SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Pipe, fittings, valves and connections for sprinkler systems.

B. Related Sections:
   1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
   2. Section 09 90 00 - Painting and Coating: Execution requirements for piping painting specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.3 - Malleable Iron Threaded Fittings.
   2. ASME B16.5 - Pipe Flanges and Flanged Fittings.
   3. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.

B. ASTM International:
   1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

D. National Fire Protection Association:
   1. NFPA 13 - Installation of Sprinkler Systems.

1.3 SYSTEM DESCRIPTION

A. Firestopping Materials: Comply with requirements of Section 07 84 00.

1.4 PERFORMANCE REQUIREMENTS

A. Firestopping Materials: Comply with requirements of Section 07 84 00.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Product Data: Submit manufacturer’s catalogue information. Indicate valve data and ratings.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and tag numbering.

C. Operation and Maintenance Data: Submit spare parts lists.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13 and New York City Fire Code standards.

B. Maintain one (1) copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience approved by manufacturer.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver and store valves in shipping containers, with labeling in place.

C. Furnish cast iron and steel valves with temporary protective coating.

D. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

1.12 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer warranty for basic fire suppression materials and methods.

1.13 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two sets of valve stem packing for each size and type of valve installed.

PART 2 - PRODUCTS

2.1 VALVES

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Milwaukee
   2. Stockham
   3. Victualic
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Furnish materials in accordance with New York City Fire Code standards.

C. Gate Valves:
   1. Over 2 inches: Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid bronze or cast iron wedge, grooved ends.

D. Ball Valves:
   1. Up to and including 2 inches: Stainless-steel, two-piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle , threaded ends.

E. Butterfly Valves:
   1. Bronze Body: Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device and built-in tamper proof switch rated 10 amp at 115 volt AC.
   2. Cast or Ductile Iron Body: Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends. With extended neck, handwheel and gear drive and integral indicating device, and external tamper switch rated 10 amp at 115 volt AC.

F. Drain Valves:
   1. Ball Valve: Brass with cap and chain, 3/4 inch hose thread.

2.2 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53/A53M, Grade B; UL listed, threadable, ASTM A795/A795M; Schedule 40 black. Schedule 40 shall be used for all sizes.
   1. Malleable Iron Fittings: ASME B16.3, threaded fittings.
   2. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   3. Mechanical Formed Fittings: Carbon-steel housing with integral pipe stop and O-ring pocked and O-ring uniformly compressed into permanent mechanical engagement onto pipe.

2.3 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inches: Carbon steel, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

G. Vertical Support: Steel riser clamp.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.4 FIRESTOPPING

A. Firestopping Materials: Comply with requirements of Section 07 84 00.

2.5 FIRESTOPPING ACCESSORIES

A. Installation Accessories: Comply with requirements of Section 07 84 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Obtain permission from Architect/Engineer before using powder-actuated anchors.

E. Do not drill or cut structural members.

F. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

G. Remove incompatible materials affecting bond.

H. Install backing or damming materials to arrest liquid material leakage.

3.3 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems.

B. Install Work in accordance with the New York City Fire Code standards.

C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

D. Install piping to conserve building space, to not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

F. Install pipe sleeve at piping penetrations through partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

H. Pipe Hangers and Supports:
   1. Install in accordance with NFPA 13.
   2. Install hangers to with minimum 1/2 inch space between finished covering and adjacent work.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

I. Slope piping and arrange systems to drain at low points. Install eccentric reducers to maintain top of pipe level.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 90 00.

K. Do not penetrate building structural members unless indicated.

L. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.

M. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

N. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

O. Install gate or butterfly valves for shut-off or isolating service.

P. Install drain valves at main shut-off valves, low points of piping and apparatus.

3.4 INSTALLATION - FIRESTOPPING

A. Firestopping Materials: Comply with requirements of Section 07 84 00.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Install hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

C. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean entire system after other construction is complete.

END OF SECTION 21 05 00

SECTION 21 05 05 - HANGERS, SUPPORTS AND ANCHORS FOR FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Hangers, supports, anchors and guides for fire protection piping and equipment.
2. Flashing.
3. Sleeves.
4. Mechanical sleeve seals.
5. Formed steel channel.

B. Related Sections:
1. Division 09 - Painting and Coating: Product and execution requirements for painting specified by this section.
2. Section 21 13 13 - Wet-Pipe Sprinkler Systems: Product requirements for wet sprinkler piping for placement by this section.

1.2 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Manufacturer’s literature, catalog data and illustrations.

C. Shop Drawings indicating:
1. Dimensions.
2. Construction details of hangers, inserts, anchors and guides.
3. Materials.
4. Maximum Load.
5. Locations.
6. Recommended installation procedures.
7. Isolator loading and deflection.
8. Spring diameters, compressed spring heights at rated load; solid spring heights.
9. Equipment operating speeds.

D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

E. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers. [Submit [sizing methods] [calculations] sealed by a registered professional engineer.]

F. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.
   2. Firestopping: Submit preparation and installation instructions.

1.3 QUALITY ASSURANCE

A. Codes and Authorities:
   1. Federal Specification WW-H171b.
   2. ASA Code for Pressure Piping.
   3. ASTM A-575-73.
   4. MSS SP-58-67.
   5. MSS SP-69-66.
   6. Underwriters Laboratories.
   7. Factory Mutual.
   8. National Fire Protection Association

B. Perform Work in accordance with NYCBC.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five (5) years documented experience approved by manufacturer.

C. Design pipe hangers and supports under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of New York.

1.5 DELIVERY, STORAGE AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.

C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

1.9 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer’s warranty for pipe hangers and supports.

PART 2 - PRODUCTS

2.1 HANGERS

A. All bracket, clamp and rod sizes indicated in this specification are minimum sizes only. Piping may be supported by inserts with sufficient holding capacity to support 5 times the calculated dead load.

B. No expansion bolts shall be permitted without written permission from the Architect.

C. Provide all auxiliary steel necessary to transmit loads for piping and equipment installed to building beams.

D. Anchor points shall be located and constructed to permit the piping system to take up its expansion and contraction freely in opposite directions from the anchored points.

E. Guide points shall be located and constructed wherever required or shown on drawings and at each side of an expansion joint or loop, to permit free axial movement only in a piping system.

F. All hangers shall be U.L. listed and FM approved.

G. C-clamps with locknut and retaining clip will be permitted.

H. Acceptable Manufacturers:
1. I.R. Rauch’s & Sons

2. Grinnell Company, Inc.
3. Carpenter & Paterson

I. Pipe Hanger Schedule:

	Carpenter & Paterson 'Witch'	Grinnell	I.R. Rauch's & Sons
C-Clamp with Retaining Clip and locknut	47	86	47
(pipe sizes 2" & smaller)	with 22	with 89	with 22
Beam Clamp	293	228	82
Multi-J Hook	---	---	228
J Hook	---	---	221
Clevis Hanger	100	260	100
Clevis hanger w/Saddle	100SH	---	100SH
180° Shield	265P	168	265P
Single Rod Roll Hanger	140	181	140
Double Rod Roll Hanger	142	171	142
Trapeze	---	46	1600-1700
U-bolt Adjustable Pipe	283	137C	283
Stanchion Saddle	247	259	247
Welded Steel Bracket	84 or 139	199 or 195	84 or 139
Riser clamp	126	261	126
Welded Beam Attachment	113A	66	---
Welded Beam Attachment w/bold & nut	113B	66	113A
Concrete Insert	108	282	180 or 181
Phillips Inserts	513	Phillips Insert	1000

J. Hanger Rod Schedule:

Pipe Size	Rod Diameter
2" and smaller	3/8"
2-1/2" - 3-1/2"	1/2'
4" - 5"	5/8"
6"	3/4"
8" - 12"	7/8"

2.2 ANCHORING SYSTEM

A. Pipe hangers shall be connected to the building structure as follows:

1. All piping shall be supported directly from beams or by means of auxiliary steel furnished and installed by this Contractor attached to beams by means of isolation hangers, or to existing slab via adhesive anchors furnished and installed by this contractor.
2. Adhesive Anchors: Provide threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Submit all products to the Structural Engineer for final review and approval.
    a. Provide stainless steel anchors. Stainless steel anchors shall be AISI Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified full-size tensile strength of the externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
    b. Provide the following:
        1) Hilti HAS threaded rods, with HIT-HY 200 Safe Set System using Hilti Hollow Drill Bit System for anchorage to concrete. ICC ESR-3187.
        2) Hilti HIT-Z anchor rods with HIT-HY 200 Safe Set System for anchorage to concrete. ICC ESR-3187.
        3) Hilti HAS threaded rods with HIT-HY 200 Injection Adhesive Anchoring System for anchorage to concrete, ICC ESR-3187.
        4) Hilti HAS threaded rods, with RE 500 SD Injection Adhesive Anchoring System for anchorage to concrete, ICC ESR-2322.
3. Contractor shall be required to submit slab pull-out strength test to the structure engineer for approval prior to installation.

B. Examine the areas and conditions where specialty anchoring system is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

C. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

D. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction and the manufacturer's recommended installation procedures.

E. Install the following manufacturer's guidelines:
1. Drill hole using a roto-hammer or Hilt diamond coring machine.
2. Push the HIT-TZ in the hole to verify sufficient hole depth (only threads visible). For floor applications, pushing the rod compacts to the drill dust.
3. Inject adhevise staring from the bottom of the hole.
4. Fill hole 1/2 to 2/3 full. If the hole is full of water, it is suggested to start injecting from the bottom of the hole and fill entirely with adhesive.

F. Anchoring system shall be required to comply with the following:

1. Each anchor shall be able to hold 5x the load being placed or as required by the New York City Building Code or as required by the Project Manual, whichever is most restrictive.

G. Engineering Data:
1. Before any anchor system is installed, submit engineering data drawings to the Architect for review indicating how performance standards specified here shall be met. The Contractor is responsible for the structural design and supports for these systems and must show his proposed systems on these drawings.
2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.

H. Quality Assurance:
1. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance f the work of this Section.
2. Manufacturers shall provide training for all workers to install system.
3. Each Prime Contractor to provide on-site testing by an accredited testing laboratory, demonstrating compliance with specifications. Testing shall be performed to the loading requirements of the New York City Building Code or by requirements of the Project Manual or 5x the load being placed on the most heavily loaded anchor; whichever is most restrictive. Test a minimum of 3 anchors in each zone, of each floor, evenly distributed over the area where anchors will be installed. Tested anchors can be used in the final assemblies. Supply reports to Architect.

2.3 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings and Potentially Wet Floors: Schedule 40 galvanized steel pipe.

C. Sleeves for pipes through Rated Construction: Galvanized steel, thickness as required to meet UL1479 requirements.

D. Sealant: Acrylic; refer to Division 07.

2.4 MECHANICAL SLEEVE SEALS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Thunderline Link-Seal, Inc.
2. NMP Corporation
3. Substitutions: Division 01 - Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.5 FORMED STEEL CHANNEL

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Allied Tube & Conduit Corp.
   2. B-Line Systems
   3. Unistrut Corp.
   4. Substitutions: Division 01 - Product Requirements.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.6 FIRESTOPPING

A. Comply also with the requirements of Section 07 84 00.

B. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Dow Corning Corp.
   2. Fire Trak Corp.
   3. Hilti Corp.
   4. 3M fire Protection Products
   5. Specified Technology, Inc.
   6. Substitutions: Division 01 - Product Requirements.

C. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
   1. Silicone Firestopping Elastomeric Firestopping: Multiple component silicone elastomeric compound and compatible silicone sealant.
   2. Foam Firestopping Compounds: Multiple component foam compound.
   3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
   4. Fiber Stuffing and Sealant Firestopping: Composite of ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
   5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
   6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
   7. Firestop Pillows: Formed mineral fiber pillows.

D. Firestopping system shall meet UL1479 requirements.

E. Color: As selected from manufacturer's full range of colors.

2.7 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:
1. Mineral fiberboard.
2. Sheet metal.
3. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
1. Furnish UL listed products.
2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 INSTALLATION

A. All piping shall be supported only from building structural steel or galvanized steel inserts imbedded in poured concrete. Where piping revisions are required after slabs are poured, pipes 3" and smaller may be supported at intermediate points by "Phillips" or other 3/4" expansion bolts and shields, provided main supports are not less than 20' on centers. All inserts, expansion bolts and shields in post-tensioned concrete slabs shall be submitted to Structural Engineer for approval prior to commencement of work. Intermediate supports for piping 4" and larger shall be attached to concrete beams or columns by means of 4" x 4" x 3/8" (horizontal) and supporting rod at 90° from anchor bolt. It is the intent that inserts are only permitted in poured concrete construction.

B. Hanger Locations for Horizontal Piping:
1. Steel Piping 1-1/4" and Smaller: Every 6'.
2. Steel Piping 1-1/2" and Larger: Every 10'.

C. Support Locations for Vertical Piping:
   1. Threaded & Mechanical Joint Piping: At every floor, but in no case greater than 20-foot intervals.

D. Hangers shall be installed outside of piping insulation with a semi-cylindrical galvanized shield set between the hanger and insulation.

E. All beam attachments shall be installed on clean, smooth, and non-fireproofed sections of the beam.

F. All fire protection piping shall be hung individually from the structure.

G. All hangers, anchors, rods and supports shall be painted.

H. Supporting piping from other piping, conduit or ductwork is prohibited.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Refer to Division 09. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation.

3.4 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel escutcheons at finished surfaces.

3.5 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping and other items, requiring firestopping to meet UL1479 requirements.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

D. Place intumescent coating in sufficient coats to achieve rating required.

E. Remove dam material after firestopping material has cured.

F. Fire Rated Surface:
   1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

G. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.

b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
c. Install type of firestopping material recommended by manufacturer.

2. Install escutcheons, floor plates or ceiling plates where piping, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations at computer rooms, telecommunication rooms and data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit

3.6 FIELD QUALITY CONTROL

A. Division 01 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

3.7 CLEANING

A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

END OF SECTION 21 05 05

SECTION 21 05 48 - NOISE AND VIBRATION CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Inertia bases.
   2. Vibration isolators.

B. Contractor shall provide complete seismic and vibration isolation for the entire fire pump, standpipe and sprinkler systems. Design of seismic systems and installation supervision shall be provided by the contractor's registered Professional Engineer. The seismic engineer shall have a minimum of five years of experience in the design of such systems. The contractor's professional Engineer shall provide signed and sealed affidavit indicating complete compliance with State and Local codes for the design and installation of the seismic systems.

C. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.
   2. Section 07 90 00 - Joint Protection: Product requirements for joint sealers specified for placement by this section.
   3. Section 21 05 29 - Hangers and Supports for Fire Protection Piping and Equipment: Product requirements for pipe hangers and supports.
   4. Division 23 - Testing, Adjusting, and Balancing for HVAC: Requirements for sound and vibration measurements performed independent of this section

1.2 REFERENCES

A. Air Movement and Control Association International, Inc.:
   1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

B. American National Standards Institute:
   1. ANSI S1.4 - Sound Level Meters.
   2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
   3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
   4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

C. Air-Conditioning and Refrigeration Institute:
   1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

D. American Society of Heating, Refrigerating and:
   1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
   2. ASHRAE Handbook - HVAC Applications.

E. Sheet Metal and Air Conditioning Contractors':
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 PERFORMANCE REQUIREMENTS

A. Provide vibration isolation on motor driven equipment over 0.5 hp, plus connected piping.

B. Consider upper floor locations critical unless otherwise indicated.

C. Use concrete inertia bases for base mounted pumps over 10 hp (7.5 kW).

D. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.

1.4 SUBMITTALS

A. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each. Indicate assembly, materials, thickness, dimensional data, pressure losses, acoustical performance, layout, and connection details for sound attenuation products fabricated for this project.

B. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.

C. Design Data: Submit calculations indicating maximum room sound levels are not exceeded.

D. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions.

E. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.

F. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of hangers including attachment points.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

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

C. Design application of seismic restraints and isolators under direct supervision of Professional Engineer experienced in design of this Work and licensed in New York State.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 WARRANTY

A. Furnish five-year manufacturer warranty for inertia bases.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS (For Fire Protection Equipment, No Piping)

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Mason Industries Inc.
   2. Vibration Eliminator Co., Inc.
   3. Vibration Mountings & Controls/Korfund

B. Open Spring Isolators:
   1. Spring Isolators:
      a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
      b. Code: Color code springs for load carrying capacity.
   2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
   3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
   4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.

C. Restrained Spring Isolators:
   1. Spring Isolators:
      a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.

b. Code: Color code springs for load carrying capacity.

2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
5. Restraint: Furnish mounting frame and limit stops.

D. Closed Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance.

E. Restrained Closed Spring Isolators:
1. Spring Isolators:
   a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
   b. Code: Color code springs for load carrying capacity.
2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance and limit stops.

F. Neoprene Pad Isolators:
1. Rubber or neoprene-waffle pads.
   a. 30 durometer.
   b. Minimum 1/2 inch thick.
   c. Maximum loading 40 psi.
   d. Height of ribs: not to exceed 0.7 times width.
2. Configuration: Single layer.

G. Seismic Snubbers:
1. Type: Non-directional and double acting unit consisting of interlocking steel members restrained by neoprene elements.
2. Neoprene Elements: Replaceable, minimum of 0.75 inch thick.
3. Capacity: 4 times load assigned to mount groupings at 0.4 inch deflection.
4. Attachment Points and Fasteners: Capable of withstanding 3 times rated load capacity of seismic snubber.

H. Seismic Restraint, Type I:
1. Each corner or side seismic restraint shall incorporate minimum 5/8" thick pad limit stops. Restraints shall be made of plate, structural members or square metal tubing in a welded assembly, incorporating resilient pads. Angle bumpers are not acceptable. System to be field bolted to structure to resist seismic forces in accordance with the NYCBC.
2. Seismic spring mountings as described above are an acceptable alternative providing all seismic loading requirements are met.
3. Mason Industries Type Z-1011, Type Z-1225, or approved equal.

I. Seismic Restraint, Type II:
1. Metal cable type with approved end fastening devices to equipment and structure. System to be field bolted to structure or overhead structural members or structure with aircraft cable.

J. Spring Seismic Restraint, Type III:
1. Shall comply with general characteristics of spring isolators. Shall incorporate snubbing restraint in all directions. Shall be capable of supporting equipment at a fixed elevation during equipment erection. Cast or aluminum housings are not acceptable. System to be field bolted to deck to resist seismic forces in accordance with the Building Code.
   a. Mason Type SSLFH, or as approved equal.
   b. VMCI Type SAWR
   c. VEC Type BXL

K. Bolted Seismic Restraint, Type IV:
1. Non-isolated equipment shall be field bolted (powder shots not acceptable) to resist seismic forces unless under 100 pound shear force required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment and piping is installed before work in this section is started.

3.2 INSTALLATION

A. Install isolation for motor driven equipment.

B. Bases:
1. Set steel bases for 1 inch clearance between housekeeping pad and base.
2. Set concrete inertia bases for 2 inch clearance between housekeeping pad and base.

C. Adjust equipment level.

D. Install spring hangers without binding.

E. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

F. Provide resiliently mounted equipment with seismic snubbers. Provide each inertia base with minimum of four seismic snubbers located close to isolators. Snub equipment designated for post disaster use to 0.05 inch maximum clearance. Provide other snubbers with clearance between 0.15 inch and 0.25 inch.

3.3 FIELD QUALITY CONTROL

A. Inspect isolated equipment after installation and submit report. Include static deflections.

B. Refer to Division 23 for sound measurements.

C. After start-up, final corrections and balancing of systems take octave band sound measurements over full audio frequency range in areas adjacent to mechanical equipment rooms, duct and pipe shafts, and other critical locations. Provide one-third octave band measurements of artificial sound sources in areas indicated as having critical requirements. Submit complete report of test results including sound curves.

D. Furnish services of testing agency to take noise measurement. Use meters meeting requirements of ANSI S1.4.

END OF SECTION 21 05 48

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Wet-pipe sprinkler system
   2. System design
   3. Installation
   4. Certification

B. Related Sections:
   1. Section 26 05 83 - Wiring Connections: Execution requirements for electric connections to equipment specified by this section.

1.2 REFERENCES

A. National Fire Protection Association:
   1. NFPA 13 - Installation of Sprinkler Systems.

1.3 SYSTEM DESCRIPTION

A. System to provide coverage for building areas noted.

B. Provide hydraulically designed system to NFPA 13 light and ordinary hazard, occupancy requirements.

C. Determine volume and pressure of incoming water supply from water flow test data. When not available, assume 500 gpm at 60 psig static and 55 psig residual. Revise design when test data become available prior to submittals.

D. Interface system with building fire and smoke alarm system.

1.4 SUBMITTALS

A. Shop Drawings: Indicate layout of finished ceiling areas indicating sprinkler locations coordinated with ceiling installation. Indicate detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.

B. Product Data: Submit data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Samples: Submit two of each style of sprinkler specified.

D. Design Data: Submit design calculations; signed and sealed by professional engineer.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

B. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13 and New York City Fire Code.

B. Maintain one (1) copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

C. Design system under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of New York.

1.8 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE AND HANDLING

A. Store products in shipping containers until installation.

B. Furnish piping with temporary inlet and outlet caps until installation.

1.10 WARRANTY

A. Furnish five-year manufacturer warranty for materials.

1.11 EXTRA MATERIALS

A. Furnish extra sprinklers under provisions of NFPA 13.

B. Furnish suitable wrenches for each sprinkler type.

PART 2 - PRODUCTS

2.1 AUTOMATIC SPRINKLERS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Ansul Incorporated.
2. Automatic Sprinkler Corp.
3. Kike Protection Systems.
4. Grinnell Corp.
5. Reliable Automatic Sprinkler Corp.
6. WSA Inc.
7. Viking.

B. Suspended Ceiling Type:
1. Type: Concealed pendant type with matching clamp on escutcheon plate.
2. Finish: Brass.
3. Escutcheon Plate Finish: White
4. Fusible Link: Glass bulb type temperature rated for specific area hazard.

C. Exposed Area Type:
1. Type: Standard upright type [with guard].
2. Finish: Brass.
3. Fusible Link: Glass bulb type temperature rated for specific area hazard.

D. Sidewall Type:
1. Type: Standard horizontal side wall type with matching and guard.
2. Finish: Brass.
3. Fusible Link: [Glass bulb type] temperature rated for specific area hazard.

E. Guards: Finish to match sprinkler finish.

2.2 PIPING SPECIALTIES

A. Waterflow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NFPA 13.

B. Install Work in accordance with New York City Fire Code standards.

C. Install approved double check valve back-flow preventer assembly at sprinkler system water source connection.

D. Place pipe runs to minimize obstruction to other work.

E. Install piping in concealed spaces above finished ceilings.

F. Center sprinklers in two directions in ceiling tile and install piping offsets or one direction only in ceiling tile with location in other direction variable, dependent upon spacing and coordination with ceiling elements.

G. Install guards on sprinklers as indicated on Drawings.

H. Hydrostatically test entire system at 200 psi for 2 hours per NYCFC requirements.

I. Require test be witnessed by special inspector.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.3 CLEANING

A. Flush entire piping system of foreign matter.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. If any sprinklers are covered with paint replace painted sprinklers with new.

END OF SECTION 21 13 13

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. The contractor shall provide all labor and materials required to install, test and place into operation the plumbing systems as called for in the Contract Documents, and according to applicable codes and regulations. The contractor shall be responsible for all work associated with the design and installation of plumbing systems for this project. This shall include, but not be limited to; code review, design and layout of plumbing systems, coordination with all trades and building structure, detailed piping layouts prepared in accordance with State and Local authorities.

B. Provide submission of all required shop drawing submittals for review by Architect/ Engineer, complete installation of the plumbing systems, all valves, piping, supports, fixtures, all testing and system corrections, accurate as-built drawings submitted as CAD drawings to Architect and all required certificates.

C. Furnish and install all labor, materials, apparatus and appliances essential to the complete functioning of the systems described and/or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Drawings and Specifications or not.

D. Sizes indicated on contract documents are minimum sizes and shall not be reduced.

E. Related Sections:
   1. Division 03 - Concrete Forming and Accessories: Execution requirements for inserts and sleeves specified by this section.
   2. Division 09 - Painting and Coating: Execution requirements for piping painting specified by this section.
   3. Division 23 05 00 - General Mechanical Requirements.
   4. Divisions 22 and 23 sections as noted herein.

1.2 DIVISION OF RESPONSIBILITY

A. The requirements under Section 22 05 00 are intended for the party or parties who have been duly awarded the applicable portion of work to be performed under the indexed sections of Division 22 also known as the Plumbing Work.

1.3 REFERENCE STANDARDS

A. New York City Building Code 2014.

B. New York City Plumbing Code 2014.

C. American Society of Mechanical Engineers:
   1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
      a. ASME B16.11 - Forged Steel Fittings - Socket-Welding and Threaded.
      b. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
      c. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
      d. ASME B16.25 - Butt Welding Ends.
      e. ASME B16.3 - Malleable Iron Threaded Fittings.
      f. ASME B16.4 - Gray Iron Threaded Fittings.
      g. ASME B16.5 - Pipe Flanges and Flanged Fittings.
      h. ASME B16.9 - Factory-Made Wrought Steel Butt Welding Fittings.
      i. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.

D. ASTM International:
   1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
      a. ASTM A135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
      b. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
      c. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
      d. ASTM B32 - Standard Specification for Solder Metal.
      e. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
      f. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

E. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
      a. AWS D1.1 - Structural Welding Code - Steel.

F. American Water Works Association:
   1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
      a. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
      b. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

G. Compliance with the following codes and standards shall be required as applicable:

CISPI	Cast Iron Soil Pipe Institute
NEMA	National Electrical Manufacturers Association
FM	Factory Mutual
NFPA	National Fire Protection Association
UL	Underwriters' Laboratories, Inc.
NEC	National Electrical Code
ANSI	American National Standards Institute
OSHA	Occupational Safety and Health Act
AWWA	American Water Works Association
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry
ARI	Air Conditioning and Refrigeration Institute

ISEA	Industry Safety Equipment Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
FS	Federal Specification
IAMPO	International Association of Plumbing and Mechanical Officials
ASSE	American Society of Sanitary Engineering
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
NYCFC	New York City Fire Code
NYCMC	New York City Mechanical Code
NYSEC	Energy Conservation Construction Code of New York State (New York State Energy Code)

H. Conform to materials and equipment rating standards, listings or classifications of the above organizations as well as ratings, listings or classifications accepted under local codes and laws.

1.4 ABBREVIATIONS

A. In addition to those listed below, meanings of common abbreviations used in text of Division 22 of the Project Specifications are tabulated in ASHRAE Handbook, "Fundamentals", latest edition.

B. Project Abbreviations:

MER	Mechanical Equipment Room
HVAC	Heating, Ventilating and Air Conditioning
BMS	Building Management System
CM (GC)	Construction Manager (General Contractor)
AC	Air Conditioning
H & V	Heating and Ventilating
AWG	American Wire Gauge
BWG	Birmingham Wire Gauge
USS	United States Standard
B & S	Brown & Sharpe
OS & Y	Outside Screw and Yoke
IBBM	Iron Body Brass Mounted
WSP	Working Steam Pressure
PSIG	Pounds per Square Inch Gauge
PRV	Pressure Reducing Valve
GPM	Gallons per Minute
MBH	Thousand BTU per hour
BTU	British Thermal Units
F	Degrees Fahrenheit
WG	Water Gage
GPM	Gallons Per Minute
#	Number
SP	Static Pressure
CFM	Cubic Feet per Minute
LB	Pound (Also shown as: #)
	See Drawings for additional abbreviations

1.5 DEFINITIONS

A. "Provide" means to "Furnish" and "install".

B. "Install" means to erect, join, units, fasten, link, attach, set up, connect, test and turn over to Owner, complete and ready for regular operation, the particular work referred to.

C. "Furnish" means to purchase and supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application for the particular work referred to.

D. "As Directed" means as directed by the Architect/ Engineer, or his representative.

E. "Concealed" means embedded in masonry or other construction, installed behind wall furring or within double partitions, installed within hung ceilings, pipe shafts and pipe spaces.

F. "Submit' means submit to Engineer for review. Refer to Architectural General and Special Conditions for proper procedures.

1.6 REVIEW OF CONTRACT DOCUMENTS AND SITE

A. With the submission of his Bid, Contractor shall give written notice to the Owner of any materials or apparatus believed in-adequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his Proposal for a complete project.

B. Contractor shall acknowledge that he has examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, water, electric power, roads and uncertainties of weather; the conformation and condition of the ground; the character, quality and quantity of surface and subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work.

C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract, and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

1.7 MEASUREMENTS

A. Contractor shall base all his measurements, both horizontal and vertical from established benchmarks. All work shall agree with these established lines and levels. He shall verify all measurements at site; and check the correctness of same as related to the work.

1.8 BID DOCUMENTS

A. The drawings show the general layout of the various items of equipment; however, layout of equipment, accessories, specialties, and piping systems are diagrammatic unless specifically dimensioned, and do not necessarily indicate every required fitting, support or similar items required for a complete installation. Consult the architectural drawings and details for exact locations of fixtures and equipment located in finished construction and/or surfaces. Where same is not definitively located, obtain the information from the Architect before proceeding by submitting a dimensioned submittal for review. Any reasonable changes in locations indicated shall be made by this Contractor without additional cost to the Owner.

B. The Contractor shall follow the drawings in laying out the work and check drawings of all trades to verify spaces in which work shall be installed. Maintain maximum headroom and where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.

C. In general, specifications describe quality and type of material and equipment.

D. The drawings show the various systems schematically. No added compensation shall be granted for variations due to field conditions or resulting from coordination with other trade Contractors working under other divisions of the specifications and/or design documents.

E. Work that is reasonably inferable scope of work not shown on the drawings but called for in the specifications, or vice versa, shall be provided by the Contractor without additional expense to the Owner.

F. Where variance occurs between the drawings and specifications, or within either document itself, the Contractor shall request, through the Construction Manager, clarification in writing from the Architect and/or Engineer as to which item and manner in the work shall be installed.

G. The commercially standard items of equipment and the specified names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

H. Equipment shown on the drawings with particular manufactures identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements, and physical size with regard to the space where the equipment is shown. If they comply with the project specifications, these and the other specified manufacturers of this equipment shall be acceptable, contingent on the Contractor providing a complete installation and maintaining full responsibility to provide, at no additional cost, any modifications to the structure or electrical service that are required to properly install, operate and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.
   1. The Contractor shall note these changes on the equipment submittal and shall show all differences in equipment being supplied from that shown on the drawings. Failure of the

Contractor to provide this information with the submittal shall indicate the submitted equipment meets or exceeds in performance the equipment shown on the drawings and is physically no larger than the equipment specified.

I. Failure of the Contractor to comply with the above and any discrepancy found shall result in the Contractor providing equipment equal to that specified at the Contractor's expense.

1.9 SPACE LIMITATIONS

A. The equipment selections used in the preparation of the Construction Documents shall fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with Code requirements, the requirements of the local Authorities Having Jurisdiction and the equipment manufacturer's recommendations.

B. In the preparation of drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made; however, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, Code-required access and proper fit rests with the Contractor.

C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.

D. Coordinate the installation of equipment, ductwork, conduit, bus duct, piping, cable, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment and the structure. Provide additional rises, drops and offsets as required. If, after installed, new ductwork, conduit, bus duct, piping or cable is found to be in conflict with the architecture, structure or other trade work which is either existing or shown on the Construction Documents, the ductwork, conduit, bus duct, piping or cable shall be relocated without additional cost to the Owner.

E. The Contractor shall follow the drawings in laying out the work and check drawings of all trades to verify spaces in which work shall be installed. Maintain maximum headroom and, where space conditions appear inadequate, the Architect and Engineer shall be notified before proceeding with the installation.

1.10 LABOR AND MATERIALS

A. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces.

B. Contractor shall remove all materials delivered, or work erected, which does not comply with Contract Drawings and Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

1.11 COVERING OF WORK

A. No pipe, fitting, or other work of any kind shall be covered up or hidden from view before it has been examined or approved by the Engineer, Architect, and/or other authority having jurisdiction over same. Any unacceptable work, or unauthorized or disapproved materials discovered shall be removed and corrected immediately after being condemned.

B. Any type of equipment shown or specified to be installed outdoors, on grade or on roof, shall have appropriate protection against outdoor weather. Equipment such as motors, panels, etc. shall have rain hood or appropriate protection as provided under Division 22. Insulated pipes shall have aluminum covers or as specified. Insulated ducts shall be provided with aluminum jacket with overlapping, sealed joints. Uninsulated ducts shall be soldered joints and seams or as specified. Where no protection is feasible, such as in exposed vibration springs, hangers, pipe or steel members, such items shall be hot dipped galvanized or as approved by the Architect.

1.12 PROTECTION

A. Contractor shall protect the work and material of all trades from damage by his work or workmen, and shall replace all damaged material with new.

B. Contractor shall be responsible for work and equipment until his work is finally inspected, tested, and accepted; he shall protect his work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.

C. Contractor shall be responsible for the preservation of all public and private property, along and adjacent to the work, and shall use every precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and shall carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and shall not remove them until directed.

D. All mechanical and electrical equipment delivered to the site shall have appropriate wrapping to protect them from rain, flood, wind, construction debris and all types of water damage normally encountered at the construction sites. Protection of equipment such as fans, coils, valves and similar equipment shall be the responsibility of the Contractor receiving such equipment at the jobsite for installation under Division 22 Contract.

1.13 CUTTING AND PATCHING

A. Provide all cutting, rough and finish patching required for systems and equipment included in these specifications.

B. Furnish and locate all sleeves and inserts required before the floors and walls are built; Contractor shall pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.

C. All holes cut through concrete slabs or arches shall be punched or drilled from the underside. No structural members shall be cut without the approval of the Architect and/or the Structural Engineer and all such cutting shall be done in a manner directed by him.

D. Contractor shall not do any cutting that may impair strength of building construction. No holes, except for small screws, may be drilled in beams or other structural members without obtaining prior approval. All work shall be done in a neat manner by mechanics skilled in their trades and as approved.

E. Provide sleeves and fire stopping at piping and ductwork floor, wall and roof penetrations in accordance with recognized standards.

1.14 SUBMITTALS

A. Procedure:
   1. Prepare a schedule of specific submissions at the outset of the Project for the Owner's review and approval; make submissions listed below and in the other Sections of Division 22 of the Project Specifications.
      a. If submissions listed in other Sections of Division 22 are more specific than those listed below, comply with the more specific requirements.
      b. Failure of the Contractor to submit Shop Drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of such default will be allowed.
      c. Piecemeal submittals are unacceptable and will not be reviewed. No submittal shall be considered for review, the review of which is contingent upon acceptance of other features for which submittals have not been submitted.
      d. Submittals from Vendor without Contractor’s review and approval stamp will not be reviewed.
      e. Submittals shall not be used by the Contractor as a means to secure approval of a substitution. Contractor must indicate all deviations, omissions and substitutions in his submittal; if there are none of these 3 exceptions, he shall then state on the submittal: “NO EXCEPTION TAKEN”. Any submittal without stated exceptions, or without statement that no exception is taken will not be reviewed and will be rejected and returned to Contractor for rectification.
      f. All products of a similar nature (i.e., valves, pipe, fixtures) shall be provided by one manufacturer.

B. Shop Drawings:
   1. Manufacturer's Drawings:
      a. Submit equipment listed in all applicable Sections - include material specifications, operating characteristics and finishes, specified agency listings or approvals.
      b. Cuts, brochures or other literature submitted for expeditious approval but incomplete or missing items of hardware or software (performance data) shall be re-submitted until all system or equipment components have been reviewed and approved. Any item not included in the original or first submission shall be considered outstanding work until such item of equipment or work has been submitted or installed in place exactly conforming to the intent of the contract documents.

c. Contractor shall provide preliminary layout drawings of all major pieces of equipment (i.e., water heaters, pumps, backflow preventers), confirming that the submitted product physically fits within the architectural enclosures. This drawing is required along with the manufacturer's product data.
d. Contractors shall be responsible for all costs related to substitutions as they affect other contractors.

2. Installation Drawings:
   a. Furnish coordinated drawings of equipment installation, including interconnecting piping and ductwork. Minimum scale for these drawings shall be 1/4 inch equals one foot for piping and 3/8 inch equals one foot for ductwork.
   b. Coordinate space requirements for electrical, HVAC and other trades in the vicinity of work.
   c. Include connections, anchorages and fastenings for piping, conduit and ductwork.
   d. Make allowance for clearances for access to and maintenance of equipment.
   e. Do not install any piping or equipment, in any area, prior to obtaining approval of its layout by means of submitting shop drawings.
   f. Any missing items of equipment, material or labor, during initial submission of shop drawings, are to be completed and re-submitted for final approval. Shop drawing should not be used as a vehicle for obtaining variances, deviation or omission from the scope of contract documents. Approval of a submittal shall pertain to the portions that conform to the intent of the contract documents.
   g. Submission of any missing, incomplete or otherwise deviant layout is subject to re-submission until all contract requirements have been properly included or shown on the same layout.
   h. Submit drawings indicated on equipment and piping loads to structural engineer for review.

C. Required Samples:
   1. Color samples, for prefinished items.
      a. Natural finish metals, for quality of finish.

D. Reports:
   1. Compliance with listings and approvals for equipment and for fire ratings.
      a. Acceptance certificates from inspecting agencies.
      b. Complete printed and illustrated operating instructions where required in report format.
      c. Manufacturer's pressure tests on vessels.
      d. Manufacturer's performance tests on operating equipment.
      e. Field pipe testing reports.
      f. Welder's certificates and field test reports.
      g. Field operating test results for operating equipment.
      h. Performance report on the balancing of water systems.
      i. Performance reports for vibration isolation equipment.
      j. Manufacturer's reports on motorized equipment alignment and installation.
      k. Additional reports as noted in other sections.

E. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the authority having jurisdiction.

F. Contractor shall be responsible for any deviations in equipment size, motor horsepower and access requirement, from specified products, including coordination with and costs associated with the related work of other Trades.

1.15 COMPLETE PERFORMANCE OF WORK

A. This Contractor, under this section of the specifications, shall provide all labor, materials, supervision, supplies, tools, scaffolding, machinery, equipment, appliances and services (including transportation, rigging, storage utilities, etc.) and all required permits and licenses necessary to complete the work under this Contract. All systems and equipment shall be complete in every respect and all items of material, equipment and labor shall be furnished, installed, tested and commissioned for a fully operational system.

B. This Contractor shall coordinate his work with the work of the other trades so as to resolve conflicts without impeding job progress or the project construction schedule. Provide notice with the bid proposal of any concrete work required by this section that is not indicated on the structural or architectural drawings or drawings of other trades.

C. This Contractor shall examine all Construction Documents for all sections of the specifications in order to determine the extent of work required to be completed under this section. Failure to examine all the Construction Documents for this project shall not relieve this Contractor of the responsibility to perform all the work required for a complete, fully operational and satisfactory installation.

D. Work shall be executed in strict accordance with the best practice of the trades in a thorough, workmanlike manner by competent, skilled technicians and trade personnel.

E. This Contractor shall provide a competent, experienced full-time Superintendent who is authorized to make decisions on behalf of the Contractor.

F. All labor, materials, apparatus and appliances essential to the complete and proper functioning of the systems described and/or indicated herein, or which may be reasonably implied as essential, whether mentioned in the Contract Drawings and specifications or not, shall be furnished and installed by the Contractor. The entire installation shall be ready in every respect for the satisfactory and efficient operation when completed.

G. In cases of doubt as to the work intended, or in the event of need for explanation thereof, request supplementary written instructions in the form of a Request For Information (RFI) from the Architect and/or Engineer.

H. Prior to commencing with the fabrication and/or installation, shop drawings must be prepared and approved, and the work specified herein and shown on the Contract Drawings must be coordinated with all other trades.

I. This Contractor shall be responsible for material and workmanship until completion and final acceptance. Replace any of same which may be damaged, lost or stolen, without additional cost to Owner. Guard the building and its contents against damage by this Contractor, his employees or Subcontractors, and make good any damage free of charge.

J. Where, due to union regulations or trade agreements, any of the work shown on the drawings or specified herein is not considered this trade's work, subcontract the work in question, but assume full responsibility for the complete installation. Except for such changes as may be specifically approved by the Architects and Consulting Engineers, in accordance with alternates or options stated hereinafter, all work must be in full accordance with the intent of the plans and specifications, complete in every way and ready for satisfactory and efficient operation when delivered to the Owner.

K. Provide signs required by the Authorities Having Jurisdiction.

L. Provide all rigging required for complete installation and furnish drawings showing necessary points of support, reactions and supplementary bracing. This shall be submitted for approval by Owner. Should any shoring be required, provide same after Owner's approval. Rigging plan shall be provided to the Engineer and Owner for review prior to scheduling rigging. Rigging plan must be stamped by a registered professional Engineer in the State of New York.

M. Become thoroughly acquainted with the work involved, and obtain and verify at the building all measurements necessary for the proper installation of work. Furnish to other Contractors any information relating to work of this division necessary for the proper installation of their Contracts. Confer with other Contractors for finish adjacent to work of this division and arrange to have visible portions of the work (such as access doors, grilles, escutcheons, etc.) fit in with the finish in a manner satisfactory to the Owner, Architect and Engineer.

N. Certain materials may be furnished, installed or furnished and installed under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.

O. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the General Construction Drawings.

P. Transmit to trades doing work of other divisions all information required for work to be provided under their respective divisions (such as water connections, foundations, electric wiring, access doors and the like) in ample time for installation.

Q. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items (valves, dampers, pull boxes, etc.) in an approved manner in order that the other trades may know where to install such items such as access doors, panel, etc.

R. Where disagreements occur between the plans and the specifications or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Base Bid.

S. Provide required supports and hangers for piping, ductwork, conduit and equipment, so that loading shall not exceed allowable loadings of structure. Submittal of a bid shall be deemed a representation that the Contractor submitting such bid has ascertained allowable loadings and has included in his estimates the costs associated in furnishing required supports.

T. Set all inserts in ample time to allow the work of the other trades to be performed on scheduled time.

U. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with the Construction Manager in order to expedite and properly perform this work.

V. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this division shall be coordinated through the Construction Manager and approved by the Structural Engineer. All such drilling, cutting and reinforcing costs shall be borne by this Contractor.

W. Should the Contractor neglect to perform preliminary work, and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.

X. Architectural drawings shall be checked for ceiling height requirements.

Y. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence

1.16 INDEMNIFICATION

A. This Contractor covenants and agrees:
   1. That the Contractors, their Subcontractors and their agents, servants and employees shall provide and maintain a safe place of work, and that they shall comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.
      a. To indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorney's fees arising from a failure or alleged failure on the part of the Contractors, their Subcontractors and their agents, servants and employees to provide and maintain a safe place to work or to comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.
      b. That the Contractors, their Subcontractors and their agents, servants and employees shall indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorneys' fees, arising from a failure or alleged failure on the part of the Contractors, their Subcontractors and their agents, servants and employees to discharge the obligations assumed by them in the performance of the work, including any act or omission allegedly resulting in death, personal injury, property damage or improper construction, construction techniques, or the use of improper or inappropriate material or tools.
      c. That any controversy or dispute to which the Contractor, the Owner and the Consulting Engineers are parties shall be submitted to the American Arbitration Association for decision in accordance with the rules of such association for construction industry disputes. All Contractors, including Subcontractors assigned to this Contractor, likewise agreed to submit to such arbitration any dispute

between or among them, the Contractor, the Owner and the Consulting Engineers, and the Contractor agrees to make available to the Consulting Engineers, on demand, signed copies of the Contract between the Owner and the Contractor and between the Contractor and his Subcontractors. The Contractor and each Subcontractor agree that by submitting a bid which is accepted, this paragraph shall be deemed a written agreement to submit any controversy thereafter arising to arbitration.

1.17 COORDINATION

A. Contractor shall prepare preliminary shop drawings suitable for use in coordinating his work with the work of other trades. The HVAC Section shall prepare and furnish background with ductwork at 3/8" = 1'-0" scale for all trades to indicate piping, cable tray and conduit in relation to all structural elements of the construction, including floor elevations; steel locations, size and elevations; partitions locations; door locations and direction of swing; and all other information required to assure coordination of the electrical, sheetmetal and piping trades and fire protection in relation to the Architectural function of the project. Coordination meetings shall be held under the supervision of the Construction Manager (CM) or General Contractor (GC). Each trade shall have proper representation at all coordination meetings for the purpose of detailing, on the drawings mentioned above, the exact location and routing of their work. After the conclusion of the coordination at the working meetings, each trade shall sign the coordinated originals, copies of which shall be distributed by the CM or GC to all parties concerned including the Owner. Final shop drawings of all trades shall be in accordance with the coordinated drawing, after which final shop drawings shall be submitted for final approval.

B. If the trade contractor installs work so as to cause interference with work of other trades, he shall make necessary changes in work to correct the condition immediately without delaying project and without extra charge.

C. Dimensional layout plans of equipment rooms shall be made showing all bases, pads and inertia blocks required for mechanical equipment. Include dimensions of bases, bolt layouts, details, etc.

D. Contractor shall furnish all necessary templates, patterns, etc., for installing work and for purpose of making adjoining work conform, furnish setting plans and shop details to other trades as required.

1.18 EXCAVATION AND BACKFILLING

A. Excavation and backfilling of trenches required for the installation of all services underground piping inside of the building are to be provided.

B. Trenching: Excavate to required depth and grade, the bottom of trenches to secure required slope for pipe lines. Each trade will be responsible for the required slopes, inverts, bed material, and all other pertinent requirements.

C. Bottom of trench shall be accurately excavated to provide firm, uniform bearing for bottom of the pipe. Pipe having bells, sleeves or other enlargement at joints to have recesses excavated to accommodate these joints.

D. Backfilling: Trenches shall not be backfilled until piping has been tested. Backfill consisting of sand or selected excavated material shall be placed to a level equal to the final grade and hand compacted as required to produce the same density as the soil in the surrounding areas. Furnish and run constantly, if required or directed, sufficient pumping machinery to keep trenches free from water up to the time of inspection and acceptance of that part of this work.

E. Refer to General Conditions for additional requirements governing excavation and backfilling. These requirements shall prevail unless superseded by specific requirements in Division 22.

F. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be approved before work commences. Each Trade Contractor shall provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

G. Provide sheet piling where required to properly support sides of trenches and excavations.

1.19 CONCRETE AND GROUTING

A. Provide concrete pads for all floor mounted equipment.

B. Contractor shall make coordinated layouts showing concrete work required for housekeeping pads, which are cast in place.

C. Concrete housekeeping pads: 4" minimum thickness, sized to cover the full area of each piece of equipment and access area provided under Concrete Work.

D. Concrete bases: Dimension and height to suit the equipment.

1.20 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

A. Noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within plumbing equipment are not to exceed sound pressure levels determined by the noise criteria curves in the ASHRAE Guide and as noted under Section 22 05 48.

B. Acoustical Tests:
   1. Owner may require contractor to conduct sound tests for those areas or equipment he deems too noisy.
      a. If NC level in any space exceeds that in the schedule or the specification due to improper installation or operation of mechanical systems, the respective Trade Contractor is required to make remedial changes or repairs.
      b. Respective Trade Contractor is required to retest until specified criteria has been met.

1.21 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Instructions and Demonstration for Owner's Personnel:
   1. After all equipment is functioning properly, each system is to be automatically operated for five (5) working shifts, and not to be adjusted during this period, 40 hours scheduled at the convenience of the Owner. Any adjustments will void the test and start the time period all over again.
      a. During this period, instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system. Training will include a lecture-type instruction given in a non-machine room environment. During the lesson, normal operation of the system installed and operating will be explained, along with troubleshooting procedures. This will be followed by a field inspection and demonstration of equipment.
      b. The above instruction is exclusive of that required of specified equipment manufacturers. If more stringent or longer instruction is indicated for specific equipment or systems, these shall supersede the above requirements.

B. Operating and Maintenance Data:
   1. Provide four (4) complete sets of manufacturer's catalogues, instructions, maintenance and repair information and parts lists for operating equipment and devices.
      a. Include performance curves for fans and pumps, factory furnished wiring diagrams and control diagrams, and applicable flow diagrams.
      b. Submit seven sets of instructions for distribution.
   2. Data for the equipment actually installed is to be submitted.
      a. The data is to be carefully checked for accuracy by comparison with the installed equipment nameplates.
      b. Provide a recommended list of spare parts for equipment and list of special, non-standard tools to service equipment.
      c. Index and assemble the instructions in durable loose-leaf binders.
      d. The completed binders are to be available at the time the equipment installation begins.
      e. In addition, follow all requirements of Section 01 77 00 “Execution and Closeout Requirement”.

1.22 RECORD DRAWINGS

A. Provide and maintain a currently up-to-date record set of reproducible prints showing all changes, additions or omissions made during construction. Contractor shall, at his own expense, produce the Record Drawings.

B. Deliver four (4) sets of all as-built drawings and one (1) set of electronic files of the record drawings to the Owner before submitting requisition for final payment.

C. Shop Drawings shall be cross-referenced on the mylar copies for this requirement where applicable.

D. CADD background, if desired to be obtained from Engineer, sign release and indemnification and pay fee.

E. Submit AutoCAD compatible as-built drawing files.

1.23 WARRANTY

A. The following supplements the GENERAL CONDITIONS for Plumbing Work:
   1. Non-durable, expendable items such as replaceable (not cleanable) water filter media are not subject to replacement after the date of acceptance.

B. Warranty time limits for equipment exceeding those indicated in General Conditions are specified in the applicable Sections of Division 22.

C. In addition, follow all requirements of Division 01 “Execution and Closeout Requirement”.

1.24 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and tag numbering.

C. Operation and Maintenance Data: Submit spare parts lists.

1.25 QUALITY ASSURANCE

A. Perform Work in accordance with NYCBC.

B. Comply with current governing codes, ordinances and regulations, as well as with requirements of EPA, NFPA, U.L. and all other applicable codes.

C. Comply with the requirements of agencies or authorities having jurisdiction over any part of the work and secure all necessary permits.

D. Where codes or standards are listed herein, the applicable portions apply.

E. Plans, specifications, codes and standards are minimum requirements. Where requirements differ, apply the more stringent.

F. Should any change in plans or specifications be required to comply with governing regulations, notify the Engineer at the time of submitting his bid.

G. Execute work in strict accordance with the best practices of the trades in a thorough, substantial, workmanlike manner by competent workmen. Provide a competent, experienced full-time Superintendent who is authorized to make decisions on behalf of the Contractor.

1.26 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 50 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.27 DELIVERY, STORAGE AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Deliver and store valves in shipping containers, with labeling in place.

C. Furnish cast iron and steel valves with temporary protective coating.

D. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.28 EXTRA MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two (2) sets of valve stem packing for each size and type of valve installed.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 22 05 00

SECTION 22 05 03 - PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems:
   1. Domestic water piping
   2. Sanitary sewer piping
   3. Storm water piping within
   4. Unions and flanges.
   5. Bedding and cover materials.

B. Related Sections:
   1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
   2. Section 08 31 13 - Access Doors and Frames: Product requirements for access doors for placement by this section.
   3. Section 09 90 00 - Painting and Coating: Product and execution requirements for painting specified by this section.
   4. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping: Product requirements for piping expansion compensation devices for placement by this section.
   5. Section 22 05 23 - General-Duty Valves for Plumbing Piping: Product requirements for valves for placement by this section.
   6. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports and firestopping for placement by this section.
   7. Section 22 07 00 - Plumbing Insulation: Product requirements for piping insulation for placement by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
   2. ASME B16.3 - Malleable Iron Threaded Fittings.
   3. ASME B16.4 - Gray Iron Threaded Fittings.
   4. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   5. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   6. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
   7. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
   8. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

B. ASTM International:

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
3. ASTM A536 - Standard Specification for Ductile Iron Castings.
4. ASTM B32 - Standard Specification for Solder Metal.
5. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
6. ASTM B75 - Standard Specification for Seamless Copper Tube.
7. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
8. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:
1. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

E. Cast Iron Soil Pipe Institute:
1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

F. National Fire Protection Association:
1. NFPA 54 - National Fuel Gas Code.
2. NFPA 99 - Standard for Health Care Facilities.

1.3 SUBMITTALS

A. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, and sizes. Submit shop drawings sealed by registered professional engineer.

B. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information.

C. Welders' Certificate: Include welders' certification of compliance with ASME Section IX., AWS D1.1.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

B. Perform Work in accordance with NYCPC standard.

C. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section [with minimum three years documented experience.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 COORDINATION

A. Coordinate installation of buried piping with trenching.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder, AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

B. Copper Tubing: ASTM B88 Type L, drawn, rolled grooved ends.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze, or ASTM B584 bronze sand castings, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
      b. Gasket: Elastomer composition for operating temperature range from -30 degrees F to 180 degrees.
      c. Accessories: [Steel] [Stainless steel] bolts, nuts, and washers.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron, ASTM A74.
   2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hub-less, service weight.
   1. Fittings: Cast iron, CISPI 301.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized.
   1. Fittings: Cast Iron, ASME B16.4, threaded fittings.
   2. Fittings: Malleable Iron, ASME B16.3, threaded type ASTM A47/A47M.
   3. Joints: Threaded for pipe 2 inch and smaller; flanged for pipe 2-1/2 inches and larger.

2.3 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88, Type L drawn.
   1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

2.4 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Piping: Class 250, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints]
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
   2. Gaskets: 1/16 inch thick preformed neoprene gaskets.
   3. Flanges shall be of same weight as the fittings and valves in each service category. Welding neck flanges shall be used with flanged valves and equipment on welded lines.

Galvanized screwed flanges shall be used on galvanized screwed lines. Flanges shall be drilled in conformance with 150 lbs. or 300 lbs. standard and shall be faced and spot-faced. Threaded and loose flanges on brass piping shall be brass. Laps shall be machined on front, back and edge. Threaded flanges shall have faces perpendicular to adjoining pipe.

2.5 PIPE FITTINGS

A. Each pipe fitting shall have cast, stamped, or indelibly marked on it the marker's name or mark, weight, and quality of the product when such marking is required by the approved standard.

B. Welding fittings shall be of same material and schedule as pipe to which they are welded. Welding fittings including laterals shall be approved factory reinforced to develop full working pressure of connecting piping main. Welding elbows shall be long radius pattern. Welding fittings shall be used exclusively, except as otherwise specified. Weldolets may be used for branches only where branch is two (2) or more nominal pipe sizes smaller than main or riser. All welding "lateral" fittings shall have pressure ratings equal to the pipe with which they are to be used. Welding fittings shall be of Tube-Turn or Walworth manufacture or approved equal, to conform to ASTM-A-234 specifications.

C. Nipples shall be extra heavy shoulder type of same material as pipe, close nipples are not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

B. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 22 05 29.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.

G. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.

H. Install non-conducting dielectric connections wherever jointing dissimilar metals.

I. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.

J. Slope piping and arrange systems to drain at low points.

K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

L. Install piping penetrating roofed areas to maintain integrity of roof assembly.

M. Install valves in accordance with Section 22 05 23.

N. Insulate piping. Refer to Section 22 07 00.

O. Install pipe identification in accordance with Section 22 05 53.

3.4 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

A. Install Work in accordance with the New York City Plumbing Code standards.

3.5 INSTALLATION - SANITARY WASTE AND VENT PIPING SYSTEMS

A. Install sanitary waste and vent piping systems in accordance with New York City Plumbing Code standards.

3.6 FIELD QUALITY CONTROL

A. Test domestic water piping system in accordance with NYCPC, piping shall be hydrostatically tested at 150 psi or 50 psi above working pressure, whichever is greater for 2-hours.

B. Test sanitary waste, storm and vent piping system in accordance with NYCPC, piping shall be water tested with a 10 foot high column of water for 15 minutes.

C. Pressure test natural gas piping in accordance with NFPA 54 and NYCFC. System Distribution pressures up to ½ psig shall be tested with a non-mercury gauge at a pressure of 3 psig at 30 minutes.

3.7 CLEANING

A. Clean and disinfect domestic water distribution system in accordance with NYCPC standards. Disinfection procedure method shall comply with AWWA C651 or AWWA C652 and as follows:
   1. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlets.
   2. The system or part thereof shall be filled with water/chlorine solution containing at least 50 parts per million of chlorine, and the system or parts thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million of chlorine and allowed to stand for 3 hours.
   3. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purge from the system.
   4. The procedure shall be repeated where shown by a bacteriological examination that contamination remains present in the system.

END OF SECTION 22 05 03

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Gate valves.
2. Ball valves.
3. Plug valves.
4. Check valves.

B. Related Sections:
1. Section 22 05 03 - Pipes and Tubes for Plumbing Piping and Equipment: Product and installation requirements for piping materials applying to various system types.
2. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product and installation requirements for pipe hangers and supports.
3. Section 22 07 00 - Plumbing Insulation: Product and installation requirements for insulation for valves.
4. Section 22 11 00 - Facility Water Distribution: Product and installation requirements for [piping,] [piping specialties,] and equipment used in domestic water systems.

1.2 REFERENCES

A. ASTM International:
1. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
2. ASTM D4101 - Standard Specification for Propylene Injection and Extrusion Materials.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
3. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
4. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
5. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

B. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves.

B. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

B. Perform Work in accordance with New York City Plumbing Code Standards.

C. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install valves underground when bedding is wet or frozen.

1.10 WARRANTY

A. Furnish five-year manufacturer warranty for valves excluding packing.

1.11 EXTRA MATERIALS

A. Furnish two packing kits for each size valve.

PART 2 - PRODUCTS

2.1 GATE VALVES

A. Manufacturers:
1. Apollo
2. Milwaukee
3. Nibco

B. Furnish materials in accordance with NYCPC standards.

C. 2-1/2 inches and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves mounted over above floor.

2.2 BALL VALVES

A. Manufacturers:
1. Apollo
2. Milwaukee
3. Nibco

B. Furnish materials in accordance with NYCPC standards.

C. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two-piece body, [chrome plated bronze ball, full port, teflon seats, blow-out proof stem, solder or threaded ends, [lever handle]

2.3 PLUG VALVES

A. Manufacturers:
1. Nordstrom
2. Walworth

B. Furnish materials in accordance with NYCPC standards.

C. 2 inches and Smaller: MSS SP 78, Class 150, semi-steel construction, [round] port, full pipe area pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.

D. 2-1/2 inches and Larger: MSS SP 78, Class 150, semi-steel construction, round port, full pipe area, pressure lubricated, teflon packing, flanged ends. Furnish [wrench-operated].

2.4 CHECK VALVES

A. Horizontal Swing Check Valves:
   1. Manufacturers:
      a. Apollo
      b. Milwaukee
      c. Nibco
   2. Furnish materials in accordance with NYCPC standards.
   3. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, teflon disc, solder or threaded ends.
   4. 2-1/2 inches and Larger: MSS SP 71, Class 150, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat.

B. Spring Loaded Check Valves:
   1. Manufacturers:
      a. Apollo
      b. Milwaukee
      c. Nibco
   2. Furnish materials in accordance with NYCPC standards.
   3. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, teflon disc, integral seat, threaded ends.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify piping system is ready for valve installation.

3.2 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

D. Install valves with clearance for installation of insulation and allowing access.

E. Provide access where valves and fittings are not accessible. Refer to Section 22 05 29 for pipe hangers.

F. Refer to Section 22 07 00 for insulation requirements for valves.

G. Refer to Section 22 05 03 for piping materials applying to various system types.

H. For installation of valves in domestic water systems refer to Section 22 11 00.

3.3 VALVE APPLICATIONS

A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.

B. Install ball or gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball valves for throttling, bypass, or manual flow control services.

D. Install lever and spring check valves on discharge of pumps in pumped sanitary and pumped storm water piping.

E. Install lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

F. Install ball and gate valves in domestic water systems for shut-off service.

G. Install ball valves in domestic water systems for throttling service.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Sleeves.
5. Mechanical sleeve seals.
6. Formed steel channel.
7. Equipment bases and supports.

B. Related Sections:
1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
2. Section 07 90 00 - Joint Protection: Product requirements for sealant materials for placement by this section.
3. Section 09 90 00 - Painting and Coating: Product and execution requirements for painting specified by this section.
4. Section 22 05 03 - Pipes and Tubes for Plumbing Piping and Equipment: Execution requirements for placement of hangers and supports specified by this section.
5. Section 22 11 00 - Facility Water Distribution: Execution requirements for placement of hangers and supports specified by this section.
6. Section 22 14 00 - Facility Storm Drainage: Execution requirements for placement of hangers and supports specified by this section.

1.2 REFERENCES

A. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

C. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SUBMITTALS

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

B. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

C. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

D. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NYCBC AWS D1.1 for welding hanger and support attachments to building structure.

B. Perform Work in accordance with NYCBC standard.

C. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

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

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Furnish five-year manufacturer warranty for pipe hangers and supports.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. B-Line
2. Grinnel
3. Hilti
4. Tolco
5. Michigan Hanger Co.
6. PHD

B. Furnish materials in accordance with New York University Medical Center Design standards.

C. Plumbing Piping – Drain/Waste/Vent:
1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 or MSS SP89.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

D. Plumbing Piping - Water:
1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 or MSS SP89.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.

7. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
8. Vertical Support: Steel riser clamp.
9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Hilti
   2. Anvil

B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors, Footings, Walls: 18 gage thick galvanized steel.

B. Sealant: [Acrylic]

2.5 MECHANICAL SLEEVE SEALS

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. Thunderline Link-Seal, Inc.
   2. NMP Corporation.

B. Furnish materials in accordance with the New York University Langone Medical Center standards.

C. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FORMED STEEL CHANNEL

A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
   1. B-Line
   2. Grinnel
   3. Hilti
   4. Tolco
   5. Michigan Hanger Co.
   6. PHD

B. Furnish materials in accordance with New York University Langone Medical Center standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing or damming materials to arrest liquid material leakage.

D. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, MSS SP 58 or MSS SP.

B. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Design hangers for pipe movement without disengagement of supported pipe.

J. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

3.5 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Sleeves shall be flush with finished floor level. Caulk sleeves.

E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping, insulation or caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel escutcheons at finished surfaces.

3.6 FIELD QUALITY CONTROL

A. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.7 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.8 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

3.9 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
Cast Iron (All Sizes)	5	5/8
Cast Iron (All Sizes) with 10 foot length of pipe	10	5/8
Copper Tube, 1-1/4 inches and smaller	6	1/2
Copper Tube, 1-1/2 inches and larger	10	1/2
Steel, 3 inches and smaller	10	1/2
Steel, 4 inches and larger	10	5/8

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Tags.
   2. Stencils.
   3. Pipe markers.
   4. Labels.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Execution requirements for painting specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog literature for each product required.

B. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.5 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

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

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries Incorporated.
   2. Seton Nameplate Corp.
   3. W.H. Brady Co.

B. Furnish materials in accordance with New York University Langone Medical Center standards.

C. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color, minimum 2 inches in height.

2.2 TAGS

A. Metal Tags:
   1. Manufacturers:
      a. Brimar Industries Incorporated.
      b. Seton Nameplate Corp.
      c. W.H. Brady Co.
   2. Brass, Aluminum, or Stainless Steel with stamped letters; tag size minimum 3 inches diameter with finished edges.

B. Tag Chart: Typewritten letter size list of applied tags and location plastic laminated.

2.3 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Plastic Pipe Markers
   1. Manufacturers:
      a. Brimar Industries Incorporated.
      b. Seton Nameplate Corp.
      c. W.H. Brady Co.
   2. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

3.2 INSTALLATION

A. Apply stencil painting in accordance with Section 09 90 00.

B. Install identifying devices after completion of coverings and painting.

C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

D. Install tags using corrosion resistant chain. Number tags consecutively by location.

E. Identify water heaters, pumps and tanks with plastic nameplates. Identify in-line pumps and other small devices with tags.

F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify valves in main and branch piping with tags.

H. Identify piping, concealed or exposed, with plastic pipe markers, 1 inch high for piping 2-1/2” diameter piping and smaller and 2 inches high for 3” diameter piping. Identify service, flow and direction. Install in clear view and align with axis of piping. Identification tags not to exceed 10 feet in un-concealed areas and 5 feet in concealed areas. All valves shall be tagged and labeled on valve chart.

3.3 SCHEDULES

A. Identification:
   1. Domestic Water Piping.
      a. Background Color: White
      b. Lettering Color: Green

END OF SECTION 22 05 53

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plumbing piping insulation, jackets and accessories.
   2. Plumbing equipment insulation, jackets and accessories.

B. Related Sections:
   1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
   2. Section 09 90 00 - Painting and Coating: Execution requirements for painting insulation jackets and covering specified by this section.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   2. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
   3. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
   4. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
   5. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
   6. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
   7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   8. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

B. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 450 in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

D. Perform Work in accordance with New York University Langone Medical Center standards.

E. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

B. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Furnish five-year manufacturer warranty for man-made fiber.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Glass Fiber and Mineral Fiber Insulation
   1. Manufacturers:
      a. Armacell
      b. Armstrong
      c. Knauf
      d. Johns-Mansville
      e. Owens-Corning Fiberglas
      f. Pittsburgh Plate Glass

B. Furnish materials in accordance with New York University Langone Medical Center standards.

2.2 PIPE INSULATION

A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation.
   1. Thermal Conductivity: 0.23 at 75 degrees F.
   2. Operating Temperature Range: 0 to 850 degrees F.
   3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
   4. Jacket Temperature Limit: minus 20 to 150 degrees F.

2.3 PIPE INSULATION JACKETS

A. Vapor Retarder Jacket:
   1. ASTM C921, white Kraft paper with glass fiber yarn, bonded to aluminized film.
   2. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.

B. PVC Plastic Pipe Jacket:
   1. Product Description: ASTM D1785, One piece molded type fitting covers and sheet material, off-white color.
   2. Thickness: 30 mil.
   3. Connections: Pressure sensitive color matching vinyl tape.

2.4 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.

D. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.

B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Refer to Section 07 84 00 for penetrations of assemblies with fire resistance rating greater than one hour.

C. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

D. Hot Piping Systems less than 140 degrees F:
   1. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
   2. Do not insulate unions and flanges at equipment, but bevel and seal ends of insulation at such locations.

E. Inserts and Shields:
   1. Piping 1-1/2 inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
   2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.

a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.

3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

F. Prepare pipe insulation for finish painting. Refer to Section 09 90 00.

3.3 SCHEDULES

A. Water Supply Services Piping Insulation Schedule:
1. Domestic Hot Water Supply and Recirculation Systems:
a. Type: P-1.
b. Thickness:
1) Pipe Size 1-1/4 Inches and 1.0 inches
2) Pipe Size 1-1/2 Inches and Larger: 1.5 inches
2. Domestic Cold Water:
a. Type: P-1.
b. Thickness:
c. Pipe Size 1-1/4 Inches and Smaller: 0.5 inch
d. Pipe Size 1-1/2 Inches and Larger: 1.0 inch

B. Drainage Services Piping Insulation Schedule:
1. Storm Piping - Horizontal Above Ground Within Building:
a. Type: P-1.
b. Thickness: 1 inch

END OF SECTION 22 07 00

SECTION 22 10 00 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems:

1. Domestic water piping within 5 feet of building.
2. Sanitary sewer piping within 5 feet of building.
3. Equipment drains and over flows.
4. Unions and flanges.
5. Underground pipe markers.
6. Bedding and cover materials.

B. Related Sections:

1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
2. Section 08 31 13 - Access Doors and Frames: Product requirements for access doors for placement by this section.
3. Section 09 90 00 - Painting and Coating: Product and execution requirements for painting specified by this section.
4. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping: Product requirements for piping expansion compensation devices for placement by this section.
5. Section 22 05 23 - General-Duty Valves for Plumbing Piping: Product requirements for valves for placement by this section.
6. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports and firestopping for placement by this section.
7. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment: Product requirements for vibration isolation for placement by this section.
8. Section 22 07 00 - Plumbing Insulation: Product requirements for piping insulation for placement by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
2. ASME B16.3 - Malleable Iron Threaded Fittings.
3. ASME B16.4 - Gray Iron Threaded Fittings.
4. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
5. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
6. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
7. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.

8. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
9. ASME B31.9 - Building Services Piping.
10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
11. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:

1. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
4. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
5. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
6. ASTM A536 - Standard Specification for Ductile Iron Castings.
7. ASTM B32 - Standard Specification for Solder Metal.
8. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
9. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
10. ASTM B75 - Standard Specification for Seamless Copper Tube.
11. ASTM B75M - Standard Specification for Seamless Copper Tube (Metric).
12. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
13. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric).
14. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
15. ASTM B251M - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube (Metric).
16. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
17. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.
18. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV).
19. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
20. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
21. ASTM C14M - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe (Metric).
22. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
23. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
24. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
25. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
26. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
27. ASTM C1053 - Standard Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.

28. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
29. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
30. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameters.
31. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
32. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
33. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
34. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
35. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
36. ASTM D2513 - Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
37. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
38. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
39. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
40. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
41. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
42. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
43. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
44. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
45. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
46. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
47. ASTM D2996 - Standard Specification for Filament-Wound Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
48. ASTM D2997 - Standard Specification for Centrifugally Cast Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
49. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
50. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
51. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

52. ASTM D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
53. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe.
54. ASTM D3754 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe.
55. ASTM D3840 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Fittings for Nonpressure Applications.
56. ASTM F437 - Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
57. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
58. ASTM F439 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
59. ASTM F441/F441M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
60. ASTM F442/F442M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
61. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
62. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
63. ASTM F628 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core.
64. ASTM F679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
65. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
66. ASTM F1282 - Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
67. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

C. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:

1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

6. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
7. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
8. AWWA C950 - Fiberglass Pressure Pipe.

E. Cast Iron Soil Pipe Institute:

1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

F. National Fire Protection Association:

1. NFPA 99 - Standard for Health Care Facilities.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, and sizes.

C. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information.

D. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum 3 years' experience.

B. Installer: Company specializing in performing work of this Section and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not install underground piping when bedding is wet or frozen.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate installation of buried piping with trenching.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED

A. Ductile Iron Pipe: AWWA.

1. Fittings: AWWA C110, ductile iron, standard thickness.
2. Joints: AWWA C111, rubber gasket with rods.
3. Jackets: AWWA C105 polyethylene jacket.

B. Copper Tubing: ASTM B88, Type L annealed.

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
2. Joints: Compression connection or Brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

C. Copper Tubing: ASTM B42, Temper O61 annealed.

1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22 wrought copper and bronze.
2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

D. Copper Tubing: ASTM B42, Temper O61 annealed.

1. Fittings: ASME B16.26 cast bronze.
2. Joints: Flared.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

B. Copper Tubing: ASTM B88, Type L drawn, rolled grooved ends.

1. Fittings: ASME B16.18 cast copper alloy,or ASME B16.22 wrought copper and bronze, grooved ends.
2. Joints: Grooved mechanical couplings meeting ASTM F1476.

a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
b. Gasket: Elastomer composition for operating temperature range from minus 30 degrees F to 230 degrees F.
c. Accessories: Stainless steel bolts, nuts, and washers.

2.3 SANITARY SEWER PIPING, BURIED

A. Cast Iron Soil Pipe: ASTM A74, extra heavy service weight, plain ends.

1. Fittings: Cast iron, ASTM A74.
2. Joints: ASTM C564, rubber gasket joint devices.

B. Ductile Iron Pipe: AWWA C150 or AWWA C151, 52 minimum special class plain ends.

1. Fittings: AWWA C110, ductile iron, standard thickness.
2. Joints: AWWA C111, rubber gasket joint devices.

2.4 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.

1. Fittings: Cast iron, ASTM A74.
2. Joints: ASTM C564, rubber gasket joint devices or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hub-less, service weight.

1. Fittings: Cast iron, CISPI 301.
2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B306, DWV Type M.

1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

2.5 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized.

1. Fittings: ASME B16.3, malleable iron or ASME B16.4, cast iron.
2. Joints: Threaded for pipe 2 inch and smaller; flanged for pipe 2-1/2 inches and larger.

B. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, [cut] [rolled] grooved ends.

1. Fittings: ASTM A395/A395M and ASTM A536 ductile iron, grooved ends.
2. Joints: Grooved mechanical couplings meeting ASTM F1476.

a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with steel piping sizes, rigid type.
b. Gasket: Elastomer composition for operating temperature range from minus 30 degrees F to 230 degrees F.
c. Accessories: Steel bolts, nuts, and washers.

C. Copper Tubing: ASTM B88, Type M, drawn.

1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

2.6 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.
2. Copper Piping: Class 150, bronze unions with soldered.
3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
4. PVC Piping: PVC.
5. CPVC Piping: CPVC.

B. Flanges for Pipe 2-1/2 inches and Larger:

1. Ferrous Piping: Class [150] [250] [300], forged steel, slip-on flanges.
2. Copper Piping: Class 150, slip-on bronze flanges.
3. PVC Piping: PVC flanges.
4. CPVC Piping: CPVC flanges.
5. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.7 UNDERGROUND PIPE MARKERS

A. Manufacturers:

1. Kolbi Pipe Marker Co.

2. Marking Services, Inc.
3. Pipemarker.com; Brimar Industries, Inc.
4. Rhino Marking and Protection Systems.
5. Seton Identification Products; a Brady Corporation company.

B. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

C. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "[Sewer Service" in large letters.

2.8 BEDDING AND COVER MATERIALS

A. Bedding: Fill Type A1.

B. Cover: Fill Type A1

C. Soil Backfill from Above Pipe to Finish Grade: Soil Type S2,

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

B. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

B. Establish elevations of buried piping with not less than 2 ft of cover.

C. Establish minimum separation from sanitary sewer piping piping in accordance with local and state code.

D. Excavate pipe trench in accordance with Section [312316.13] <_____>.

E. Install pipe to elevation as required.

F. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding [4] <_____> inches [compacted] [loose] depth; [compact to 95 percent maximum density] [compact to <_____> percent maximum density].

G. Install pipe on prepared bedding.

H. Route pipe in straight line.

I. Install pipe to allow for expansion and contraction without stressing pipe or joints.

J. Install [shutoff] [and] [drain] valves at locations indicated on Drawings or as required

K. Install trace wire continuous [over top of pipe.] [buried [6] <_____> inches below finish grade,] above pipe line; coordinate

L. Pipe Cover and Backfilling:

1. Backfill trench
2. Maintain optimum moisture content of fill material to attain required compaction density.
3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in [4] [6] inches compacted layers to [6] [12] inches minimum cover over top of jacket. Compact to [95] <_____> percent maximum density.
4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
5. Do not use wheeled or tracked vehicles for tamping.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 22 05 29.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 21 05 16.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.

G. Provide access where valves and fittings are not accessible.

H. Install non-conducting dielectric connections wherever jointing dissimilar metals.

I. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients.

J. Slope piping and arrange systems to drain at low points.

K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

L. Install piping penetrating roofed areas to maintain integrity of roof assembly.

M. Install valves in accordance with Section 22 05 23.

N. Install piping specialties in accordance with Section 23 21 16.

O. Insulate piping. Refer to Section 22 07 00.

P. Install pipe identification in accordance with Section 22 05 53.

3.5 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

A. Install domestic water piping system in accordance with ASME B31.9.

3.6 INSTALLATION - SANITARY WASTE AND VENT PIPING SYSTEMS

A. Install sanitary waste and vent piping systems in accordance with ASME B31.9.

B. Install bell and spigot pipe with bell end upstream.

C. Support cast iron drainage piping at every joint.

3.7 FIELD QUALITY CONTROL

A. Test domestic water piping system in accordance with [applicable code]

B. Test sanitary waste and vent piping system in accordance with [applicable code]

3.8 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. Clean and disinfect domestic water distribution system in accordance with Section [221100] [331300] <_____>.

END OF SECTION 22 10 00

SECTION 22 36 00 - DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electric water heaters.

1.2 SUBMITTALS

A. Shop Drawings: Required

B. Product Data: Required

C. Manufacturer's Installation Instructions: Required

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Required

1.4 QUALITY ASSURANCE

A. Conform to ASME for construction of water heaters. Provide boilers registered with National Board of Boiler and Pressure Vessel Inspectors.

B. Electric Water Heater Performance Requirements: Equipment efficiency not less than prescribed by ASHRAE 90.1.

1.5 WARRANTY

A. Furnish five year manufacturer warranty for domestic water heaters and water storage tanks.

PART 2 - PRODUCTS

2.1 ELECTRIC WATER HEATERS

A. Manufacturers: Subject to compliance with the requirements, manufacturers offering products that may be suitable for use on this project include, but are not limited to, the following or approved equal:

B. Type: Commercial.

C. Storage Tank: Vertical.

D. Tank: Glass lined welded steel, encased in corrosion-resistant steel jacket with baked-on enamel finish.

E. Tank: Insulation: 2 inches thick polyurethane.

F. Controls:
1. Automatic water thermostat with externally adjustable temperature range.
2. Wire double element units so elements do not operate simultaneously.
3. High temperature limit thermostat.

G. Accessories:
1. Brass water connections and dip tube.
2. Drain valve.
3. Magnesium anode.
4. ASME temperature and pressure relief valve.

2.2 ELECTRIC WATER HEATER

A. System: direct heating boiler, controls, piping and valves as indicated on Drawings, storage tank.

B. Refer to schedules and drawings for heater information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water heater on concrete housekeeping pad, minimum 3-1/2 inches high and6 inches larger than water heater base on each side.

B. Connect domestic hot water, domestic cold water piping to supply and return water heater connections.

END OF SECTION 22 36 00

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Water closets.
2. Lavatories.
3. Sinks.
4. Mop sinks.
5. Electric water coolers.
6. Drinking fountains.
7. Emergency combination shower with eye and face wash.

B. Related Sections:
1. Section 22 11 00 - Facility Water Distribution: Supply connections to plumbing fixtures.
2. Section 22 13 00 - Facility Sanitary Sewerage: Waste connections to plumbing fixtures.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI Z358.1 - Emergency Eyewash and Shower Equipment.

B. American Society of Mechanical Engineers:
1. ASME A112.6.1 - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
2. ASME A112.18.1 - Plumbing Fixture Fittings.
3. ASME A112.19.2M - Vitreous China Plumbing Fixtures.
4. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks and Urinals.

1.3 SUBMITTALS

A. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

B. Manufacturer's Installation Instructions: Submit installation methods and procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
   1. Water Efficiency Certificates:
      a. Certify plumbing fixture flow rates.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit fixture, trim, exploded view, and replacement parts lists.

1.6 QUALITY ASSURANCE

A. Perform Work according to New York University Langone Medical Center standard.

B. Provide plumbing fixture fittings according to ASME A112.18.1 that prevent backflow from fixture into water distribution system.

C. Maintain one copy of each document on Site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.8 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing Work of this Section.

1.9 DELIVERY, STORAGE AND HANDLING

A. Accept fixtures on Site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.10 WARRANTY

A. Furnish five-year manufacturer warranty for plumbing fixtures.

1.11 EXTRA MATERIALS

A. Furnish two sets of faucet washers, flush valve service kits, lavatory supply fittings, toilet seats.

PART 2 - PRODUCTS

2.1 FLUSH VALVE WATER CLOSETS

A. Manufacturers:
   1. American Standard

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Bowl: ASME A112.19.2M; floor mounted, back outlet siphon jet 17-1/8 inch bowl height, ADA accessible vitreous china closet bowl, with elongated rim, 1-1/2-inch top spud, china bolt caps.

D. Sensor Operated Flush Valve: ASME A112.18.1; concealed rough brass, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome-plated plate, wheel handle stop and vacuum breaker ; maximum 1.28 gal. flush volume.

E. Seat: Solid white plastic, open front, extended back, brass bolts, with cover.

2.2 LAVATORIES

A. Manufacturers:
   1. American Standard.

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Vitreous China Wall Hung Basin: ASME A112.19.2M; vitreous china wall hung lavatory 21-1/2 by 17-3/4 inches minimum, with vitreous china shroud, single hole drillings, recessed self-draining deck, ADA compliant.

D. Metered Faucet: ASME A112.18.1; chrome-plated metered mixing faucet with battery operated solenoid operator and infrared sensor, .5 GPM aerator and cover plate, open grid strainer.

E. Waste Fittings: ASME A112.18.2 or ASTM F 409.

F. For public hand washing facilities, provide tempered water through regulating device conforming to ASSE 1070.

G. Accessories:
   1. Chrome-plated 17-gage brass P-trap and arm with escutcheon.
   2. Wheel handle stops.
   3. Flexible supplies.
   4. Exposed trap and waste insulated and offset to meet ADA compliance.

H. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, concealed arm supports, bearing plate and studs.

2.3 SINKS

A. Manufacturers:
   1. Elkay.
   2. Corian Du Pont

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Trim: ASME A112.18.1; chrome-plated brass supply with gooseneck swing spout, vandal proof water economy aerator with maximum 1.5 gpm flow.

D. Accessories: Chrome-plated 17-gage brass P-trap and arm with escutcheon, wheel handle stop, flexible supplies.

2.4 DRINKING FOUNTAINS WITH BOTTLE FILLER

A. Manufacturers:
   1. Elkay
   2. Filtrine
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Fountain:
   1. ASME A112.19.3, NSF/ANSI 42 Lead Free; Recessed, ADA accessible mounted water fountain with stainless-steel body, push button bubbler activation, and electronic bottle filler sensor.

2.5 MOP SINK

A. Manufacturers:
   1. Just Manufacturer

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Bowl: 25 by 23 by 10 inches deep, 16 gauge type 304 stainless steel sink, chrome-plated strainer, 14 gauge stainless steel wall clips, cast iron P-trap with adjustable floor flange.

D. Trim: Exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, with covering caps and adjustable threaded wall flanges.

E. Accessories:

1. 5 feet of 1/2 inch diameter plain end reinforced rubber hose.
2. Hose clamp hanger.
3. Mop hanger.

2.6 EMERGENCY COMBINATION SHOWER WITH EYE AND FACE WASH

A. Manufacturers:
   1. Water Saver
   2. Guardian

B. Furnish materials according to New York University Langone Medical Center Standards.

C. Shower: ANSI Z358.1; Ceiling mounted shower, 10-inch diameter stainless-steel, drench 20 GPM shower head, instant action stay open valve actuated by rigid stainless-steel panic bar on cover.

D. Eyewash: ANSI Z358.1; recessed stainless-steel combination cover and drain pan, instant action stay open valve actuated by opening cover, twin spray heads and drainage at front elbow.

E. Furnish universal emergency sign.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify electric power is available and of correct characteristics.

C. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections according to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

A. Install Work according to New York University Langone Medical Center standards.

B. Install each fixture with trap, easily removable for servicing and cleaning.

C. Provide chrome-plated flexible supplies to fixtures, stops, reducers, and escutcheons.

D. Install components level and plumb.

E. Install and secure fixtures in place with wall supports, carriers and bolts.

F. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 00, color to match fixture.

G. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

H. For ADA accessible water closets, install flush valve with handle to wide side of stall.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Do not permit use of fixtures before final acceptance.

END OF SECTION 22 40 00