclosed Fan-Cooled			
Rating kW (HP)	1200 RPM	1800 RPM	3600 RPM	Rating kW (HP)	1200 RPM	1800 RPM	3600 RPM
0.746 (1)	82.5%	85.5%	77.0%	0.746 (1)	82.5%	85.5%	77.0%
1.12 (1.5)	86.5%	86.5%	84.0%	1.12 (1.5)	87.5%	86.5%	84.0%
1.49 (2)	87.5%	86.5%	85.5%	1.49 (2)	88.5%	86.5%	85.5%
2.24 (3)	88.5%	89.5%	85.5%	2.24 (3)	89.5%	89.5%	86.5%
3.73 (5)	89.5%	89.5%	86.5%	3.73 (5)	89.5%	89.5%	88.5%
5.60 (7.5)	90.2%	91.0%	88.5%	5.60 (7.5)	91.0%	91.7%	89.5%
7.46 (10)	91.7%	91.7%	89.5%	7.46 (10)	91.0%	91.7%	90.2%
11.2 (15)	91.7%	93.0%	90.2%	11.2 (15)	91.7%	92.4%	91.0%
14.9 (20)	92.4%	93.0%	91.0%	14.9 (20)	91.7%	93.0%	91.0%
18.7 (25)	93.0%	93.6%	91.7%	18.7 (25)	93.0%	93.6%	91.7%
22.4 (30)	93.6%	94.1%	91.7%	22.4 (30)	93.0%	93.6%	91.7%
29.8 (40)	94.1%	94.1%	92.4%	29.8 (40)	94.1%	94.1%	92.4%
37.3 (50)	94.1%	94.5%	93.0%	37.3 (50)	94.1%	94.5%	93.0%
44.8 (60)	94.5%	95.0%	93.6%	44.8 (60)	94.5%	95.0%	93.6%
56.9 (75)	94.5%	95.0%	93.6%	56.9 (75)	94.5%	95.4%	93.6%
74.6 (100)	95.0%	95.4%	93.6%	74.6 (100)	95.0%	95.4%	94.1%
93.3 (125)	95.0%	95.4%	94.1%	93.3 (125)	95.0%	95.4%	95.0%
112 (150)	95.4%	95.8%	94.1%	112 (150)	95.8%	95.8%	95.0%
149.2 (200)	95.4%	95.8%	95.0%	149.2 (200)	95.8%	96.2%	95.4%

L. Minimum Power Factor at Full Load and Rated Voltage: 90 percent at 1200 RPM, 1800 RPM and 3600 RPM. Power factor correction capacitors shall be installed unless the motor is controlled by a variable frequency drive. The power factor correction capacitors shall be able to withstand high voltage transients and power line variations without breakdown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install motors in accordance with manufacturer’s recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

B. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.2 FIELD TESTS

A. Megger all motors after installation, before start-up. All shall test free from grounds.

3.3 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

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SECTION 22 05 19
METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the requirements for water meters and gages primarily used for troubleshooting the system and to indicate system performance.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

D. Section 25 10 10, ADVANCED UTILITY METERING SYSTEM.

1.3 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):

B40.100-2013.....Pressure Gauges and Gauge Attachments

B40.200-2008.....Thermometers, Direct Reading and Remote Reading

C. American Water Works Association (AWWA):

C700-2009.....Standard for Cold Water Meters, Displacement Type, Bronze Main Case

C701-2012.....Cold Water Meters-Turbine Type, for Customer Service

C702-2010.....Cold Water Meters – Compound Type

C706-2010.....Direct-Reading, Remote-Registration Systems for Cold-Water Meters

D. Institute of Electrical and Electronics Engineers (IEEE):

C2–2012.....National Electrical Safety Code (NESC)

E. International Code Council (ICC):

IPC-2012.....International Plumbing Code

F. National Fire Protection Association (NFPA):

70–2011.....National Electrical Code (NEC)

G. NSF International (NSF):

61-2012.....Drinking Water System Components – Health Effects

372-2011.....Drinking Water System Components – Lead Content

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 22 05 19, METERS AND GAGES FOR PLUMBING PIPING”, with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. Pressure Gages.
2. Thermometers.
3. Product certificates for each type of meter and gage.
4. BACnet or Lon. Coordinate with Controls Manufacturer communication protocol.

D. Operations and Maintenance manual shall include:

1. System Description.
2. Major assembly block diagrams.
3. Troubleshooting and preventive maintenance guidelines.
4. Spare parts information.

E. Shop Drawings shall include the following: One line, wiring and terminal diagrams including terminals identified, protocol or communication modules, and Ethernet connections.

1.5 AS-BUILT DOCUMENTATION

A. Submit manufacturer’s literature and data updated to include submittal review comments and any equipment substitutions.

B. Submit copies of complete operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder per the requirements of Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation

shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. A list of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

PART 2 – PRODUCTS

2.1 PRESSURE GAGES FOR WATER AND SEWAGE USAGE

A. ASME B40.100 all metal case 115 mm (4-1/2 inches) diameter, bottom connected throughout, graduated as required for service, and identity labeled. Range shall be 0 to 1380 kPa (0 to 200 psig) gage.

B. The pressure element assembly shall be bourdon tube. The mechanical movement shall be lined to pressure element and connected to pointer.

C. The dial shall be non-reflective aluminum with permanently etched scale markings graduated in kPa and psig.

D. The pointer shall be dark colored metal.

E. The window shall be glass.

F. The ring shall be brass or stainless steel.

G. The accuracy shall be grade A, plus or minus 1 percent of middle half of scale range.

H. The pressure gage for water domestic use shall conform to NSF 61 and NSF 372.

2.2 THERMOMETERS

A. Thermometers shall be straight stem, metal case, liquid-filled thermometer, approximately 175 mm (7 inches) high, 4 degrees C to 100 degrees C (40 degrees F to 212 degrees F). Thermometers shall comply with ASME B40.200.

B. Mercury is not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Direct mounted pressure gages shall be installed in piping tees with pressure gage located on pipe at the most readable position.

B. Valves and snubbers shall be installed in piping for each pressure gage.

C. Test plugs shall be installed on the inlet and outlet pipes of all heat exchangers or water heaters serving more than one plumbing fixture.

D. Pressure gages shall be installed where indicated on the drawings and at the following locations:
   1. Building water service entrance into building.
   2. Inlet and outlet of each pressure reducing valve.
   3. Suction and discharge of each domestic water pump or re-circulating hot water return pump.

E. Thermometers shall be installed on the water heater inlet and outlet piping, thermostatic mixing valve outlet piping, and the hot water circulation pump inlet piping.

F. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.2 TRAINING

A. A training course shall be provided to the medical center on meter configuration and maintenance. Training manuals shall be supplied for all attendees with four additional copies supplied. The training course shall cover meter configuration, troubleshooting, and diagnostic procedures.

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SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the requirements for general-duty valves for domestic water and sewer systems.

B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.

D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

E. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

1.3 APPLICABLE PUBLICATIONS

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

B. American Society of Mechanical Engineers (ASME):
A112.14.1-2003.....Backwater Valves

C. American Society of Sanitary Engineering (ASSE):
1001-2008.....Performance Requirements for Atmospheric Type Vacuum Breakers
1003-2009.....Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems
1011-2004.....Performance Requirements for Hose Connection Vacuum Breakers
1013-2011.....Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers
1015-2011.....Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

1017-2009.....Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems

1020-2004.....Performance Requirements for Pressure Vacuum Breaker Assembly

1035-2008.....Performance Requirements for Laboratory Faucet Backflow Preventers

1069-2005.....Performance Requirements for Automatic Temperature Control Mixing Valves

1070-2004.....Performance Requirements for Water Temperature Limiting Devices

1071-2012.....Performance Requirements for Temperature Actuated Mixing Valves for Plumbed Emergency Equipment

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

A126-2004(R2009).....Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

A276-2013a.....Standard Specification for Stainless Steel Bars and Shapes

A536-1984(R2009).....Standard Specification for Ductile Iron Castings

B62-2009.....Standard Specification for Composition Bronze or Ounce Metal Castings

B584-2013.....Standard Specification for Copper Alloy Sand Castings for General Applications

E. International Code Council (ICC):

IPC-2012.....International Plumbing Code

F. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):

SP-25-2008.....Standard Marking Systems for Valves, Fittings, Flanges and Unions

SP-67-2011.....Butterfly Valves

SP-70-2011.....Gray Iron Gate Valves, Flanged and Threaded Ends

SP-71-2011.....Gray Iron Swing Check Valves, Flanged and Threaded Ends

SP-80-2013.....Bronze Gate, Globe, Angle, and Check Valves

SP-85-2011.....Gray Iron Globe & Angle Valves, Flanged and Threaded Ends
SP-110-2010.....Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

G. National Environmental Balancing Bureau (NEBB):
7th Edition 2005 Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems

H. NSF International (NSF):
61-2012.....Drinking Water System Components – Health Effects
372-2011.....Drinking Water System Components – Lead Content

I. University of Southern California Foundation for Cross Connection Control and Hydraulic Research (USC FCCCHR):
9th Edition.....Manual of Cross-Connection Control

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING”, with applicable paragraph identification.

C. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.
1. Ball Valves.
2. Gate Valves.
3. Butterfly Valves.
4. Balancing Valves.
5. Check Valves.
6. Globe Valves.
7. Water Pressure Reducing Valves and Connections.
8. Backwater Valves.
9. Backflow Preventers.
10. Chainwheels.
11. Thermostatic Mixing Valves.

D. Test and Balance reports for balancing valves.

E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:
   1. Include complete list indicating all components of the systems.
   2. Include complete diagrams of the internal wiring for each item of equipment.
   3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.
   4. Piping diagrams of thermostatic mixing valves to be installed.

F. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the Contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

G. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Valves shall be prepared for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Valves shall be prepared for storage as follows:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew point temperature.

C. A sling shall be used for large valves. The sling shall be rigged to avoid damage to exposed parts. Hand wheels or stems shall not be used as lifting or rigging points.

PART 2 - PRODUCTS

2.1 VALVES, GENERAL

A. Asbestos packing and gaskets are prohibited.

B. Bronze valves shall be made with dezincification resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc shall not be permitted.

C. Valves in insulated piping shall have 50 mm or DN50 (2 inch) stem extensions and extended handles of non-thermal conductive material that allows operating the valve without breaking the vapor seal or disturbing the insulation. Memory stops shall be fully adjustable after insulation is applied.

D. Exposed Valves over 65 mm or DN65 (2-1/2 inches) installed at an elevation over 3.6 m (12 feet) shall have a chain-wheel attachment to valve hand-wheel, stem, or other actuator.

E. All valves used to supply potable water shall meet the requirements of NSF 61 and NSF 372.

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

2.2 SHUT-OFF VALVES

A. Cold, Hot, Re-circulating Hot Water and Re-circulating Cold Water:

1. 50 mm or DN50 (2 inches) and smaller: Ball, MSS SP-110, Ball valve shall be full port three piece or two piece with a union design with adjustable stem package. Threaded stem designs are not allowed. The ball valve shall have a SWP rating of 1035 kPa (150 psig) and a CWP rating of 4138 kPa (600 psig). The body material shall be Bronze ASTM B584, Alloy C844. The ends shall be non-lead solder.
2. Less than 100 mm DN100 (4 inches): Butterfly shall have an iron body with EPDM seal and aluminum bronze disc. The butterfly valve shall meet MSS SP-67, type I standard. The butterfly valve shall have a SWP rating of 1380 kPa (200 psig). The valve design shall be lug type suitable for bidirectional dead-end service at rated pressure. The body material shall meet ASTM A536, ductile iron.
3. 100 mm DN100 (4 inches) and larger:
   a. Class 125, OS&Y, Cast Iron Gate Valve. The gate valve shall meet MSS SP-70 type I standard. The gate valve shall have a CWP rating of 1380 kPa (200 psig). The valve materials shall meet ASTM A126, grey iron with bolted bonnet, flanged ends, bronze trim, and positive-seal resilient solid wedge disc. The gate valve shall be gear operated for sizes under 200 mm or DN200 (8 inches) and crank operated for sizes 200 mm or DN200 (8 inches) and above.

b. Single flange, ductile iron butterfly valves: The single flanged butterfly valve shall meet the MSS SP-67 standard. The butterfly valve shall have a CWP rating of 1380 kPa (200 psig). The butterfly valve shall be lug type, suitable for bidirectional dead-end service at rated pressure without use of downstream flange. The body material shall comply with ASTM A536 ductile iron. The seat shall be EPDM with stainless steel disc and stem.

c. Grooved end, ductile iron butterfly valves. The grooved butterfly valve shall meet the MSS SP-67 standard. The grooved butterfly valve shall have a CWP rating of 1380 kPa (200 psig). The valve materials shall be epoxy coated ductile iron conforming to ASTM A536 with two piece stainless steel stem, EPDM encapsulated ductile iron disc, and EPDM seal. The butterfly valve shall be gear operated.

B. Reagent Grade Water: Valves for reagent grade, reverse osmosis, or deionized water service shall be ball type of same material as used for pipe.

2.3 BALANCING VALVES

A. Hot Water and Cold Water Re-circulating, 75 mm or DN75 (3 inches) and smaller manual balancing valve shall be of bronze body, brass ball construction with glass and carbon filled TFE seat rings and designed for positive shutoff. The manual balancing valve shall have differential pressure read-out ports across the valve seat area. The read out ports shall be fitting with internal EPT inserts and check valves. The valve body shall have 8 mm or DN8 NPT (1/4 inch NPT) tapped drain and purge port. The valves shall have memory stops that allow the valve to close for service and then reopened to set point without disturbing the balance position. All valves shall have calibrated nameplates to assure specific valve settings.

B. Larger than 75 mm or DN75 (3 inches): Manual balancing valves shall be of heavy duty cast iron flanged construction with 861 kPa (125 psig) flange connections. The flanged manual balancing valves shall have either a brass ball with glass and carbon filled TFE seal rings or fitted with a bronze seat, replaceable bronze disc with EPDM seal insert and stainless steel stem. The design pressure shall be 1200 kPa (175 psig) at 121 degrees C (250 degrees F).

2.4 CHECK VALVES

A. 75 mm or DN75 (3 inches) and smaller shall be Class 125, bronze swing check valves with non-metallic disc suitable for type of service. The check valve shall meet MSS SP-80 Type 4 standard. The check valve shall have a CWP rating of 1380 kPa (200 psig). The check valve shall have a Y pattern horizontal body design with bronze body material conforming to ASTM B62, solder joints, and PTFE or TFE disc.

B. 100 mm or DN100 (4 inches) and larger:

1. Check valves shall be Class 125, iron swing check valve with lever and weight closure control. The check valve shall meet MSS SP-71 Type I standard. The check valve shall have a CWP rating of 1380 kPa (200 psig). The check valve shall have a clear or full waterway body design with gray iron body material conforming to ASTM A126, bolted bonnet, flanged ends, bronze trim.
2. All check valves on the discharge side of submersible sump pumps shall have factory installed exterior level and weight with sufficient weight to prevent the check valve from hammering against the seat when the sump pump stops.

2.5 GLOBE VALVES

A. 75 mm or DN75 (3 inches) or smaller: Class 150, bronze globe valve with non-metallic disc. The globe valve shall meet MSS SP-80, Type 2 standard. The globe valve shall have a CWP rating of 2070 kPa (300 psig). The valve material shall be bronze with integral seal and union ring bonnet conforming to ASTM B62 with solder ends, copper-silicon bronze stem, PTFE or TFE disc, and malleable iron hand wheel.

B. Larger than 75 mm or DN75 (3 inches): Similar to above, except with cast iron body and bronze trim, Class 125, iron globe valve. The globe valve shall meet MSS SP-85, Type 1 standard. The globe valve shall have a CWP rating of 1380 kPa (200 psig). The valve material shall be gray iron with bolted bonnet conforming to ASTM A126 with flanged ends, bronze trim, and malleable iron handwheel.

2.6 WATER PRESSURE REDUCING VALVE AND CONNECTIONS

A. 75 mm or DN75 (3 inches) or smaller: The pressure reducing valve shall consist of a bronze body and bell housing, a separate access cover for the plunger, and a bolt to adjust the downstream pressure. The pressure reducing valve shall meet ASSE 1003. The bronze bell housing and access cap shall be threaded to the body and shall not require the use of ferrous screws. The assembly shall be of the balanced piston design and

shall reduce pressure in both flow and no flow conditions. The assembly shall be accessible for maintenance without having to remove the body from the line.

B. 100 mm or DN100 (4 inches) and larger: The pressure reducing valve shall consist of a flanged cast iron body and rated to 1380 kPa (200 psig). The valve shall have a large elastomer diaphragm for sensitive response. The pressure reducing valve shall meet ASSE 1003.

C. The regulator shall have a tap for pressure gauge.

D. The regulator shall have a temperature rating of 100 degrees C (212 degrees F) for hot water or hot water return service. Pressure regulators shall have accurate pressure regulation to 6.9 kPa (+/- 1 psig).

E. Setting: Entering water pressure, discharge pressure, capacity, size, and related measurements shall be as shown on the drawings.

F. Connections Valves and Strainers: Shut off valves shall be installed on each side of reducing valve and a bypass line equal in size to the regulator inlet pipe shall be installed with a normally closed globe valve. A strainer shall be installed on inlet side of, and same size as pressure reducing valve. A pressure gage shall be installed on the inlet and outlet of the valve.

2.7 BACKWATER VALVE

A. The backwater valve shall have a cast iron body, automatic thermoplastic type valve seat and flapper suited for water service. The flapper shall be slightly open during periods of non-operation. The pressure reducing valve shall meet ASME A112.14.1. The cleanout shall be extended to the finish floor and fit with a threaded countersunk plug. A clamping device shall be included when the cleanout extends through the waterproofing membrane.

B. When the backwater valve is installed greater than 600 mm (24 inches) below the finish floor elevation, a pit or manhole large enough for a repair person can enter to service the backwater valve shall be installed.

2.8 BACKFLOW PREVENTERS

A. A backflow prevention assembly shall be installed at any point in the plumbing system where the potable water supply comes in contact with a potential source of contamination. The backflow prevention assembly shall be approved by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research (USCFCCC).

B. The reduced pressure principle backflow prevention assembly shall be ASSE listed 1013 with full port OS&Y positive-seal resilient gate valves and an integral relief monitor switch. The main body and access cover shall be epoxy coated ductile iron conforming to ASTM A536 grade 4. The seat ring and check valve shall be the thermoplastic type suited for water service. The stem shall be stainless steel conforming to ASTM A276. The seat disc shall be the elastomer type suited for water service. The checks and the relief valve shall be accessible for maintenance without removing the device from the line. An epoxy coated wye type strainer with flanged connections shall be installed on the inlet. Reduced pressure backflow preventers shall be installed in the following applications.
   1. Deionizers.
   2. Sterilizers.
   3. Stills.
   4. Deionized or Reverse Osmosis Water Systems.
   5. Water make up to heating systems, chilled water system, and similar equipment consuming water.
   6. Water service entrance from loop system.
   7. Dental equipment.
   8. Medical equipment.
   9. Process equipment.

C. The pipe applied or integral atmospheric vacuum breaker shall be ASSE listed 1001. The main body shall be cast bronze. The seat disc shall be the elastomer type suited for water service. The device shall be accessible for maintenance without removing the device from the service line. The installation shall not be in a concealed or inaccessible location or where the venting of water from the device during normal operation is deemed objectionable. Atmospheric vacuum breakers shall be installed in the following applications.
   1. Hose bibs and sinks with threaded outlets.

D. The hose connection vacuum breaker shall be ASSE listed 1011. The main body shall be cast brass with stainless steel working parts. The diaphragm and disc shall be the elastomer type suited for water service. The device shall permit the attachment of portable hoses to hose thread outlets. Hose connection vacuum breakers shall be installed in the following locations requiring non-continuous pressure:
   1. Hose bibbs and wall hydrants.

E. The pressure vacuum breaker shall be ASSE listed 1020. The main body shall be brass. The disc and O-ring seal shall be the elastomer type. The valve seat and disc float shall be the thermoplastic type. Tee handle or lever handle shut-off ball valves. Test cocks for testing and draining where freezing conditions occur. All materials shall be suitable for water service. The device shall be accessible for maintenance without removing the device from the service line. The installation shall not be in a concealed or inaccessible location or where the venting of water from the device during normal operation is deemed objectionable. Pressure vacuum breakers shall be installed in the following locations requiring continuous pressure and no backpressure including equipment with submerged inlet connections:

F. The laboratory faucet vacuum breaker shall be ASSE listed 1035. The main body shall be cast brass. Dual check valves with stainless steel working parts. The diaphragm and disc shall be the elastomer type suited for water service. The device shall permit the attachment of portable hoses to laboratory faucets for non-continuous pressure applications.

G. The double check backflow prevention assembly shall be ASSE listed 1015 and supply with full port, OS&Y, positive-seal, resilient gate valves. The main body and access cover shall be epoxy coated ductile iron conforming to ASTM A536 grade. The seat ring and check valve shall be the thermoplastic type suited for water service. The stem shall be stainless steel conforming to ASTM A276. The seat disc shall be the elastomer type suited for water service. The first and second check valve shall be accessible for maintenance without removing the device from the line. Double check valves shall be installed in the following location requiring continuous pressure subject to backpressure and backsiphonage conditions.

1. Food Processing Equipment.
2. Laundry equipment.

2.9 CHAINWHEELS

A. Valve chain wheel assembly with sprocket rim brackets and chain shall be constructed according to the following:

1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to butterfly valve stem.

3. Sprocket rim with chain guides: Ductile or cast iron of type and size required for valve with zinc coating.
4. Chain: Hot dipped galvanized steel of size required to fit sprocket rim.

2.10 THERMOSTATIC MIXING VALVES

A. Thermostatic Mixing Valves shall comply with the following general performance requirements:
1. Shall meet ASSE requirements for water temperature control.
2. The body shall be cast bronze or brass with corrosion resistant internal parts preventing scale and biofilm build-up. Provide chrome-plated finish in exposed areas.
3. No special tool shall be required for temperature adjustment, maintenance, replacing parts and disinfecting operations.
4. Valve shall be able to be placed in various positions without making temperature adjustment or reading difficult.
5. Valve finish shall be chrome plated in exposed areas.
6. Valve shall allow easy temperature adjustments to allow hot water circulation. Internal parts shall be able to withstand disinfecting operations of chemical and thermal treatment of water temperatures up to 82°C (180°F) for 30 minutes or 50 mg/L (50 ppm) chlorine residual concentration for 24 hours.
7. Parts shall be easily removed or replaced without dismantling the valves, for easy scale removal and disinfecting of parts.
8. Valve shall have a manual adjustable temperature control with locking mechanism to prevent tampering by end user. Outlet temperature shall be visible to ensure outlet temperature does not exceed specified limits, particularly after thermal eradication procedures.
9. Provide mixing valves with integral check valves with screens and stop valves.

. Automatic Water Temperature Control Mixing Valves:
1. Application: Gang plumbing fixtures point-of-use when no other mixing at fixtures occurs.
2. Standard: ASSE 1069.
3. Pressure Rating: 861 kPa (125 psig).
4. Type: Thermostatically controlled water mixing valve set at 43 degrees C (110 degrees F).
5. Connections: Threaded union or soldered inlets and outlet.

6. Thermometers shall be provided to indicate mixed water temperature.
7. Upon cold water supply failure the hot water flow shall automatically be reduced to 0.5 gpm maximum.

C. Water Temperature Limiting Devices:
1. Application: Single plumbing fixture point-of-use such as sinks or lavatories.
2. Standard: ASSE 1070.
3. Pressure Rating: 861 kPa (125 psig).
4. Type: Thermostatically controlled water mixing valve set at 43 degrees C (110 degrees F).
5. Connections: Threaded union, compression or soldered inlets and outlet.
6. Upon cold water supply failure the hot water flow shall automatically be reduced to 0.2 gpm maximum.

D. Temperature Activated Mixing Valves:
1. Application: Emergency eye/face/drench shower equipment.
2. Standard: ASSE 1071.
3. Pressure Rating: 861 kPa (125 psig).
4. Type: Thermostatically controlled water mixing valve set at 24-30 degrees C (75-85 degrees F).
5. Connections: Soldered or threaded union inlets and outlet.
6. Cabinet: Factory-fabricated, stainless steel, for recessed or surface mounting and with hinged, stainless-steel door.
7. Thermometers shall be provided to indicate mixed water temperature.
8. Upon cold water supply failure the hot water flow shall automatically be reduced to 0.5 gpm maximum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Valve interior shall be examined for cleanliness, freedom from foreign matter, and corrosion. Special packing materials shall be removed, such as blocks, used to prevent disc movement during shipping and handling.

B. Valves shall be operated in positions from fully open to fully closed. Guides and seats shall be examined and made accessible by such operations.

C. Threads on valve and mating pipe shall be examined for form and cleanliness.

D. Mating flange faces shall be examined for conditions that might cause leakage. Bolting shall be checked for proper size, length, and

material. Gaskets shall be verified for proper size and that its material composition is suitable for service and free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Valves shall be located for easy access and shall be provide with separate support. Valves shall be accessible with access doors when installed inside partitions or above hard ceilings.

C. Valves shall be installed in horizontal piping with stem at or above center of pipe.

D. Valves shall be installed in a position to allow full stem movement.

E. Install chain wheels on operators for butterfly valves NPS 100 mm or DN100 (4 inches) and larger and more than 3.6 m (12 feet) above floor. Chains shall be extended to 1524 mm (60 inches) above finished floor.

F. Check valves shall be installed for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level and on top of valve.

G. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction. Locate backflow preventers in same room as connected equipment or system.

1. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.

H. Install pressure gages on outlet of backflow preventers.

I. Do not install bypass piping around backflow preventers.

J. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets.

1. Install thermometers if specified.

2. Install cabinet-type units recessed in or surface mounted on wall as specified.

K. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
1. Calibrated balancing valves.
2. Thermostatic, water mixing valves.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.4 ADJUSTING

A. Valve packing shall be adjusted or replaced after piping systems have been tested and put into service but before final adjusting and balancing. Valves shall be replaced if persistent leaking occurs.

B. Set field-adjustable flow set points of balancing valves and record data. Ensure recorded data represents actual measured or observed conditions. Permanently mark settings of valves and other adjustment devices allowing settings to be restored. Set and lock memory stops. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

D. Testing and adjusting of balancing valves shall be performed by an independent NEBB Accredited Test and Balance Contractor. A final settings and flow report shall be submitted to the VA Contracting Officer’s Representative (COR).

3.5 COMMISSIONING

A. Provide commissioning documentation in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.

3.6 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer’s technical representative for four hours to instruct VA Personnel in operation and maintenance of the system.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

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SECTION 22 07 11
PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Field applied insulation for thermal efficiency and condensation control for the following:
   1. Plumbing piping and equipment.

B. Definitions:
   1. ASJ: All Service Jacket, Kraft paper, white finish facing or jacket.
   2. Air conditioned space: Space having air temperature and/or humidity controlled by mechanical equipment.
   3. All insulation systems installed within supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, interiors of air conditioned or heating ducts, and mechanical equipment rooms shall be noncombustible or shall be listed and labeled as having a flame spread indexes of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723. Note: ICC IMC, Section 602.2.1.
   4. Cold: Equipment or piping handling media at design temperature of 15 degrees C (60 degrees F) or below.
   5. Concealed: Piping above ceilings and in chases and pipe spaces.
   6. Exposed: Piping and equipment exposed to view in finished areas including mechanical equipment rooms or exposed to outdoor weather. Shafts, chases, crawl spaces and pipe basements are not considered finished areas.
   7. FSK: Foil-scrim-Kraft facing.
   8. Hot: Plumbing equipment or piping handling media above 40 degrees C (104 degrees F).
   9. Density: kg/m^3 - kilograms per cubic meter (Pcf - pounds per cubic foot).
   10. Thermal conductance: Heat flow rate through materials.
      a. Flat surface: Watts per square meter (BTU per hour per square foot).
      b. Pipe or Cylinder: Watts per linear meter (BTU per hour per linear foot) for a given outside diameter.

11. Thermal Conductivity (k): Watts per meter, per degree K (BTU - inch thickness, per hour, per square foot, per degree F temperature difference).
12. Vapor Retarder (Vapor Barrier): A material which retards the transmission (migration) of water vapor. Performance of the vapor retarder is rated in terms of permeance (perms). For the purpose of this specification, vapor retarders/vapor barriers shall have a maximum published permeance of .02 perms.
13. HWR: Hot water recirculating.
14. CW: Cold water.
15. SW: Soft water.
16. HW: Hot water.
17. PVDC: Polyvinylidene chloride vapor retarder jacketing, white.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
C. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.
D. Section 07 84 00, FIRESTOPPING: Mineral fiber and bond breaker behind sealant.
E. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING: General mechanical requirements and items, which are common to more than one section of Division 22.
F. Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING: Hot and cold water piping.
G. Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING: Hot and cold water piping.
H. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

1.3 APPLICABLE PUBLICATIONS

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

B209-2014.....Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
C411-2011.....Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

C449-2007 (R2013).....Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement

C450-2008 (R2014).....Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging

Adjunct to C450.....Compilation of Tables that Provide Recommended Dimensions for Prefab and Field Thermal Insulating Covers, etc.

C533-2013.....Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation

C534/C534M-2014.....Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

C547-2015.....Standard Specification for Mineral Fiber Pipe Insulation

C552-2014.....Standard Specification for Cellular Glass Thermal Insulation

C553-2013.....Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

C591-2013.....Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

C680-2014.....Standard Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs

C612-2014.....Standard Specification for Mineral Fiber Block and Board Thermal Insulation

C1126-2014.....Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation

C1136-2012.....Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

C1710-2011.....Standard Guide for Installation of Flexible Closed Cell Preformed Insulation in Tube and Sheet Form

D1668/D1668M-1997a (2014)e1 Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
E84-2015a.....Standard Test Method for Surface Burning Characteristics of Building Materials
E2231-2015.....Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation to Assess Surface Burning Characteristics

C. Federal Specifications (Fed. Spec.):
L-P-535E-1979.....Plastic Sheet (Sheeting): Plastic Strip; Poly (Vinyl Chloride) and Poly (Vinyl Chloride - Vinyl Acetate), Rigid.

D. International Code Council, (ICC):
IMC-2012.....International Mechanical Code

E. Military Specifications (Mil. Spec.):
MIL-A-3316C (2)-1990....Adhesives, Fire-Resistant, Thermal Insulation
MIL-A-24179A (2)-1987...Adhesive, Flexible Unicellular-Plastic Thermal Insulation
MIL-PRF-19565C (1)-1988.Coating Compounds, Thermal Insulation, Fire-and Water-Resistant, Vapor-Barrier
MIL-C-20079H-1987.....Cloth, Glass; Tape, Textile Glass; and Thread, Glass and Wire-Reinforced Glass

F. National Fire Protection Association (NFPA):
90A-2015.....Standard for the Installation of Air-Conditioning and Ventilating Systems

G. Underwriters Laboratories, Inc (UL):
723-2008 (R2013).....Standard for Test for Surface Burning Characteristics of Building Materials
1887-2004 (R2013).....Standard for Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics

H. 3E Plus® version 4.1 Insulation Thickness Computer Program: Available from NAIMA with free download; http://.www.pipeinsulation.net

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 07 11, PLUMBING INSULATION", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

D. Shop Drawings:

1. All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM Designation, Federal and Military specifications.
   a. Insulation materials: Specify each type used and state surface burning characteristics.
   b. Insulation facings and jackets: Each type used and state surface burning characteristics.
   c. Insulation accessory materials: Each type used.
   d. Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation shall follow the guidelines in accordance with ASTM C1710.
   e. Make reference to applicable specification paragraph numbers for coordination.
   f. All insulation fittings (exception flexible unicellular insulation) shall be fabricated in accordance with ASTM C450 and the referenced Adjunct to ASTM C450.

E. Completed System Readiness Checklist provided by the CxA and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

1.5 QUALITY ASSURANCE

A. Refer to article QUALITY ASSURANCE, in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

B. Criteria:

1. Comply with NFPA 90A, particularly paragraphs 4.3.3.1 through 4.3.3.6, 4.3.11.2.6, parts of which are quoted as follows:

   4.3.3.1 Pipe and duct insulation and coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and supplementary materials added to air ducts, plenums, panels and duct silencers used in duct systems shall have, in the form in

which they are used, a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with ASTM E84 and appropriate mounting practice, e.g. ASTM E2231.

4.3.3.3 Coverings and linings for air ducts, pipes, plenums and panels including all pipe and duct insulation materials shall not flame, glow, smolder, or smoke when tested in accordance with a similar test for pipe covering, ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation, at the temperature to which they are exposed in service. In no case shall the test temperature be below 121 degrees C (250 degrees F).

4.3.11.2.6.3 Nonferrous fire sprinkler piping shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with UL 1887, Standard for Safety Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.

4.3.11.2.6.8 Smoke detectors shall not be required to meet the provisions of Section 4.3.

2. Test methods: ASTM E84, UL 723, and ASTM E2231.
3. Specified k factors are at 24 degrees C (75 degrees F) mean temperature unless stated otherwise. Where optional thermal insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.
4. All materials shall be compatible and suitable for service temperature, and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.

C. Every package or standard container of insulation or accessories delivered to the job site for use shall have a manufacturer's stamp or label giving the name of the manufacturer, description of the material, and the production date or code.

D. Bio-Based Materials: For products designated by the USDA’s Bio-Preferred Program, provide products that meet or exceed USDA