DOCUMENT 00 01 10

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Asbestos 3-Year Re-Inspection Report And Updated Management Plan
Washington Elementary School
795 Wilder Street
Lowell, Massachusetts 01851
Prepared By Cardno ATC September 25, 2014

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END OF DOCUMENT

SECTION 01 03 00

ALTERNATES

1.1 SCOPE

A. This Section lists the Alternates which appear in the Contract Documents. Consult the individual sections of the detailed requirements of each Alternate.

B. Bid prices for each Alternate shall include overhead, profit, and all other expenses incidental to the Work under each Alternate.

C. The Contractor and Subcontractors shall be responsible for examining the scope of each Alternate generally defined herein and for recognizing modifications to the Work caused by the Alternates and including the cost thereof in the bid price.

1.2 ALTERNATE NO. 1

A. Provide all labor, materials, and equipment for the demolition of the existing Girls Room and the construction of the new Boys and Girls Rooms on the east side of the school as shown and described on the Drawings and Specifications and identified as “Alternate #1.

B. The demolition of the existing Boys Room and the construction of the new Boys and Girls Rooms on the west side of the school and the renovation of the Storage Room shall be under the base bid. The cost of the Alternate shall include any minor revisions and/or alterations to the work of the base bid required to construct the Alternate.

END OF SECTION

SECTION 02 41 16

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Removing Asbestos containing material prior to any other work.
2. Demolishing designated portions of the building.
3. Demolishing portions of designated slabs-on-grade.
4. Demolishing and Disconnecting and capping designated utilities.
5. Demolishing designated building components, equipment and fixtures.
6. Protecting items designated to remain.
7. Removing demolished materials.

B. The school will not be in session during demolition, but coordinate with Owner to allow Owner's use of the remainder of the facility during demolition and construction.

1.2 HAZARDOUS WASTE REMOVAL

A. Prior to any demolition all asbestos containing material (ACM) shall be removed by a licensed asbestos removal contractor in accordance with all applicable laws and regulations. All pipe insulation shall be assumed to be ACM.

B. Work shall be performed in accordance with AHERA and the following Report:

Asbestos 3-Year Re-Inspection Report and Updated Management Plan
Washington Elementary School
795 Wilder Street
Lowell, Massachusetts 01851
Prepared By Cardno ATC September 25, 2014.

C. The above Report is incorporated into this specification by reference and a copy is included with the bid documents.

D. If any other hazardous material or suspected hazardous material other than that identified in the Report (not including lead paint) is discovered during demolition, stop work in that area immediately and notify the Owner. Work stopped in one area shall not preclude continuing work in other areas as long as the suspected material can be adequately isolated to ensure safety.

E. The Contractor is responsible for conformance with all laws and regulations; filing and paying for all required permits and notifications; providing all monitoring and reporting; and providing all required enclosures, material, labor, equipment for the removal of all ACM.

F. Lead paint: All painted surfaces shall be assumed to contain lead paint and shall be demolished and disposed of in accordance with all applicable laws and regulations.

1.3 SUBMITTALS

A. Demolition Plan: Describe demolition, removal procedures, sequence and schedule.

B. Existing Conditions: Submit dated and labeled photographs in PDF format keyed to a floor plan showing location of photos.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of capped utilities.

B. Provide manifests for hazardous waste removal as required by law and regulation.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Document condition of adjacent spaces indicated to remain prior to the start of work.

B. Monitor building during demolition operations. Isolate demolition area including any utilities to prevent interference with the operations in the other parts of the building.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices.

B. Notify Owner of work which may affect their property, potential noise, utility outage, or disruption 48 hours prior to the start of Work. Coordinate with Owner.

C. Erect and maintain weatherproof airtight closures for exterior openings.

D. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy.

E. Protect existing items indicated to remain.

3.3 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent building areas.

B. Conduct operations with minimum interference to public or private accesses.

C. Maintain protected egress and access at all times. Do not close or obstruct roadways and sidewalks without permits.

3.4 SELECTIVE DEMOLITION

A. Demolish and remove components in orderly and careful manner, in sequence as indicated on Drawings.

B. Protect existing supporting structural members.

3.5 CLEAN UP

A. Remove demolished materials from site as work progresses.

B. Leave areas of work in clean condition on a daily basis.

C. Locate dumpsters as determined by the Owner. Empty dumpsters promptly when full; do not allow to overflow.

3.6 PRODUCTS TO BE REMOVED

A. All demolished material shall become the property of the Contractor and shall be promptly removed form the site. No salvage, recycling, or sale of material shall be allowed on site.

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor and materials necessary to seal all joints exterior and interior as indicated on drawings and/or in this Section.

1.2 REFERENCES

A. ASTM International (ASTM)
1. ASTM C834 Latex Sealants
2. ASTM C920 Standard Specification for Elastomeric Joint Sealants
3. ASTM D1667 Flexible Cellular Materials - PVC Foam (Closed-Cell)

1.3 SUBMITTALS

A. Submit manufacturer's product data for all sealant products.

PART 2 PRODUCTS

2.1 GENERAL PURPOSE EXTERIOR SEALANT

A. Polyurethane; ASTM C920, Grade NS, Class 25, single component. Elongation: 700%; Service Temperature: -40 to 180 degrees F; Shore A Hardness: +/-30; Color: As selected from manufacturer's standards.
1. Dynatrol I, manufactured by Pecora Corp.
2. Dymonic, manufactured by Tremco.
3. Sonolastic, manufactured by Sonneborn.
4. Chem-Calk, 900 manufactured by Bostik.
5. Or approved equal.

B. Applications - Use for:
1. Joints between concrete and other materials.
2. Joints between metal or fiberglass frames and other materials.
3. Joints around window and door frames.
4. Masonry control joints.
5. Other exterior joints for which no other sealant is indicated.

2.2 GENERAL PURPOSE INTERIOR SEALANT

A. Acrylic emulsion latex; ASTM C834, single component, paintable. Standard colors matching finished surfaces or white if not otherwise noted.

B. Applications - Use for:
1. Interior wall and ceiling control joints.
2. Joints between door and window frames and wall surfaces.
3. Joints between ceiling and vertical surfaces or fixtures in ceiling.

4. Other interior joints for which no other type of sealant is indicated.

2.3 BATHROOM SEALANT

A. Silicone; ASTM C920, single component, mildew resistant. Color: white unless otherwise noted.

B. Applications - Use for:
1. Joints between plumbing fixtures and floor and wall surfaces.
2. Any area subject to occasional wetting.

2.4 ACCESSORIES

A. Primer: Non-staining type, as recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, as recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width:
1. Green Rod manufactured by NMC, Inc.
2. HBR Backer rod manufactured by Nomaco, Inc.
3. Or approved equal.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 SEALANT SCHEDULE

A. General: Seal all interior and exterior joints, gaps, and abutting dissimilar materials to achieve a tight finished product as shown and specified.

B. Exterior: Seal all joints around openings for exhaust louver with polyurethane sealant.

C. Interior: Seal all joints around all doors and electrical fixtures with paintable acrylic sealant.

D. Seal all joints between plumbing fixtures and adjacent construction with clear or white silicone.

E. Seal all plumbing pipe penetrations with silicone and cover with escutcheons. Coordinate with fire stopping and sealant in fire rated partitions.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor, materials, and equipment required for the complete finished and functioning installation of hollow metal doors and frames as shown and specified.

1.2 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

B. ASTM International (ASTM)
   1. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C. Steel Door Institute (SDI)
   1. ANSI A250.8/SDI-100 Recommended Specifications for Standard Steel Doors and Frames
   2. SDI-108 Recommended Selection and Usage Guide for Standard Steel Doors
   3. SDI-111 Recommended Details for Standard Steel Doors, Frames, Accessories and Related Components.

1.3 SUBMITTALS

A. Schedule: Submit door and frame schedule listing each opening.

B. Shop Drawings: Indicate door and frame elevations, internal reinforcement, and finishes.

C. Product Data: Submit door and frame configurations, location of cut-outs for hardware reinforcement.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following Steel Door Institute (SDI):
   1. SDI-100
   2. SDI-111

B. Warranty: Provide manufacturer’s standard warranty.

PART 2 PRODUCTS

2.1 STEEL DOORS AND FRAMES

A. Manufacturers:

1. Amweld Building Products, Inc.
2. Ceco Door Products Model.
3. Republic Builders Products Model.
4. Steelcraft Model.
5. Or Equal.

B. Product Description: Standard shop fabricated steel doors and frames; non-fire rated types; flush face.

2.2 COMPONENTS

A. Doors: SDI 108, 1-3/4 inch thick.
1. Level 2 - Heavy Duty, nominal 18 gage/0.042 inch thick face sheets; Model 1, full flush design.

B. Frames:
1. Level 2, nominal 16 gage/0.053 inch thick material, base metal thickness, galvanized.

C. Door Core:
1. Door Core: Treated cardboard honeycomb or steel channel grid.

D. End Closure: Channel, 0.04 inch thick, flush and sealed on top; inverted on bottom.

2.3 ACCESSORIES

A. Primer: ANSI A250.10 rust inhibitive type.

2.4 FABRICATION

A. Fabricate doors and frames with hardware reinforcement welded in place.

B. Fabricate frames as face welded units.

2.5 SHOP & FIELD FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M A40.

B. Primer: Manufacturer’s standard rust inhibitive type, shop applied, baked.

C. Field Paint:
1. Color as selected from manufacturer’s standards by Owner.
2. Refer to Section 09 90 00 Paints & Coatings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors and frames in accordance with SDI-100/ANSI A250.8.

B. Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00 DOOR HARDWARE.

C. Coordinate door frames with wall construction for frame anchor placement.

D. Adjust door for smooth and balanced door movement.

E. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

F. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

G. Tolerances: Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

3.3 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

B. Provide up to 180 days of adjustment service of doors and hardware for proper operation from date of substantial completion.

3.4 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.5 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware for hollow metal steel doors.

1.2 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI/BHMA A156 Series Standards

B. Builders Hardware Manufacturers Association (BHMA)
   1. ANSI/BHMA Numbers for Materials & Finishes

C. Massachusetts Architectural Access Board (521 CMR)
   1. Rules and Regulations of the Architectural Access Board

1.3 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets for each hardware item including all features, options, and finishes.

B. Schedule: Submit door and hardware schedule listing each door with hardware organized by sets.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

B. Deliver to Owner's maintenance staff any special tools required for specific items.

C. Provide written, executed warranty specifically for this project.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
   1. ANSI A156 series.
   2. 521 CMR Architectural Access Board.

B. Coordination: Coordinate work of this section with other directly affected sections requiring integral reinforcement for door hardware.

C. Supplier: Company specializing in supplying commercial and institutional door hardware with minimum three years documented experience.

1.6 WARRANTY

A. Furnish five year manufacturer's warranty for door hardware.

1.7 MAINTENANCE SERVICE

A. Provide service and adjustment of door hardware to ensure smooth and proper operation for 6 months from Date of Substantial Completion.

B. Provide special wrenches and tools applicable to each different or special hardware component.

PART 2 PRODUCTS

2.1 DOOR HARDWARE COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors. All hardware shall conform to the requirements of the Architectural Access Board 521 CMR.
   1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
   2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
   3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
      a. Provide concealed or vandal resistant fasteners.
      b. Finish: Match hardware item being fastened.
   4. All hardware shall be corrosion resistant; stainless steel if not otherwise specified.

B. Hinges: ANSI A156, complying with following general requirements unless otherwise scheduled.
   1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
   2. Number: Furnish minimum three hinges per door.

C. Locksets and Latchsets: Furnish locksets compatible with specified cylinders. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt. Verify type of cutouts provided in metal frames.
   1. Bored (Cylindrical) Locksets and Latchsets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.

D. Cylinders: ANSI A156.5, Grade 1, 6 pin type interchangeable core type cylinders. Match Owner's existing system cylinders.
   1. Keying: Keyed as directed by Owner; Master keyed.
   2. Supply keys in the following minimum quantities:

a. 2 master keys.
b. 2 change keys for each lock.
3. Provide temporary construction cores.

E. Protection Plates, and Trim: Furnish as indicated in Schedule on drawings, with accessories as required for complete operational door installations.
1. Kickplates: ANSI A156.6, metal; 8 inch height by 1 inch less than door width; stainless steel.

2.2 ACCESSORIES

A. Lock Trim: Furnish levers with rose for bored sets as selected from manufacturer's full range of levers and trim.

B. Through Bolts: Through bolts and grommet nuts are not permitted on door faces in occupied areas unless no alternative is possible.

2.3 FINISHING

A. Finishes: ANSI A156.18; with following finishes except where otherwise indicated in Schedule on drawings.
1. Hinges: BHMA 626 satin chromium plated brass, bronze
2. Typical Interior Door Hardware either:
a. BHMA 630, satin finished stainless steel.
b. BHMA 626, satin chromium plated brass or bronze.
3. Other Items: Provide manufacturer's corrosion resistant standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish; BHMA 630stainless steel if not otherwise specified.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify doors and frames are ready to receive work and dimensions are as indicated.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights from finished floor to center line of hardware item: Comply with manufacturer recommendations, 521 CMR, BHMA A156, and applicable codes.

3.3 CLOSE OUT

A. Adjust all hardware for proper operation and fit.

B. Remove construction cores and install permanent cores or deliver cores to Owner at Owner's discretion. Deliver keys to owner.

C. Deliver two sets of all installation and maintenance information, clearly labeled, in three ring binders and in electronic PDF format to Owner.

D. Deliver spare parts, special tools, and warranties to Owner.

END OF SECTION

SECTION 09 26 00

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish and install gypsum wallboard on studs with joint treatment for walls and furred space enclosures as shown on drawings.

B. Furnish and install moisture resistant gypsum board as shown on drawings.

C. Furnish and install cementitious backer board as shown on drawings.

D. Furnish and install insulation as shown on drawings.

1.2 REFERENCES

A. ASTM International (ASTM)
1. ASTM C475 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
2. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board
3. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
4. ASTM C1396 Standard Specification for Gypsum Board

B. American National Standards Institute (ANSI)
1. ANSI A118.9 Test Methods and Specifications for Cementitious Backer Units

1.3 SUBMITTALS

A. Product Data: Submit data on metal framing, gypsum board, for cementitious backer board and accessories.

PART 2 PRODUCTS

2.1 GYPSUM & CEMENT BOARD SYSTEM

A. Manufacturers:
1. United States Gypsum.
2. National Gypsum.
3. Gold Bond Gypsum.
4. Or approved equal.

B. Gypsum Board Types: ASTM C1396, 1/2 inch or as shown, maximum available length in place; ends square cut, tapered edges.

C. Cementitious Backer Board: ANSI A118.9; High density, glass fiber reinforced, 1/2 inch thick.

2.2 INSULATION

A. Insulation: preformed glass fiber, friction fit type, foil faced thickness as shown on drawings.

B. Vapor barrier: Polyethylene sheet, 6 mil minimum.

2.3 ACCESSORIES

A. Sealants: As specified under 07 90 00 Joint Protection.

B. Corner Beads: Non-corrosive metal (zinc or galvanized steel) and paper combination.

C. Edge Trim: "J" Type bead, concealed.

D. Joint Materials:
1. Gypsum Board: ASTM C475, reinforcing tape, joint compound, adhesive, and water.
2. Cementitious Backer board: 2 inch wide coated glass fiber tape for joints and corners.

E. Fasteners: ASTM C1002, Type A, W, or S hardened screws, depending on application, length as required.

F. Adhesive: Joint compound.

PART 3 EXECUTION

3.1 INSTALLATION – GYPSUM & CEMENTITIOUS BOARD

A. Install in accordance with ASTM C840 and as shown and specified.
1. Install cement board to the same standards and specifications as gypsum board.

B. Install cementitious backer board. Tape joints and corners, cover with skim coat of mortar to feather edge.

C. Level of Finish, ASTM C840
1. Typical finish for exposed gypsum board unless otherwise specified: Level 4.
2. Finish for cementitious backer board: Level 1, prepared for application of ceramic tile.
3. Finish for concealed areas above ceilings: Level 1.

D. Install with edges over solid framing, stagger joints of two layer applications. Use floating interior angle method, applying ceiling boards first.

E. Fasten gypsum board to furring or framing with screws.

F. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

G. Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

H. Place control joints where:
   1. Partitions or ceilings of dissimilar construction meet and remain in the same plane.
   2. Expansion or control joints occur in the substrate.
   3. Partitions exceed 30 linear feet.

I. Seal control joints with flexible sealant.

J. Seal cut edges and holes in moisture resistant gypsum board.

K. Furring and Accessories: Provide wood furring strips and metal or wood grounds as required to finish or shim walls.

3.2 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface in accordance with specified Level of Finish ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Tape and fill but do not sand finish on joints in areas not exposed to view.

3.3 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 30 00

TILING

FILED SUB-BID REQUIRED

PART 1 GENERAL

1.1 The Conditions of the Contract and all sections of Division 01, General Requirements shall be part of this section unless otherwise specifically excluded.

1.2 Filed Sub-bids

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the Advertisement. The procedures and requirements for submitting sub-bids are set forth in the Instructions to Bidders.

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidder's Update Statement with the bid

C. The Work of this section is shown on the following Drawings:
1. A-1 FLOOR PLAN
2. A-3 INTERIOR ELEVATIONS
3. A-4 SCHEDULES & DETAILS

1.3 SCOPE OF WORK

A. The scope of work consists of the installation of all materials to be furnished under Section 09 30 00 TILING and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant, transportation, rigging, staging, appurtenances, and services necessary and/or incidental to properly complete all work as shown on the drawings listed above, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect.

B. Section includes ceramic tile and grout for interior wall applications; installation and finish of inserts furnished by other trades including access panels; and coordination with other trades to ensure proper sequence of construction.

C. Scope includes sealing and caulking tile around all penetrations, control and/or construction joints, and where tile abuts dissimilar materials in accordance with Section 07 90 00 JOINT PROTECTION.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Cementitious backer board as tile substrate shall be installed under 09 21 16 GYPSUM BOARD ASSEMBLIES prior to installation of tile under this Section.

B. Flooring shall be installed under 09 67 00 FLUID APPLIED FLOORING after tile is installed.

C. Rough plumbing and electrical shall be installed prior to tile installation; all access panels for same shall be furnished by others for installation under this Section. Coordinate location of access panels, outlets, piping, and other penetrations to fit neatly into tile work.

D. Cutting and Patching: Perform incidental Cutting and Patching required for work of this trade.

1.5 ALTERNATES

A. Attention is directed to Section 01 23 00 ALTERNATES for a detailed description of all Alternates.

B. The Tiling subcontractor shall be responsible for examining the scope of each Alternate and for the Work caused by the Alternates and for including the costs thereof in the appropriate space in paragraph A of the Form for Sub-bid.

1.6 REFERENCES

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

B. American National Standard (ANSI)
1. A108 Series/A118 Series - American National Standard Specifications for the Installation of Ceramic Tile

A. ASTM INTERNATIONAL (ASTM)
1. ASTM C1027 (2009) Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
2. ASTM C373 (1988; R 2006) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
3. ASTM C648 (2004; R 2009) Breaking Strength of Ceramic Tile

B. TILE COUNCIL OF NORTH AMERICA (TCNA)
1. TCA Hdbk (2010) Handbook for Ceramic Tile Installation

1.7 SUBMITTALS

A. Shop Drawings: Indicate patterned applications. Include scale drawings of pattern at inside corners, outside corners, termination points and location of all equipment items such as thermostats, switch plates, mirrors and toilet accessories mounted on surface. Submit drawings showing ceramic tile pattern elevations.

B. Product Data: Submit manufacturer's catalog data documenting compliance with specifications; printed data for preliminary selection of tile and grout from manufacturer's full range of standard colors, textures, and styles.

C. Submit preprinted installation and cleaning instructions.

D. Samples: Submit mounted tile and grout on plywood panels, 16 x 16 inches in size illustrating pattern, color variations, and grout joint size variations. Provide actual full size tiles of preliminary selections for final selection. Provide physical samples of preliminary grouts for final selection.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.9 QUALITY ASSURANCE

A. Perform Work in accordance with TCA Handbook and ANSI A108.1 Series/A118.1 Series.

B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years.

C. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather, and store them under cover in accordance with manufacturer's printed instructions.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.12 WARRANTY

A. Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

PART 2 PRODUCTS

2.1 TILE

A. Glazed Ceramic Wall Tile: Tile that has lead-free bright finish conforming to the following:
1. Strength for wall tile: ASTM C648, 90 pound minimum.
2. Moisture Absorption: ASTM C373, 3 to 20 percent.
3. Abrasion Resistance: ASTM C1027, 3 minimum.
4. Size: 4-1/4 by 4-1/4 inches nominal by 5/16 inch thick.
5. Shape: Square.
6. Edge: Cushioned.
7. Surface Finish: Bright glazed.

8. Colors: As selected from manufacturer's standards (up to 8 different colors):
   a. Field for all spaces.
   b. Base & Cap for all spaces.
   c. Boys Room: 2 Accent Colors.
   d. Girls Room: 2 Accent Colors.
   e. Entry Hall: 2 Accent Colors.
9. Pattern: As shown or selected from manufacturer's catalog.

B. Base: Coved base; match wall tile for moisture absorption, surface finish, and colors:
   1. Internal Corner: Coved.
   2. External Corner: Bullnosed

C. Wainscot Cap: Match wall tile for moisture absorption, surface finish, and colors.
   1. Bull nosed top edge.
   2. Size: 8 inch long by 2 inch high, by 5/16 inch thick.

D. Mortar Bond Coat Materials:
   a. Dry-Set Portland Cement type: ANSI A118.1.
      -or-
   b. Latex-Portland Cement type: ANSI A118.4.

E. Grout Materials: Commercial Latex-Portland cement type as specified in ANSI A118.6; color as selected from manufacturer's standards.

PART 3 EXECUTION

3.1 EXAMINATION & WORKMANSHIP

A. Verify surfaces are ready to receive work and that all related preparatory work is done prior to starting work. Do not start tile work until roughing in for plumbing, mechanical, and electrical work has been completed and tested, and built-in items have been installed and tested or approved.

B. Inspect surface to receive tile in conformance to the requirements of TCA Hdbk for surface conditions for the type setting bed specified and for workmanship.

C. Provide variations of tiled surfaces that fall within 1/8 inch in 8 ft.

3.2 INSTALLATION

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook recommendations.

B. Wall Tile: Install over cementitious backer units in accordance with TCA Handbook Method for Dry-Set Mortar or Latex-Portland Cement Mortar.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align base and wall joints, level and plumb.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

E. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar.

F. Control Joints: Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials. Form and seal joints as specified in Section 07 90 00 JOINT SEALANTS. Do not bridge joints.

G. Grout tile joints and tool to a solid smooth concave joint.

3.3 CLEANING AND PROTECTING

A. Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection as recommended by manufacturer for wall tile surfaces. Replace damaged or defective tiles.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes suspended metal grid ceiling system; and acoustic panels.

1.2 REFERENCES

A. ASTM INTERNATIONAL (ASTM)
1. ASTM C635/C635M (2013a) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
2. ASTM C636/C636M (2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
3. ASTM E1264 (2008; E 2010) Acoustical Ceiling Products
4. ASTM E84 (2014) Standard Test Method for Surface Burning Characteristics of Building Materials

1.3 SYSTEM DESCRIPTION

A. Provide system capable of supporting imposed loads with deflection limited to 1:360.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data sheets for grid and panels demonstrating conformance with this specification. Submit manufacturer’s care and maintenance instructions.

1.5 QUALITY ASSURANCE

A. Surface Burning Characteristics: Maximum 25/50 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F.

1.7 WARRANTY

A. Provide manufacturer’s standard 30 year warranty.

PART 2 PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

A. For the purpose of establishing a standard of quality, the following manufacturers are acceptable. Other manufacturers whose products meet the requirements of the specifications are also acceptable. Ceiling grid and panels shall be by one manufacturer.
1. Armstrong, Model 2907 Shasta panel with Prelude grid.
2. BPB Americas Inc.
3. United States Gypsum Company.
4. Or approved equal.

2.2 COMPONENTS

A. Grid:
1. Non-Fire Rated Grid: ASTM C635, intermediate duty, non-fire rated, exposed "T" configuration; components die cut and interlocking.
2. Accessories: Stabilizer bars, clips, splices, edge moldings, and other materials required for a complete suspended grid system.
3. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
4. Exposed grid surface width: 15/16 inch.
5. Grid Finish: White.
6. Support Channels and Hangers: Galvanized steel, size and type to suit application and ceiling system flatness requirements specified.

B. Acoustic Panels:
1. Fiberglass with vinyl facing; ASTM E1264 Type XII, Form 1, Pattern E.
2. Sag resistant.
3. Anti-mold & mildew.
4. Water repellant.
5. Washable, scrubbable & soil resistant.
6. Impact resistant.

C. Acoustic Panel Physical characteristics:
1. Nominal Size: 24 x 48 inches.
2. Thickness: 5/8 inches.
3. NRC Range: 0.50 minimum.
4. Light Reflectance: 0.72 minimum.
5. Surface Finish: Unperforated, light texture.
6. Edge: Square.
7. Color: White.
8. Fire Rating: Class A

2.3 ACCESSORIES

A. Acoustic Sealant for Perimeter Moldings: Specified in Section 07 90 00.

B. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify layout of hangers does not interfere with other work.

3.2 INSTALLATION

A. Suspension System:
1. Install system in accordance with ASTM C636.
2. Coordinate location of hangers with other work. Where components prevent regular spacing of hangers, reinforce system to span extra distance and provide additional offset trapeze hangers if necessary.
3. Hang system independent of walls, columns, ducts, pipes and conduit. Attach hangers directly to the building structure.
4. Locate system on room axis according to reflected ceiling plan.
5. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths.

B. Acoustic Units:
1. Install acoustic units level, free from damage, twist, warp or dents.
2. Lay directional patterned units one way with pattern parallel to longest room axis.

C. Tolerances: Variation from Flat and Level Surface: 1/8 inch in 10 feet .

3.3 CLOSEOUT

A. Clean all exposed surfaces; touch-up any minor defects; replace any damaged grid or panels.

B. Maintenance Stock: Provide extra panels equal to 5% of the area of the installed ceiling (round up amount to the nearest unopened container quantity). Deliver to Owner in original unopened containers at location designated by the Owner.

END OF SECTION

SECTION 09 67 00

FLUID APPLIED FLOORING

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with decorative quartz aggregate broadcast and Epoxy broadcast and topcoats.

B. The system shall have the color and texture as selected by the Owner with a nominal thickness of 1/4 inch. It shall be applied to the prepared areas as shown on the plans strictly in accordance with the manufacturer's recommendations.

C. Cove base is not included.

1.2 SUBMITTALS

A. Product Data: Manufacturer's literature including performance data, technical data sheets, installation procedures, and color chart for preliminary selection of colors.

B. Manufacturer’s Material Safety Data Sheet (MSDS) for each product being used.

C. Samples: A 3 x 3 inch square sample of proposed color(s) based on the preliminary selection from the color chart. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance instruction and data.

1.4 QUALITY ASSURANCE

A. Manufacturer of the approved system shall be single source. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. A pre-installation conference shall be held among the Applicator Subcontractor, General Contractor and the Owner to review and clarify application procedure, quality control, inspection and acceptance criteria, and production schedule.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping

1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection
1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Owner or other personnel.

C. Waste Disposal
1. The Applicator shall be responsible for properly disposing of all hazardous waste generated during installation of the system.

1.6 PROJECT CONDITIONS

A. Site Requirements:
1. Application Temperature: Between 60 F and 85 F.
2. Relative humidity: Less than 85 %, non-condensing.
3. Provide adequate negative pressure ventilation for the work area in accordance with manufacturer’s instructions and safety regulations. Enclose the work area to prevent fumes, dust and dirt from spreading.

B. Conditions of new concrete to be coated with cementitious urethane material:
1. Concrete shall be moisture cured for a minimum of 3 days and have fully cured a minimum of 5 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
3. Sealers and curing agents should not be used.
4. Concrete shall have minimum design strength of 3.500 psi. and a maximum water/cement ratio of 0.45.
5. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements:
1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
2. "No Smoking" signs shall be posted at the entrances to the work area.
3. The Owner shall be responsible for the removal of foodstuffs from the work area.
4. Non-related personnel in the work area shall be kept to a minimum.

1.7 WARRANTY

A. Provide manufacturer’s standard warranty including that material is free from material defects and will perform substantially to published literature if installed in accordance with the manufacturer’s instructions.

PART 2 PRODUCTS

2.1 FLUID APPLIED FLOORING

A. Self leveling broadcast quartz, epoxy/aliphatic urethane topcoat seamless flooring system; nominal system finished thickness: 1/4 inch.

B. System Materials:
1. Base Coat: Primer, if required; resin, hardener and aggregate filler.
2. Broadcast aggregate: Quartz aggregate.
3. Broadcast Coat: Epoxy-based two-component resin.
4. Grout coat: Epoxy-based, two-component resin.
5. Top coat: Aliphatic urethane two-component resin.

C. For the purpose of establishing a standard of quality, the following manufacturers are acceptable. Other manufacturers whose products meet the requirements of the specifications are also acceptable.
1. Dur-A-Flex, Inc.: Hybri-Flex EQ.
2. Dex-o-Tex, Inc.
3. Stonehard, Inc.
4. Tennant, Inc.
5. Or approved equal.

2.2 PRODUCT REQUIREMENTS

A. Base Coat
1. Percent Reactive: 100 %
2. VOC: 0 g/L
3. Bond Strength to Concrete ASTM D 4541: 400 psi, substrates fails
4. Compressive Strength, ASTM C 579: 9,000 psi
5. Tensile Strength, ASTM D 638: 2,175 psi
6. Flexural Strength, ASTM D 790: 5,076 psi
7. Impact Resistance @ 125 mils, MIL D-3134, 160 inch lbs, No visible damage or deterioration

B. Broadcast Coat
1. Percent Reactive: 100 %
2. VOC: <4 g/L
3. Water Absorption, ASTM D 570: 0.04%
4. Tensile Strength, ASTM D 638: 4000psi
5. Coefficient of thermal expansion ASTM D 696, 2×10^{-5} in/in/F
6. Flammability ASTM D-635: Self-Extinguishing
7. Flame Spread/ NFPA 101, ASTM E-84: Class A

C. Topcoat
1. VOC: 0 g/L
2. 60 Degree Gloss ASTM D523: 75+/-5
3. Mixed Viscosity, (Brookfield 25°C): 500 cps
4. Tensile strength, ASTM D 638: 7,000 psi
5. Abrasion Resistance, ASTM D4060: CS 17 wheel (1,000 g load) 1,000 cycles
   a. Gloss: 4 mg loss with grit; 10 mg loss without grit

b. Satin: 8 mg loss with grit; 12 mg loss without grit

6. Pot life @ 70° F 50% RH: 2 hours
7. Full Chemical resistance: 7 days

2.3 ACCESSORIES

A. Shallow Fill and Patching Material: Latex modified portland cement patching mortar.

B. Moldings and Edge Strips: Same material as flooring, feather edge to adjacent floor and butt to wall tile or install metal strip/threshold as recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 PREPARATION

A. General: New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.

B. Moisture Testing: Perform tests recommended by manufacturer and as follows:
1. Perform anhydrous calcium chloride test, ASTM F1869. Vapor/moisture emission rates from the slab must be not higher than 20 lbs/1,000 sf/24 hrs or as required by manufacturer.
2. Perform relative humidity test using in situ probes, ASTM F2170. Substrates must have a maximum 99% relative humidity level measurement or as required by manufacturer.

C. Mechanical surface preparation:
1. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
2. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
3. 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 detail cut shall also apply to drain perimeters and expansion joint edges.
4. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.

D. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.3 APPLICATION

A. The system shall be applied in five distinct steps as listed below:
   1. Substrate preparation
   2. Primer/Base Coat application with quartz aggregate broadcast.
   3. Broadcast Coat resin application with quartz aggregate broadcast.
   4. Grout Coat application.
   5. Topcoat application.

B. Immediately prior to the application of any component of the system, the surface shall be dry. Remove any remaining dust or loose particles using a vacuum or clean, dry, oil-free compressed air.

C. The handling, mixing, and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.

D. Follow the contour of the substrate unless pitching or other leveling work has been specified by the architect.

E. Provide a neat finish with well-defined boundaries and straight edges.

F. Topping
   1. Apply topping as a self-leveling system in one lift with a nominal thickness of 1/8 inch.
   2. The topping shall be comprised of three components, a resin, hardener, and filler as supplied by the manufacturer.
   3. Add the hardener to the resin and thoroughly disperse by suitably approved mechanical means. Add aggregate the catalyzed mixture and mix in a manner to achieve a homogenous blend.
   4. Apply the topping over horizontal surfaces using a 1/2 inch “v” notched squeegee, trowels or other systems approved by the manufacturer.
   5. Immediately upon placing, de-gas the topping with a loop roller.
   6. Broadcast quartz aggregate to excess into the wet material at the rate of 0.8 lbs/sf.
   7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

G. Broadcast
   1. Apply the broadcast coat resin at the rate of 90 sf/gal or as required by manufacturer.
   2. Combine liquid components at a ratio of 2 parts resin to 1 part hardener by volume and thoroughly blend by mechanical means such as a high speed paddle mixer.
   3. Broadcast quartz aggregate into the wet resin at the rate of 0.5 lbs/sf.
   4. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

H. Grout coat

1. Squeegee the grout coat with a coverage rate of 90 sf/gal or as required by manufacturer.
2. Combine liquid components at a ratio of 2 parts resin to 1 part hardener by volume and thoroughly blend by mechanical means such as a high speed paddle mixer.
3. Back roll and cross roll the grout coated to provide a uniform texture and finish.

I. Topcoat
1. Roller apply the topcoat with a coverage rate of 500 sf/gal.
2. Nominal thickness of the finished floor: 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. Monitor air and substrate temperatures and, if applicable, dew point.

B. Monitor coverage rates and thickness for all layers by checking quantity of material used against the area covered.

3.5 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Touch-up or repair any defective areas.

C. Remove masking. Perform detail cleaning at floor termination. Provide covering to protect flooring from subsequent work.

END OF SECTION

SECTION 09 90 00

PAINTING & COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Work Included: This section includes preparing, priming, and painting surfaces indicated on the drawings, in the Specifications, and scheduled at end of this section including, but not limited to the following:
   1. All interior walls not tiled.
   2. Doors and frames.

B. Prepare surfaces and apply coatings in accordance with manufacturer’s instructions and MPI standards.

1.2 REFERENCES

A. Massachusetts Architectural and Industrial Maintenance (AIM) Coatings Regulation, 310 CMR 7.25.

B. Master Painters Institute (MPI)

1.3 ENVIRONMENTAL REQUIREMENTS

A. Store and apply materials in environmental conditions required by manufacturer's instructions.

B. Conform to regulatory restrictions on certain types or categories of paint materials and VOC regulatory requirements. All materials and applications must comply with 310 CMR 7.25.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers
   1. Benjamin Moore.
   2. Pratt and Lambert.
   3. Sherwin Williams.
   4. Or approved equal.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve the finishes specified.

PART 3 EXECUTION

3.1 CLEANING

A. Cover adjacent areas with tarps to prevent paint spills. As work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. Remove and dispose of all wastes in conformance with all environmental regulations. Do not dispose of wastes in building sanitary system, drainage system, or in the ground.

3.2 MASTER PAINTERS INSTITUTE (MPI)

A. MPI Abbreviations
1. DFT: Dry film thickness, the film thickness of the fully cured, dry paint or coating.
2. INT: MPI short term designation for an interior coating system.

B. MPI System Numbers
1. MPI 147 (Oct 2009) Institutional Low Odor / VOC Interior Latex, Semi-Gloss, MPI Gloss Level 5
2. MPI 163 (Oct 2009) Exterior Water Based Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5
3. MPI 50 (Oct 2009) Interior Latex Primer Sealer

3.3 SCHEDULE

A. Interior Gypsum Board and/or Cement Board:
1. Institutional Low Odor / Low VOC Latex, Walls; MPI INT 9.2M-G5 (Semi-Gloss)
a. Primer: MPI 50
b. Intermediate: MPI 147
c. Topcoat: MPI 147
d. System DFT: 4 mils 100 microns

B. Steel Doors & Frames
1. Primer: Factory/Shop Primed.
2. Intermediate & Topcoat: MPI 163 Sherwin Williams Pro Industrial Zero VOC Acrylic Gloss, or equal, B66 Series, Wet mils: 6.0 - 12.0 Dry mils: 2.5 - 4.0.
3. Color as selected from manufacturer’s standards by Owner.

C. Existing Wood Door Frames
1. Spot Primer: Interior Latex Primer Sealer.
2. Intermediate: Institutional Low Odor / VOC Interior Latex, Gloss.
3. Topcoat: Institutional Low Odor / VOC Interior Latex, Gloss.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

GENERAL

1.1 SUMMARY

A. Furnish all labor and materials necessary for complete installation of solid plastic high-density polyethylene (HDPE) toilet compartments and urinal screens.

1.2 RELATED WORK

A. Coordinate and install all accessories that are attached to partitions.

B. Provide adequate blocking for proper installation of partitions.

1.3 SUBMITTALS

A. Shop Drawings:
1. Indicate partition plan and elevation views, dimensions, details of wall and floor supports, and door swings.
2. Indicate attachment of toilet accessories.

B. Product Data: Submit manufacturer's technical data sheets, installation instructions, care and maintenance manuals, and color charts for preliminary selection of colors.

C. Samples: Submit two samples, 4 by 4 inches in size, for each color selected from color charts illustrating panel finish, color, and sheen. Provide for two colors, one for Boys Room and one for Girls Room.

1.4 WARRANTY

A. Provide manufacturer's standard warranty. Solid plastic HDPE material shall be warranted against breakage, corrosion, and delamination for 15 years minimum. If material is found defective during that period, the material will be replaced at no cost.

PART 2 PRODUCTS

2.1 TOILET COMPARTMENTS

A. Type: High-density polyethylene (HDPE) polymer, floor anchored and overhead braced mounting style.

B. Material: HDPE polymer shall be water resistant and non-absorbent. The HDPE material shall have homogenous color throughout each component with 1inch radius machined

edges. Self-lubricating surface shall resist markings from pens, pencils and other writing instruments.

C. Door, Panels, Pilaster and Urinal Screens:
1. Thickness: 1 inch.
2. Height: Door and panels 55” high, pilasters 82” high.
3. Color: As selected from full range of manufacturer’s standard colors.

D. Door Hardware:
1. Heavy-duty wrap around cam-action hinge set that permits door to return to a pre-set position when not locked.
2. Hinges, strike and keeper shall be aluminum or stainless steel to resist corrosion, and shall be through bolted with vandal resistant barrel nuts and shoulder screws.
3. Hinge and slide latch assembly shall allow emergency access by lifting door from bottom.
4. Latch and Keeper: Sliding type latch, door strike and keeper with rubber bumper; for each door.
5. Coat Hook: Cast alloy, with rubber bumper tip; mounted on door.
6. Pull: furnish pull for out-swinging doors.

E. Mounting Hardware:
1. Brackets at toilet stalls: Extruded aluminum or stainless steel stirrups.
2. Brackets at urinals: Full height aluminum or stainless steel brackets.
3. Panels shall be through bolted with tamper resistant barrel nuts and shoulder screws.

2.2 ACCESSORIES

A. Head Rails: Hollow aluminum or stainless steel tube, with anti-grip profile and cast socket wall brackets.

B. Pilaster Shoes: Formed stainless steel with a #4 finish. Provide adjustment for height variations with screw jack through steel saddles.

C. Attachments and Bolts: Stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening dimensions and plumbing fixture and rough-in locations are as indicated on shop drawings.

B. Verify correct location of built-in framing, anchorage, bracing, and blocking.

3.2 INSTALLATION

A. Installed in accordance manufacturer's installation instructions with partitions rigid, straight and plumb. Doors and panels shall be mounted 14 inches above the finished floor unless otherwise noted. Install partition components secure, plumb, and level.

B. Attached panel brackets securely using anchor devices. Pre-drill any holes through tile work. Any cracked tile will be replaced at contractors expense.

C. Adjust and align door hardware so free movement is attained.

D. Anchor partitions to the floor by a 1/4 x 1 inch stainless steel mounting bar attached to the bottom of the pilaster. Each mounting bar shall be anchored to the floor with 3/8 inch stainless steel bolts. Floor anchoring system shall be concealed by a stainless steel shoe.

E. Install aluminum head rail with an anti-grip profile provide for added stability and support.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes toilet accessories.

1.2 SUBMITTALS

A. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.

PART 2 PRODUCTS

2.1 TOILET ACCESSORIES

A. Manufacturers:
1. A & J Washroom Accessories
2. American Specialties, Inc.
3. Bobrick
4. Or approved equal.

2.2 COMPONENTS

A. Provide all blocking required for all accessories including Owner installed accessories.

B. All accessories shall be ADA compliant.

C. Provide stainless steel, chrome plated bronze or other non-corroding materials for all components.

D. Provide shatterproof high density polyethylene (HDPE) or polypropylene for all plastic components.

E. Provide vandal resistant stainless steel fasteners for all components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify exact location of accessories for installation.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site. Provide templates and rough-in measurements.

3.3 INSTALLATION

A. Install plumb and level, securely and rigidly anchored to substrate.

B. Mounting Heights and Locations: As required by accessibility regulations and as indicated on Drawings.

3.4 SCHEDULE

A. Provide scheduled items for each toilet room as shown on drawings.

B. Grab Bars: Satin stainless steel.
   1. Provide 2 at each barrier-free toilet

C. Coat Hooks: Stainless steel, mounted to stall door; one per each toilet stall.

D. Toilet paper holders: Stainless steel, double roll, surface wall mounted; one per each toilet stall.

E. Baby Changer Station: Horizontal, surface wall mounted, fold-up polypropylene cabinet and bed.
   1. Dimensions: 35 inches wide by 22 inches high by 4 inches deep in closed position and 22.5 inches in open position; one per each toilet room as shown on drawings.

F. Paper Towel Dispensers: Surface mounted plastic or stainless steel roll paper dispenser capable of dispensing 8 or 9 inch wide by 800 feet long paper towel roll, lever operated; one per each toilet room.

G. Mirrors: 18 inches by 24 inches as shown on drawings.
   1. Frame: One piece 430 stainless steel channel frame with 90° mitered corners, bright polished finish.
   2. Glass: Select float glass guaranteed for 15 years against silver spoilage.
   3. Mounting: Concealed wall hangers with locking devices to secure mirror and prevent the mirror from pulling away from the wall.

END OF SECTION

SECTION 22 00 00

BASIC PLUMBING REQUIREMENTS

(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The Conditions of the Contract and all sections of Division 01, General Requirements shall be part of this section unless otherwise specifically excluded.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SCOPE OF WORK

A. The scope of work consists of the installation of all materials to be furnished under Secton 22 00 00, and without limiting the generality thereof, consists of furnishing all labor, materials, equipment, plant transportation, rigging, staging up to 8 feet, appurtanences, and services necessary and/or incidental to properly complete all work as shown on the Plumbing drawings, as described in the Specifications, or as reasonably inferred from either, in the opinion of the Architect.

B. Any work associated with the steam heating system is not part of the Plumbing Filed Sub-Bid.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. The following related work or materials shall be provided under the designated Sections and coordinated by the Contractor.

1. Cutting and Patching including openings in concrete masonry floors, walls and roof: Sub contractors shall perform incidental Cutting and Patching required for work of this trade.

A. Attention is directed to Section 01 23 00 ALTERNATES for a detailed description of all Alternates.

B. The Plumbing subcontractor shall be responsible for examining the scope of each Alternate and for the Work caused by the Alternates and for including the costs thereof in the appropriate space in paragraph A of the Form for Sub-bid.

1.6 DEFINITIONS

A. Complete and Operational System: A Plumbing system that has been installed, tested, cleaned, signed-off by appropriate Authority and made operational. Completion of Owner training to be part of this requirement.

B. Plumbing Contractor: The project Contractor responsible for the installation of the Plumbing systems and equipment. This designation refers to the Contractor who performs the Plumbing work.

1.7 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
1. Schedule of Plumbing Submittals and Closeout Procedures.

C. During Construction: Submit at earliest possible date but not later than 50% completion of plumbing work as determined by schedule of values.
1. Operation and Maintenance Manual Table of Contents.
2. Schedule of Plumbing Submittals and Closeout Procedures with updated current status information.

D. Post Construction: Submit the following at least fifteen (15) days before requesting site review for Substantial Completion.
1. Project Record Documents; as-builts.
2. Operation and Maintenance manuals.
3. Warranties.
4. Completed Schedule of Plumbing Submittals and Closeout Procedures.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: All work shall be performed by qualified journeymen of their respective trades who are employed by a firm that can demonstrate successful experience with work similar in type, quality and extent to the work required by this project.

1.9 CODES, STANDARDS AND AUTHORITIES

A. General: The following listing is intended to identify the major Codes, Standards, and Authorities Having Jurisdiction, (AHJôs) for the project.
   1. The exclusion of an applicable Code, Standard, or AHJ in the list below does not absolve the Contractor from meeting the requirements of said Code, Standard or AHJ.

B. Codes: Work performed on the project must comply with the requirements of the following Codes:
   1. Massachusetts Plumbing Code.

C. Authorities Having Jurisdiction: Work performed on the project must comply with the requirements of the following AHJôs:
   1. City of Lowell Plumbing Inspector.

1.10 DRAWINGS AND SPECIFICATIONS

A. General: The drawings and specifications are complimentary.
   1. What is shown or noted on the drawings, but not mentioned in the specifications, automatically becomes a part of the specifications.
   2. What is noted in the specifications, but not shown on the drawings, automatically becomes a part of the drawings.
   3. Conflicts between the requirements of the drawings and the specifications must be brought to the immediate attention of the Architect/Engineer.
      a. The more stringent requirement will apply, unless ruled otherwise by the Architect/Engineer.
      b. When conflicts or discrepancies are noted, no work shall proceed until the conflict or discrepancy has been resolved by the Architect/Engineer.

B. Plumbing Drawings and Division 22 Specification Sections: The Plumbing Contractor shall bear the responsibility of determining full extent of work required by Contract Documents. The Plumbing Contractor shall refer to site, architectural, structural, electrical and other Drawings and Specification Sections that indicate types of construction with which work of this Section must be coordinated. The Plumbing Contractor shall review the work with the General Contractor / Construction Manager to establish the extent of work for their trade, and to determine whether there will be any interference with the work of other trades. If the work is later found to include work required to complete and coordinate the work or another trade, or to interfere with the work of another trade then the changes required to complete the work or to eliminate the interference shall be made without additional cost to the Owner.
   1. The Drawings schematically indicate the order of connection of the various system components. Each and every nuance and detail in not indicated. Whether specifically shown or not, all items shall be connected in accordance with Code, the details provided, accepted trade practices, and the intent of the Contract Documents. Coordinate with the other trades.

C. Exact locations of ceiling mounted items shall be as shown and detailed on the Architectural reflected ceiling plans.

D. System components (access doors, etc.) are identified throughout the Drawings for proper system operation. If any component is inadvertently omitted from the drawings, provide that component as per a similar location.

1.11 SUBSTITUTIONS

A. General: See Division 1 for product substitution requirements.
   1. No substitute materials or equipment shall be incorporated in the work without the written approval of the Architect/Engineer.

B. Substitute materials and equipment submitted for approval must fit within the spaces available with neither substantial alteration nor increased pressure drops or friction losses.

C. Approval of substitute materials or equipment by the Architect/Engineer shall not relieve the contractor from his responsibility to provide a complete and operational plumbing system.

D. The Architect/Engineer's decision as to the equality or acceptability of proposed substitutions for the materials and equipment specified shall be final.
   1. Any additional costs incurred by such substitutions, including additional costs to other trades, or engineering design costs, shall be borne by the Contractor. This includes costs associated with the design and installation of infrastructure and support systems to facilitate a proposed substitution. This cost will be borne by the Plumbing Contractor.

1.12 SCHEDULE OF PLUMBING SUBMITTALS AND CLOSEOUT PROCEDURES

A. General: In conjunction with submittal scheduling requirements detailed in Section 013200, prepare a separate Schedule of Plumbing Submittals and Closeout Procedures.

B. Schedule shall list the following information for each required submittal:
   1. Specification Section number and title.
   2. Product Name or Description of Work Covered.
   3. Submittal Tracking Number.
   4. Required submission relative to construction:
      a. Pre-construction (prior to fabrication/installation of product).
      b. During construction.
      c. Post-construction.
   5. Submittal Status:
      a. NC: Final Approval Not Complete
      b. A: Approved.
   6. Owner Training: Indicate if Owner Training is required.
      a. NC: Training not performed or not completed.
      b. A: Approved/Training Completed.
   7. Spare Materials and Parts.

1.13 PLUMBING SUBMITTALS

A. General: Refer to Division 1 for submittal definitions, requirements and procedures.

B. Submittal of shop drawings, certified performance data, and samples will be accepted only when submitted per Division 1. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed.

C. Submittals for each plumbing trade shall be complete, including all items for which submission and approval is required, and each sheet containing performance data shall be clearly highlighted and marked for the appropriate model or type of equipment to be reviewed. Intended use shall be written on each submittal sheet for each different type of equipment or material to be reviewed (i.e. valves for domestic water or heating hot water, etc.). Incomplete or unmarked submittals WILL BE RETURNED to the Contractor without action.

D. Submittals shall be organized by specification Section and shall be clearly labeled. Submittals for HVAC and Plumbing items covered by a ñsharedò mechanical specification Section, (i.e., hangers and supports, insulation) shall be separate and clearly labeled as to the trade intended.
   1. Unclear and/or mixed submittals will not be processed.

E. When two or more items of the same material or equipment are required, (i.e., plumbing fixtures, pumps, water heaters and valves,) they shall be products of the same manufacturer insofar as possible.
   1. This does not apply to raw or bulk materials such as pipe and fittings, etc.

1.14 RECORD DOCUMENTS

A. General: Refer to Division 1 for requirements.

B. As work progresses, mark drawings to indicate revisions to piping, size and location including locations of equipment requiring periodic maintenance or repair;; mains and branches of piping systems, with valves located and numbered; Change Orders.

C. Mark specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

D. At completion of work and prior to final request for payment, the Plumbing Subcontractor(s) shall submit a complete set of reproducible record drawings showing all systems as actually installed. Drawings submitted shall be in the following format:
   1. Neatly hand marked up copies of design drawings.
   2. CADD generated.
      a. CADD generated drawings shall be ultimately delivered in AutoCAD 2013 format on DVD format.
   3. Valve Tags: Record drawings to include valve tag markers which correspond to the valve tag chart provided under the O&M Manual Section.

1.15 OPERATION AND MAINTENANCE, (O&M) MANUALS

A. General: Refer to Division 1 for procedures and requirements for preparation and submittal of O&M Manuals.

B. Table of Contents: Prepare Table of Contents of O&M Manual and submit in accordance with Section 1.4.

C. Systems Descriptions: Provide description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

D. Operating Procedures: Provide manufacturer's printed data, including start-up, break-in, routine and normal operating instructions; regulation control, stopping, shut-down, and emergency instructions.

E. Maintenance Procedures: Provide for routine preventive maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

F. Servicing Instructions: Provide instructions.

G. Product Data: Provide copies of all approved submittals.

H. Valve Schedules: Include valve tag charts in the O&M Manuals.

1.16 WARRANTIES

A. Refer to Division 1 for project requirements for warranties. Individual warranties are required for each item of power driven or other plumbing equipment having moving parts, and wherever else specified in Division 22.
   1. Submit the warranties specified in Division 22 in a vinyl covered, three ring binder, tabulated and indexed for easy reference.

B. Provide complete warranty information for each item, to include date of commencement; duration; and the names, addresses, and telephone numbers and procedures for filing claims and obtaining warranty services.

C. Duration of warranties shall be not less than one year from the date of substantial completion of the facility unless prior approval has been granted in writing by the Architect/Engineer. If the manufacturer's warranty expires less than one year from the date of substantial completion, that warranty service and replacement of parts shall be provided by the plumbing subcontractor at no cost to the Owner.

1.17 DELIVERY, STORAGE AND HANDLING

A. General: Refer to Division 1 for material procurement requirements.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 START UP AND TESTING

A. General: Contractor shall provide all fuel for startup and testing of all equipment provided in this section. Refer to Division 1 for responsibility of electrical power.

B. The Plumbing Contractor is responsible for startup of all equipment provided in Division 22 Sections.

3.2 FINAL CLEANING

A. General: Refer to Division 1 for general requirements regarding final cleaning.

END OF SECTION 220000

SECTION 22 05 00
BASIC PLUMBING MATERIALS AND METHODS
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The requirements of Section 22 00 00, ñBasic Plumbing Requirementsò apply to work defined by this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Plumbing sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Plumbing demolition.
9. Equipment installation requirements common to equipment sections.
10. Painting and finishing.
11. Supports and anchorages.
12. Access panels and doors.

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:
1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:
1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
1. Product Data: For transition fittings, dielectric fittings, plumbing sleeve seals, escutcheons.
2. Welding certificates.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."
   1. Provide access panels per the requirements of Division 8 Sections. Installation of the panels to be as directed by the General Contractor / Construction Manager.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below.

B. AWWA Transition Couplings:
   1. Cascade Waterworks Mfg. Co.
   2. Dresser Industries, Inc.; DMD Div.
   3. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
   4. JCM Industries.
   5. Smith-Blair, Inc.
   6. Viking Johnson.

C. Plastic-to-Metal Transition Fittings:
   1. Eslon Thermoplastics.

D. Plastic-to-Metal Transition Adaptors:
   1. Thompson Plastics, Inc.

E. Plastic-to-Metal Transition Unions:
   1. NIBCO, Inc.

F. Flexible Transition Couplings for Underground Non-pressure Drainage Piping:
   1. Cascade Waterworks Mfg. Co.
   2. Fernco, Inc.
   3. Mission Rubber Company.
   4. Plastic Oddities, Inc.

G. Dielectric Flanges:
   1. Capitol Manufacturing Co.
   2. Central Plastics Company.
   3. Epco Sales, Inc.
   4. Watts Industries, Inc.; Water Products Div.

H. Dielectric Flange Kits:
   1. Advance Products & Systems, Inc.
   2. Calpico, Inc.
   3. Central Plastics Company.
   4. Pipeline Seal and Insulator, Inc.

I. Dielectric Couplings:
   1. Calpico, Inc.
   2. Lochinvar Corp.

J. Dielectric Nipples:
   1. Perfection Corp.
   2. Precision Plumbing Products, Inc.
   3. Sioux Chief Manufacturing Co., Inc.
   4. Victaulic Co. of America.

K. Plumbing Sleeve Seals:
   1. Advance Products & Systems, Inc.
   2. Calpico, Inc.
   3. Metraflex Co.
   4. Pipeline Seal and Insulator, Inc.
   5. Thunderline/Link-Seal

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8/A5.8M, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
   1. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
   2. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
   3. Aboveground Pressure Piping: Pipe fitting.

B. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig minimum working pressure as required to suit system pressures.

D. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Separate companion flanges and steel bolts and nuts shall have 150-psig minimum working pressure where required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.6 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Plastic, include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with set screws.

2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening. Escutcheon finishes to be as follows:
   1. Finished area, exposed to view: Polished chrome-plated.
   2. Unfinished areas: Rough brass or similar finish.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass.

C. One-Piece, Cast-Brass Type: With set screw.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

A. Description: ASTM C 1107/C 1107M, Grade B, non-shrink and non-metallic, dry hydraulic-cement grout.

   1. Characteristics: Post-hardening, volume-adjusting, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

2.10 ACCESS PANELS AND DOORS

A. Panels and doors are to be furnished to provide access to items required in Division 22 Sections and the Plumbing Drawings.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

A. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
6. For equipment or piping being removed the removal shall include hangers, bands, clamps, bolts, screws, fasteners and all related equipment complete.

B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 CUTTING AND PATCHING

A. Refer to Architectural Sections for general demolition requirements and procedures.

B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

C. Arrange for repairs required to restore other work, because of damage caused as a result of plumbing installations.

D. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

E. Perform cutting, fitting, and patching of plumbing equipment and materials required to:
1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Upon written instructions from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

F. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

G. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.3 ROUGH-IN

A. General: Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment and fixtures to be connected. Refer to equipment and fixture specifications in Divisions 2 through 26, and to approved shop drawings, for rough-in requirements.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. General: Coordinate equipment and materials for installation with other building components.

B. Verify dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for plumbing installations.

D. Coordinate the installation of required supporting devices.
   1. Support suspended equipment from walls or from structural frames. Do not support equipment from metal roof deck.

E. Sequence, coordinate and integrate installations of plumbing materials and equipment for efficient flow of the work.

F. Coordinate the cutting and patching of building components to accommodate the installation of plumbing equipment and materials. Refer to Division 1.

G. Install plumbing equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

H. Install access panels to allow access to equipment and other system components which require servicing or adjustment per the requirements of Division 8.

I. Coordinate the installation of plumbing materials and equipment above ceilings with suspension system, lighting fixtures, and other installations.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following. Use One-piece escutcheons where ever possible in new construction. Split-casting units acceptable for installation on existing piping systems.
   1. Piping with Fitting or Sleeve Protruding from Wall: Deep-pattern type.
   2. Chrome-Plated Piping: Cast-brass type with polished chrome-plated finish.
   3. Insulated Piping: Stamped-steel type with spring clips.
   4. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Cast-brass type with polished chrome-plated finish.
   5. Bare Piping at Ceiling Penetrations in Finished Spaces: Cast-brass type with polished chrome-plated finish.
   6. Bare Piping in Unfinished Service Spaces and Equipment Rooms: Cast-brass type with rough-brass finish.
   7. Bare Piping at Floor Penetrations in Equipment Rooms: Floor-plate type.

M. Sleeves are not required for core-drilled holes. When installing a pipe thru a core-drilled hole core drill the hole to provide for the 1ò annular space around the pipe and use a mechanical sleeve seal as indicated in paragraphs O and P below.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a. Exception: Extend sleeves installed in floors of plumbing equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
   2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
   3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

      a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
      b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
      c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
         1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

3.6 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.7 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.8 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.9 CLEAN CONSTRUCTION MEASURES

A. General: Take care during construction to maintain the integrity and cleanliness of duct, pipe and equipment systems.

B. Ductwork must be capped during construction, dust and debris in ductwork is not acceptable. Interior of ductwork and air systems must be completely cleaned.

C. Exposed ends of piping systems and equipment/fixture connection ports shall be capped, plugged, or otherwise covered during construction.

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1/ D1.1M.

3.11 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 220500

SECTION 23 07 19

PLUMBING PIPE INSULATION

(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The requirements of Section 22 00 00, ñBasic Plumbing Requirementsò apply to work defined by this Section.

C. The requirements of Section 22 05 00, ñBasic Plumbing Materials and Methodsò apply to work defined by this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SUMMARY

A. This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.4 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
   1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in the appropriate piping section.

B. Coordinate clearance requirements with piping Installer for insulation application.

1.8 SCHEDULING

A. Schedule insulation application after testing piping systems and, where required. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below.

B. Fiber Glass Insulation:
1. CertainTeed Manson.
2. Knauf FiberGlass GmbH.
3. Owens-Corning Fiberglas Corp.
4. Schuller International, Inc. / Johns Manville Insulations

C. Flexible Elastomeric Thermal Insulation:
1. Armacell LLC; AP Armaflex.
2. Rubatex Corp.

2.2 INSULATION MATERIALS

A. Fiber Glass Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Thermal conductivity: 0.23 Btu*in/(hr*sq ft*degree F) at 75 degrees F.

2. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket complying with ASTM C 1136. Based on Johns Manville Micro-Lok.

3. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.

4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Thermal conductivity: 0.27 Btu*in/(hr*sq ft*degree F) at 75 degrees F.
2. Adhesive: As recommended by insulation material manufacturer.
3. Based on Armstrong AP Armaflex.

C. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

2.3 FIELD-APPLIED JACKETS AND TAPES

A. General: ASTM C 921, Type 1, unless otherwise indicated.

B. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

C. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.

1. Adhesive: As recommended by insulation material manufacturer.
2. PVC Jacket Color: White or gray.

D. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC.

1. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
2. Adhesive: As recommended by insulation material manufacturer.

2.4 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

E. Apply multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

H. Keep insulation materials dry during application and finishing.

I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

J. Apply insulation with the least number of joints practical.

K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

L. Hangers and Anchors: Seal penetrations in insulation at supports, anchors, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

O. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Circumferential Joints: Cover with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches o.c.
3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

   a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.

4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

P. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

3.4 FIBER GLASS INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers.

C. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.
4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

3.5 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer's written instructions for applying insulation.
2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to flanges as follows:

1. Apply pipe insulation to outer diameter of pipe flange.
2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of the same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

C. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

D. Apply insulation to valves and specialties as follows:

1. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.
2. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to strainer basket.
3. Apply insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.6 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of the insulation manufacturer's recommended protective coating.

3.7 PIPING SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
1. Below-grade piping, unless otherwise indicated.
2. Chrome-plated pipes and fittings, unless potential for personnel injury.
3. Air chambers, unions, strainers, check valves, plug valves, and flow regulators.

4. Flanges and unions at equipment on hot piping systems conveying fluids 140 degrees F or less. Bevel and seal ends of insulation.

3.8 INSULATION APPLICATION SCHEDULE, GENERAL

A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.

B. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.9 INSULATION APPLICATION SCHEDULE

A. Service: Domestic hot water.
   1. Operating Temperature: 60 to 140 deg F.
   2. Insulation Material: Fiberglass with jacket.
   3. Insulation Thickness: Apply the following insulation thicknesses:
      a. Piping up to 1 1/4ò: 0.5ò thickness.
      b. Piping 1-1/4ò and greater: 1ò thickness.
   4. Vapor Retarder Required: No.
   5. Finish: None.

B. Service: Domestic cold water.
   1. Operating Temperature: 35 to 60 deg F.
   2. Insulation Material: Fiberglass with jacket.
   3. Insulation Thickness: Apply the following insulation thicknesses:
      a. Piping up to 1 1/4ò: 0.5ò thickness.
      b. Piping 1-1/4ò and greater: 1ò thickness.
   4. Vapor Retarder Required: Yes.
   5. Finish: None.

SECTION 22 11 16

PLUMBING PIPING

(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The requirements of Section 22 00 00, ñBasic Plumbing Requirementsò apply to work defined by this Section.

C. The requirements of Section 22 05 00, ñBasic Plumbing Materials and Methodsò apply to work defined by this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SUMMARY

A. This Section includes the following piping systems;
   1. Water Supply Piping.
      a. Domestic Cold and Hot Water.
   2. Drainage, Waste and Vent, (DWV).
      a. Sanitary Waste and Vent.

B. Related Sections include the following:

   1. Division 22, ñPipe Insulationò for system insulation requirements.
   2. Division 22, ñPlumbing Specialtiesò for water distribution piping specialties.

1.4 DEFINITIONS

A. DWV: Drainage, Waste and Vent piping systems.

1.5 PERFORMANCE REQUIREMENTS

A. Provide components and installations capable of producing piping systems with the following minimum working pressure ratings, unless otherwise noted.
   1. Water Supply Systems, Above Ground: 125 psig.
   2. DWV, (Gravity) Systems: 10 foot of head of water.

1.6 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
   1. Product Data: For pipe, tube, fittings, valves and couplings.
   2. Product Data: For pipe, tube, fittings, couplings, valves and water meters.

C. Submittals During Construction: Submit the following items at the intervals indicated.
   1. Pressure test results after system rough-ins.
      a. Test results to include Plumbing Inspector sign-off.
      b. If systems are tested in portions, submit results as each portion is tested.

D. Post Construction Submittals: Submit the following items upon completion of system installations.
   1. Water Disinfection statement and final water quality test results.
   2. Final Plumbing Inspector Sign-off.

1.7 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below.

B. No-hub Couplings:
   1. Husky Technologies.

2. Ideal; A Gates Group Company.
3. Tyler Pipe Co.
4. Charlotte Pipe and Foundry.

C. Ball Valves:
1. Conbraco Industries, Inc.; Apollo Div.
2. Crane Co.; Crane Valve Group; Jenkins Valves.
3. Crane Co.; Crane Valve Group; Stockham Div.
4. NIBCO INC.
5. Watts Industries, Inc.; Water Products Div.
6. Hammond Valve.
7. Milwaukee Valve Company.

D. Gate Valves:
1. Crane Co.; Crane Valve Group; Stockham Div.
2. Grinnell Corporation.
3. Hammond Valve.
4. Milwaukee Valve Company.
5. NIBCO INC.
6. Watts Industries, Inc.; Water Products Div.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type M water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

E. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.4 CAST-IRON SOIL PIPE AND FITTINGS

A. Hub-and-Spigot Pipe and Fittings: ASTM A 74, Service class.

1. Gaskets: ASTM C 564, rubber.

B. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.
1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.

1) NPS 1-1/2 to NPS 4: 3-inch wide shield with 4 bands.
2) NPS 5 to NPS 10: 4-inch wide shield with 6 bands.

2.5 VALVES

A. Balancing and drain valves are specified in Division 22 Section "Plumbing Specialties."

B. Refer to Part 3 "Valve Applications" Article for applications of valve types.

C. General Requirements:
1. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
2. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
3. Handwheel: For valves other than quarter-turn types.
4. Lever Handle: For quarter-turn valves NPS 6 and smaller.
5. Extended Valve Stems: On insulated valves.
6. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
7. Valve Grooved Ends: AWWA C606, NPS 2-1/2 (DN 65) and larger.
8. Solder Joint: With sockets according to ASME B16.18.
a. Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.
9. Threaded: With threads according to ASME B1.20.1.
10. Valve Bypass and Drain Connections: MSS SP-45.

D. Ball Valves:
1. MSS SP-110, 600# W.O.G., forged bronze, three piece body, hard chrome plated forged brass ball, full port, true adjustable packing nut, (O-ring only type stem seal not acceptable) blow-out proof stem.
2. Acceptable end connections;
a. Threaded for NPS 4 and smaller.
b. Soldered for NPS 3 and smaller.
c. Flanged or grooved for NPS 4 and larger.
3. Basis of Design: Apollo 82 Series.

E. Gate Valves:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, hand wheel, inside screw, solid wedge disc.
2. Acceptable end connections;
   a. Soldered for NPS 3 and smaller.

PART 3 - EXECUTION

3.1 EXCAVATION AND PREPARATION

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork."

B. Prepare pipe bedding to receive buried piping.
1. Grade the bottom of the trench smooth. Provide a stable, rock free base.
2. Remove any unstable materials from the base of the trench. Provide sand or pea stone as required to grade the trench bottom.
3. Remove base materials at each piping joint to relieve undo stresses at the fittings and couplings.

3.2 PIPE AND FITTING APPLICATIONS

A. Water Supply Piping, Aboveground:
1. Hard copper tube, Type L; copper pressure fittings; lead-free soldered joints.
   a. Option for NPS 2-1/2 and larger: Hard copper tube, Type L with grooved ends; copper grooved-end fittings and couplings; and grooved joints.

B. DWV Gravity Piping, Below Building Slab and to 10-feet outside the building wall:
1. Service weight cast iron soil pipe; hub and spigot fittings; gasket or lead and oakum joints.

C. DWV Gravity Piping, Aboveground:
1. Service weight cast iron soil pipe; hubless cast iron fittings; no-hub coupled joints.
2. Option: 2-inch and smaller drain and vent lines may be installed using Copper tube, Type DWV; copper drainage fittings, soldered joints.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
2. Drain Duty: Hose-end drain valves.

B. Cast-iron, grooved-end valves may be used with grooved-end piping.

C. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

D. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains, risers, and branches.
2. Install stop-and-waste drain valves where indicated.

3.4 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Basic Plumbing Materials and Methods."

B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."

C. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

D. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

E. Make changes in direction for DWV piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

F. Lay buried building DWV piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

G. Install DWV piping at the following minimum slopes, unless otherwise indicated:

1. Horizontal drainage piping, NPS 3-inch and smaller: ¼-inch per foot downward in direction of flow.

2. Horizontal drainage piping, NPS 4-inch and larger: 1/8-inch per foot downward in direction of flow.
   a. Exception: Dedicated kitchen waste piping to be pitched at ¼-inch per foot downward in direction of flow.

3. Vent Piping: 1/8-inch per foot down toward vertical fixture vent or toward vent stack.

H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.5 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Basic Plumbing Materials and Methods."

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

C. Grooved Joints: Assemble joints with grooved-end-pipe or grooved-end-tube coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

D. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
2. Hubless Joints: Make with rubber gasket and sleeve or clamp.

3.6 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Plumbing Vibration and Seismic Controls."

B. Pipe hanger and support devices are specified in Division 22 Section "Hangers and Supports." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

C. Install supports according to Division 22 Section "Hangers and Supports."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.

G. Install supports for vertical steel piping every 15 feet.

H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.

I. Install supports for vertical copper tubing every 10 feet.

J. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

K. Install supports for vertical cast-iron soil piping every 15 feet.

L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to the following:
1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
2. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

E. Connect DWV piping to existing sanitary piping. Use transition fitting to join dissimilar piping materials.

F. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.8 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

C. Inspect DWV piping as follows:
1. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

2. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test DWV piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. General: Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

B. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
3. Prepare and submit reports of purging and disinfecting activities.

C. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

D. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 221116

SECTION 22 11 19

PLUMBING SPECIALTIES

(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The requirements of Section 22 00 00, ñBasic Plumbing Requirementsò apply to work defined by this Section.

C. The requirements of Section 22 05 00, ñBasic Plumbing Materials and Methodsò apply to work defined by this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SUMMARY

A. This Section includes the following plumbing specialties:
1. Trap seal primer valves.
2. Drain valves.
3. Miscellaneous piping specialties.
4. Cleanouts.
5. Floor drains.

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
1. Water Supply Systems, Above Ground: 125 psig.

2. DWV, (Gravity) Systems: 10 foot of head of water.

1.5 SUBMITTALS

A. General: See Division 1 for general submittal and product substitution requirements.

B. Pre-Construction Submittals: Submit the following items prior to commencing with installations.
   1. Product Data, including wiring diagrams for electrically and battery powered items.
      a. Water hammer arresters, air vents, and trap seal primer valves and systems.
      b. Drain valves, hose bibbs, and wall hydrants.
      c. Cleanouts and floor drains.

C. Post Construction Submittals: Submit the following items upon completion of system installations.
   1. Maintenance Data: For plumbing specialties to include in maintenance manuals. Include the following:
      a. Trap seal primer valves and systems.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

E. NSF Compliance:
   1. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below.

B. Trap Seal Primer Valves:

1. Precision Plumbing Products, Inc.
2. Smith, Jay R. Mfg. Co.
3. Tyler Pipe; Wade Div.
4. Watts Industries, Inc.
5. Zurn Industries, Inc.

C. Water Hammer Arresters:
1. Josam Company.
2. Precision Plumbing Products, Inc.
3. Sioux Chief Manufacturing Company, Inc.
4. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
5. Watts Drainage Products.
6. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

D. Hose Bibbs:
1. Chicago Faucet Co.
2. T & S Brass and Bronze Works, Inc.
3. Royal Brass Mfg. Co.

E. Cleanouts; Floor Drains
1. Josam Company.
2. Smith, Jay R. Mfg. Co.
3. Tyler Pipe.
4. Watts Water Technologies, Inc.
5. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

2.2 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:

1. 125-psig minimum working pressure.
2. Bronze body with atmospheric-vented drain chamber.
3. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
4. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
5. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Trap Seal Primer System: Factory-fabricated, automatic-operation assembly for wall mounting with the following:

1. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing inlet and manifold with number of NPS 1/2 outlets as indicated.
2. Cabinet: Steel box with stainless-steel cover.
3. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
4. Water Hammer Arrester: ASSE 1010.
5. Vacuum Breaker: ASSE 1001.

2.3 DRAIN VALVES

A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet: Threaded or solder joint.
2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

B. Stop-and-Waste Drain Valves: MSS SP-110, ball valve, rated for 200-psig minimum CWP or MSS SP-80, Class 125, gate valve; ASTM B 62 bronze body, with NPS 1/8 side drain outlet and cap.

2.4 WATER HAMMER ARRESTERS

A. General: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.5 HOSE BIBBS

A. General: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS ¾ threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig; integral non-removable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.

1. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
2. Finish for Finished Rooms: Chrome or nickel plated.
3. Operation: Handwheel.
4. Include wall flange with each chrome- or nickel-plated hose bibb.

B. Basis of Design: As scheduled on the Drawings.

2.6 MISCELLANEOUS PIPING SPECIALTIES

A. Wall Accessible Cleanouts: Line type with lacquered cast iron body, gas and water tight tapered thread plug, and round stainless steel access cover secured with machine screw.
1. Basis of Design: Zurn #Z-1441.

B. Finished Floor Cleanouts: Lacquered cast iron body with anchor flange, reversible clamping collar, adjustable threaded top assembly, and round, gasketed cover.
1. Cover to be scored in unfinished and service areas.
2. Cover to be depressed to receive floor finish material in finished spaces.
3. Basis of Design: Zurn #Z-1400.

2.7 CLEANOUTS

A. General: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Top-Loading Classification(s): Light Duty.
2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.8 FLOOR DRAINS

A. General: ASME A112.21.2M; Provide trap primer inlet connections on drain bodies unless otherwise scheduled.
1. Where drains do not require trap primers, install a threaded plug in the primer inlet port. Plug to be of a dielectrically compatible material.
2. Basis of Design: As scheduled on the Drawings.

B. Floor Drains:
1. Body Material: Cast Iron.
2. Standard: ASME A112.6.3.
3. Seepage Flange and Clamping Device: Required for interior application.
4. Exposed Surfaces and Interior Lining: As scheduled.
5. Outlet Style: Hub and Spigot for slab-on-grade applications. No-hub for above grade applications.
6. Sediment Bucket and Grate Variations: As scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Install interior hose bibs 18-inches above finished floors.

C. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

D. Drain Valve Application: Install hose end drain valves at the base of system risers.
1. Acceptable Alternate: For ¾-inch supply risers which serve only one story above, stop-and-waste shut-off valves may be used in lieu of shut-off valves and separate drain valves.

E. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.

2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

F. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.

G. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

H. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

   a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
   b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
   c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

I. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

J. Fasten recessed-type plumbing specialties to reinforcement built into walls.

K. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

L. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 22 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.

M. Install air vents at piping high points. Include ball, gate, or globe valve in inlet and drain piping from outlet to floor drain.

N. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

O. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221119

SECTION 22 40 00

PLUMBING FIXTURES

(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. The requirements of Section 22 00 00, ñBasic Mechanical Requirementsò apply to work defined by this Section.

C. The requirements of Section 22 05 00, ñBasic Mechanical Materials and Methodsò apply to work defined by this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the **Advertisement.** The procedures and requirements for submitting sub-bids are set forth in the **Instructions to Bidders.**

B. Sub-bidders must be DCAM Certified in the listed trade and shall include a Current DCAM sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidderôs Update Statement with the bid.

C. The Work of this section is shown on Drawings D101, P-001, P-101, P-102, P-401, and P-601.

1.3 SUMMARY

A. This Section includes plumbing fixtures and related components.

B. Related Sections include the following:
1. Section 22, ñPlumbing Specialtiesò for water distribution piping specialties.

1.4 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.

C. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.

D. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

E. ABS: Acrylonitrile-butadiene-styrene plastic.

F. ADA: Americans with Disabilities Act.

G. FRP: Fiberglass-reinforced plastic.

H. MAAB: Massachusetts Architectural Access Board.

I. PMMA: Polymethyl methacrylate (acrylic) plastic.

J. PVC: Polyvinyl chloride plastic.

K. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.5 SUBMITTALS

A. Pre-Construction Submittals: Submit the following items prior to commencing with the installations.
   1. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.
   2. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

B. Post Construction Submittals: Submit the following items upon completion of system installations.
   1. Maintenance Data: For plumbing fixtures to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

   1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.

E. Regulatory Requirement: Comply with requirements of the Massachusetts Architectural Access Board, (MAAB).

F. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

G. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

H. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

I. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1/CSA B45.2.
2. Hand Sinks: NSF 2 construction.
3. Vitreous-China Fixtures: ASME A112.19.2/CSA B45.1.
4. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.

J. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Faucets: ASME A112.18.1/CSA B125.1.
2. Hose-Connection Vacuum Breakers: ASSE 1011.
3. Hose-Coupling Threads: ASME B1.20.7.
4. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
5. NSF Materials: NSF 61.
6. Pipe Threads: ASME B1.20.1.
7. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
8. Supply and Drain Fittings: ASME A112.18.1/CSA B125.1.

K. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1/CSA B125.1.
3. Manual-Operation Flushometers: ASSE 1037.
4. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
5. Tubular Brass Drainage Fittings and Piping: ASME A112.18.1/CSA B125.1.

L. Comply with the following applicable standards and other requirements specified for miscellaneous components:
   1. Floor Drains: ASME A112.6.3.
   2. Hose-Coupling Threads: ASME B1.20.7.
   3. Off-Floor Fixture Supports: ASME A112.6.1M.
   4. Pipe Threads: ASME B1.20.1.
   5. Plastic Toilet Seats: ANSI Z124.5.

1.7 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Structural failures of unit shell.
      b. Faulty operation of controls, blowers, pumps, heaters, and timers.
      c. Deterioration of metals, metal finishes, and other materials beyond normal use.

   2. Warranty Period for Commercial Applications: One year from date of Substantial Completion.

1.8 COORDINATION

A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
   2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
   3. Flushometer Valve, Repair Kits: Equal to 10 percent of amount of each type installed, but not less than 12 of each type.
   4. Provide hinged-top wood or metal box, or individual metal boxes, with separate compartments for each type and size of extra materials listed above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below.

B. Commercial Cast Brass Faucets:
   1. Chicago Faucets.
   2. Speakman Company.
   3. Symmons Industries, Inc.
   4. T & S Brass and Bronze Works, Inc.

C. Flush Valves:
   1. Sloan Valve Company.
   2. TOTO USA, INC.
   3. Zurn Industries, LLC; Commercial Brass and Fixtures.

D. Toilet Seats:
   1. Bemis Manufacturing Company.
   2. Church Seats.
   3. Kohler Co.
   4. Sanderson Plumbing Products, Inc.; Beneke Div.

E. Fixture Carriers and Supports:
   1. Zurn Industries, Inc.
   2. J.R. Smith Mfg. Co.
   3. Josam Co.
   4. Watts Drainage.
   5. Mifab.

F. Supply Stops:
   1. Chicago Faucet Co.
   2. McGuire Mfg. Co.

G. Vitreous China Fixtures:
   1. American Standard America.
   2. Crane Plumbing, L.L.C.
   3. Eljer, Inc.
   4. Kohler Co.

H. Molded Stone Basins:
   1. Fiat Products.
   2. Swan Corporation (The).
   3. Stern-Williams Co., Inc.

I. Water Coolers and Drinking Fountains:
   1. Elkay Manufacturing Co.
   2. Halsey-Taylor.

3. Haws Co.
4. Filtrene.

2.2 FIXTURES, GENERAL

A. General fixture, faucet and related item requirements are listed below. Refer to the ñPlumbing Fixture Scheduleò on the Drawings for the basis o f design for each item.

B. Accessibility: Fixtures and items that are required to be accessible are tagged as such in the Plumbing Fixture Schedule on the Drawings.

2.3 FAUCETS

A. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes and outlet with spout and fixture receptor.
   1. Body Material: Cast brass
   2. Finish: Polished chrome plate
   3. Vacuum Breaker: Required for service sinks.
      a. Required at any sink faucet which has exposed hose thread end(s).
   4. Operation Mechanism: Self closing push-button handle(s), lever handles, electric-sensor, battery-operated sensor.
      a. Provide check valves and sediment strainers on cold and hot water piping serving all sensored faucets.
         1) Refer to ñPlumbing Specialtiesò section 221119 for check valves and strainers.

2.4 FLUSHOMETERS

A. General: Cast-brass body with corrosion-resistant internal components, non-hold-open feature**,** control stop with check valve, vacuum breaker, and copper or brass tubing, and polished chrome-plated finish on exposed parts.

   1. Internal Design: Diaphragm operation.
   2. Style: Exposed, unless noted otherwise.
   3. Inlet Size: NPS 1.
   4. Trip Mechanism: Oscillating, lever-handle, battery-operated sensor.
   5. Consumption:
      a. Water Closets: 1.6 gal./flush.
      b. Urinals: 1.0 gal./flush.
   6. Tailpiece Size: Diameter scheduled, length to top of bowl.

2.5 TOILET SEATS

A. General: Solid plastic, open front, without cover, self sustaining check hinges.
   1. Color: White.
   2. Size: Elongated, unless otherwise noted.

3. Configuration: Open front without cover.
4. Hinge Type: SS, self-sustaining.
5. Class: Standard commercial.

2.6 PROTECTIVE SHIELDING GUARDS

A. General: Manufactured insulation and plastic covering for water supply, trap and drain piping and complying with ADA requirements.

2.7 FIXTURE SUPPORTS

A. Water-Closet Support: Water-closet combination carrier designed for accessible and standard mounting heights, (see schedule). Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

B. Urinal Support: Urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include steel uprights with feet.

C. Lavatory and Sink Supports: Lavatory carrier with concealed arms and tie rod. Include steel uprights with feet.

2.8 SUPPLY STOPS

A. General: Cast brass or copper, chrome plated angle style with chrome plated escutchon and loose key operator.
1. Lavatory Supplies: NPS 3/8.
2. Sink and Tank Style Water Closet Supplies: NPS ½.

2.9 WATER CLOSETS

A. General: Commercial, vitreous-china fixture, siphon jet design, 1.6 gal./flush.
1. Mounting: Wall hung and floor mounted as scheduled.
2. Outlet: Back or floor as scheduled.
3. Flush style: Flush valve or tank as scheduled.
4. Color: White.

2.10 URINALS

A. General: Wall hung, back-outlet, vitreous-china fixture designed for flushometer valve operation, wash out design, 1.0 gal./flush.
1. Color: White.

2.11 WASHFOUNTAINS

A. General: Pedestal mounted solid surface fixture.
   1. Provide juvenile height pedestal option.
   2. 0.5 GPM flow rate.
   3. Color: Selected by Architect.
   4. Pedestal frame and access panel constructed of heavy gauge 304 stainless steel.
   5. Vandal resistant sprayhead assembly.
   6. Accessories: Thermostatic mixing valve, battery operated infrared control, liquid soap dispenser.

2.12 SERVICE FIXTURES

A. Mop Service Basins: Flush-to-wall, floor-mounting solid surface basin with rim guards.
   1. Drain: NPS 3 grid.
   2. Accessories: Mop hanger, splash guards, faucet hose attachment.

2.13 WATER COOLERS

A. General: Wall-mounting, ADA compliant bi-level, stainless-steel fixture certified to NSF/ANSI 61 and be lead free per the Safe Drinking Water Act.
   1. Bubbler: Chrome plated, one-piece with integral hood.
   2. Regulator: Automatic stream height regulator to maintain constant stream height from 20 to 105 psi.
   3. Cooled water: 7.0 GPM minimum, 50 degree F outlet water at 90 degree F ambient and 80 degree F inlet.
   4. Filter: Filter system integral to unit complying with NSF/ANSI 42 and 53 standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-hanging fixtures with tubular waste piping attached to supports.

F. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture.

H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

J. Install protective shielding guards on exposed under counter supply and waste piping at fixtures identified as accessible and at other locations scheduled.

K. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

L. Install toilet seats on water closets.

M. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

N. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

O. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

P. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.

Q. Set service basins in leveling bed of cement grout. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for grout.

R. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

S. Install check valves and sediment strainers on cold and hot water lines serving all mixing valves to sensor-operated faucets.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect water supplies from water distribution piping to fixtures.

C. Connect drain piping from fixtures to drainage piping.

D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

F. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

G. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

H. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust disposers, hot-water dispensers, and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at faucets, and flushometer valves to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000