PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Chemical resistant sewer.
   3. Domestic water.
   4. Storm water.
   5. Flanges, unions, and couplings.
   6. Pipe hangers and supports.
   7. Valves.
   9. Check.
   10. Water pressure reducing valves.
   11. Relief valves.
   12. Strainers.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.
B. Section 08 3100 - Access Doors and Panels.
C. Section 09 9113 - Exterior Painting.
D. Section 09 9123 - Interior Painting.
E. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
F. Section 22 0545 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
G. Section 22 0553 - Identification for Plumbing Piping and Equipment.
H. Section 22 0719 - Plumbing Piping Insulation.
  I. Section 26 2717 - Equipment Wiring - Electrical characteristics and wiring connections.
  J. Section 31 2316 - Excavation.
  K. Section 31 2316.13 - Trenching.
  L. Section 31 2323 - Fill.
  M. Section 33 1300 - Disinfecting of Water Utility Distribution.

1.03 REFERENCE STANDARDS

D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 125 and 300; 2011.
E. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2011.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
J. ASME B16,29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; 2012.
L. ASME B31.9 - Building Services Piping; 2014.
N. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
O. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.
AA. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
AD. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.


BM. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
BN. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.
BQ. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.
BR. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2013.
BS. AWWA C606 - Grooved and Shouldered Joints; 2011.
BT. AWWA C651 - Disinfecting Water Mains; 2005.
BU. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2007.
BV. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service; 2008.
BZ. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.
CD. MSS SP-67 - Butterfly Valves; 2011.
CE. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; 2011.
CF. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.
CG. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
CH. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
CJ. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
CM. PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe; 2013.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
C. Welder Certificate: Include welders certification of compliance with ASME BPVC-IX.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE
   A. Perform work in accordance with applicable codes.
   B. Valves: Manufacturer's name and pressure rating marked on valve body.
   C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
   D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
   E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
   B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS
   A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING
   A. Cast Iron Pipe: ASTM A74 extra heavy weight.
      1. Fittings: Cast iron.
      2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
   B. PVC Pipe: ASTM D2665 or ASTM D3034.
      1. Fittings: PVC.

2.03 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING
   A. Cast Iron Pipe: ASTM A74 extra heavy weight.
      1. Fittings: Cast iron.
      2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
   B. Cast Iron Pipe: CISPI 301, hubless.
      1. Fittings: Cast iron.
      2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
   C. PVC Pipe: ASTM D2665 or ASTM D3034.
      1. Fittings: PVC.

2.04 SANITARY SEWER PIPING, ABOVE GRADE
   A. Cast Iron Pipe: ASTM A74, service weight.
      1. Fittings: Cast iron.
      2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
   B. Cast Iron Pipe: CISPI 301, hubless, service weight.
      1. Fittings: Cast iron.
   C. Copper Tube: ASTM B306, DWV.
D. PVC Pipe: ASTM D2729.
   1. Fittings: PVC.

2.05 CHEMICAL RESISTANT SEWER PIPING
A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
B. ABS Pipe: ASTM F628.
   1. Fittings: ABS.
C. PVC Pipe: ASTM D2729 or ASTM D2665.
   1. Fittings: PVC.
D. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.

2.06 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING
   1. Fittings: AWWA C110/A21.10, ductile or gray iron, standard thickness.
B. Copper Pipe: ASTM B42, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.
C. PE Pipe: ASTM D2239.
   1. Fittings: ASTM D2609, PE.
   2. Joints: Mechanical with stainless steel clamp.
D. PVC Pipe: AWWA C900.

2.07 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Copper Pipe: ASTM B42, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   1. Fittings: Ductile or gray iron, standard thickness.
C. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. PPI TR-4 Pressure Design Basis:
      a. 160 psig at maximum 73 degrees F.

2.08 DOMESTIC WATER PIPING, ABOVE GRADE
A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   3. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.
      a. Manufacturers:
3) Substitutions: See Section 01 6000 - Product Requirements.

B. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.

2.09 STORM WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING
A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
B. PVC Pipe: ASTM D3034 DR 35.
   1. Fittings: PVC.

2.10 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
B. ABS Pipe: ASTM D2680.
   1. Fittings: ABS.
   1. Fittings: PVC.

2.11 STORM WATER PIPING, ABOVE GRADE
A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
C. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.

2.12 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING
A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASTM A234/A234M, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.13 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.14 NATURAL GAS PIPING, ABOVE GRADE
A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   2. Joints: Threaded or welded to ASME B31.1.
B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) or L (B) annealed.

2.15 FLANGES, UNIONS, AND COUPLINGS
A. Unions for Pipe Sizes 3 Inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
B. Flanges for Pipe Size Over 1 Inch:
   1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges;
      preformed neoprene gaskets.
   2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing
   segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to
   secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or _____,
      galvanized.
   3. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees
      F to 230 degrees F.
   4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
   6. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.
D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end,
   water impervious isolation barrier.

2.16 PIPE HANGERS AND SUPPORTS
A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate
      type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze
      hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
   6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of
      roofing membrane, not requiring any attachment to the roof structure and not penetrating
      the roofing assembly, with support fixtures as specified; and as follows:
      b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing
         assembly.
      c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after
         fabrication in accordance with ASTM A123/A123M.
      d. Attachment/Support Fixtures: As recommended by manufacturer, same type as
         indicated for equivalent indoor hangers and supports; corrosion resistant material.
      e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
      f. Manufacturers:
         2) Substitutions: See Section 01 6000 - Product Requirements.
B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split
      ring.
2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
7. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

2.17 BALL VALVES
A. Manufacturers:
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends.

2.18 BUTTERFLY VALVES
A. Manufacturers:
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.

C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.19 PIPING SPECIALTIES
A. Flow Controls:
1. Manufacturers:
   a. ITT Bell & Gossett; Model ______: www.bellgossett.com.
   d. Substitutions: See Section 01 6000 - Product Requirements.
2. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
3. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.20 WATER PRESSURE REDUCING VALVES:
A. Manufacturers:
   4. Substitutions: See Section 01 6000 - Product Requirements.
B. Up to 2 Inches:
   1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
C. Over 2 Inches:
   1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.21 RELIEF VALVES:
A. Pressure:
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
B. Temperature and Pressure:
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.22 STRainers:
A. Manufacturers:
   3. Substitutions: See Section 01 6000 - Product Requirements.
B. Size 2 inch and Under:
   1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
   2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
C. Size 1-1/2 inch to 4 inch:
   1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
D. Size 5 inch and Larger:
   1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

PART 3 EXECUTION

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

3.02 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.

3.03 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
E. Group piping whenever practical at common elevations.
F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 0516.
G. Install hot water return loops in all clinical areas regardless of length of run of HW piping.
H. Do not leave any dead legs of more than 6” in any piping system.
I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
   1. Refer to Section 22 0719.
J. Provide access where valves and fittings are not exposed.
   1. Coordinate size and location of access doors with Section 08 3100.
K. Establish elevations of buried piping outside the building to ensure not less than 3.5 ft of cover.
L. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section _____.
M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
N. Provide support for utility meters in accordance with requirements of utility companies.
O. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
   1. Painting of interior plumbing systems and components is specified in Section 09 9123.
   2. Painting of exterior plumbing systems and components is specified in Section 09 9113.
P. Excavate in accordance with Section 31 2316.
Q. Backfill in accordance with Section 31 2323.
R. Install bell and spigot pipe with bell end upstream.
S. Install valves with stems upright or horizontal, not inverted. Refer to Section 22 0523.
T. Install water piping to ASME B31.9.
U. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
V. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
W. Sleeve pipes passing through partitions, walls and floors.
X. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide 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.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

Y. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
   a. Painting of interior plumbing systems and components is specified in Section 09 9123.
   b. Painting of exterior plumbing systems and components is specified in Section 09 9113.
10. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 22 0548.
11. Support cast iron drainage piping at every joint.

3.04 APPLICATION
A. Use grooved mechanical couplings and fasteners only in accessible locations.
B. Install unions downstream of valves and at equipment or apparatus connections.
C. Provide spring loaded check valves on discharge of water pumps.
D. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES
A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
A. Disinfect water distribution system in accordance with Section 33 1300.
B. Prior to starting work, verify system is complete, flushed and clean.
C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
F. Maintain disinfectant in system for 24 hours.
G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SERVICE CONNECTIONS
A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
   2. Provide 18 gage, 0.0478 inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

3.08 SCHEDULES
A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inches to 6 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.
      e. Pipe Size: 8 inches to 12 inches:
         1) Maximum hanger spacing: 14 ft.
         2) Hanger Rod Diameter: 7/8 inch.
      f. Pipe Size: 14 inches and Over:
         1) Maximum Hanger Spacing: 20 ft.
         2) Hanger Rod Diameter: 1 inch.
   2. Plastic Piping:
      a. All Sizes:
         1) Maximum Hanger Spacing: 6 ft.
         2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION