

**SECTION 33 11 00  
WATER DISTRIBUTION SYSTEM**

**PART 1 GENERAL**

**1.1 SCOPE**

- A. The Contractor shall furnish all labor, equipment, and materials and perform all operations necessary to construct a complete, functioning water distribution system.
- B. All materials and work performed shall be in accordance with plans, specifications, applicable codes and standards, and of first-class workmanship.

**1.2 SAFETY PROVISIONS**

- A. It shall be the responsibility of the Contractor to protect persons from injury and to avoid property damage.
- B. Contractor shall provide and maintain adequate barricades, construction signs, torches, red lanterns and guards during the progress of the construction work and until it is safe for traffic to drive over the trenches in the roadway.
- C. Contractor shall perform all construction in a safe manner, specifically, the rules and regulations of the Occupational Safety and Health Administration (OSHA) and the Manual of Uniform Traffic Control Devices (MUTCD).

**1.3 REFERENCES**

- A. Palm Beach County Minimum Engineering and Construction Standards
- B. Florida Building Code, all volumes
- C. Florida Fire Prevention Code
- D. Manual of Uniform Traffic Control Devices (MUTCD)
- E. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- F. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings
- G. ASTM B88 - Standard Specification for Seamless Copper Water Tube
- H. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable
- I. ASTM D1599 - Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
- J. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- K. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- L. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing
- M. AWWA C110 - Ductile-Iron and Gray-Iron Fittings
- N. AWWA C500 - AWWA Standard for Metal-Seated Gate Valves for Water Supply Service - International Restrictions
- O. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtances - International Restrictions
- P. AWWA C651 - Disinfecting Water Mains - International Restrictions
- Q. AWWA C800 - Underground Service Line Valves and Fittings - International Restrictions
- R. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in.(100 mm Through 300 mm), for Water Transmission and Distribution - International Restrictions

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

#### 1.4 EXISTING UTILITIES

- A. Contractor shall provide necessary temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work at his own expense.
- B. Where existing utility structures such as conduits, ducts, pipe branch connections to main sewers, or main drains obstruct the grade or alignment of the pipe, the Contractor shall permanently support, relocate, remove, or reconstruct, the existing structure with the cooperation of the their owners.
  - 1. Do not deviate from the required line or grade except, as directed, in writing by the Architect.
- C. The Contractor shall obtain a Sunshine State One Call Center (11 Plantation Road, Debarry, FL 32713; Telephone 1-800-638-4097) Certification number and an existing utility field location at least 48 hours prior to beginning any excavation.
- D. Prior to beginning construction, the Contractor shall verify the size, location, elevation, and material of all existing utilities within the area of construction by use of record drawings, electronic locating devices, ground penetrating radar, potholing, or other suitable techniques.
- E. Existing utility locations shown on these plans are approximate and identified as either "to remain" or "to be removed".
  - 1. The Architect assumes no responsibility for the accuracy of existing utilities shown or for any existing utilities not shown.
- F. The Contractor is responsible for repairing any damage done during construction to all existing utilities.
- G. If upon excavation, an existing utility is found to be in conflict with the proposed construction or to be of a size or material different from that shown on the plans; the Contractor shall immediately notify the Architect.
- H. Provide water services to each building from the underground water main system, and not from adjacent buildings.

#### 1.5 SHOP DRAWINGS AND SUBMITTALS

- A. The Contractor shall provide the Architect a copy of all manufacturers' literature and data for materials installed under this section.
  - 1. The Architect shall review and stamp the submittals, "Approved" prior to installation by the Contractor.
- B. Prior to final approval and acceptance of work, the Architect and other Regulatory Agencies shall review and accept the Contractors "As-Built" documentation.
  - 1. The Contractor shall provide complete and accurate "As-Built" information relative to manholes, valves, services, fittings, length of pipe, and the like, with the horizontal and vertical information verified by an independent Registered Surveyor to the Architect and other regulatory Agencies.

#### 1.6 APPLICABLE CODES

- A. General: All construction and materials shall conform to the Florida Building Code and all local and national codes where applicable.
- B. Survey Data: All elevations on the plans or referenced in the specifications shall be based on North American Vertical Datum of 1988 (NAVD).
- C. Portable water shall comply with the "Palm Beach County Minimum Engineering and Construction Standards, Water and Sewer Systems," and/or the construction standards of any municipality having, jurisdiction.
- D. Submit the "Florida Department of Environmental Protection Domestic Water Permit.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

1.7 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under, Division 1, General Requirements, are included as part of this section.
- B. Section 31 20 00 – Earthwork.

**PART 2 PRODUCTS**

2.1 PIPE

A. OFF-SITE

- 1. For water main construction within the public right-of-way and utility easements refer to city, county, or state utility standards and specifications for water main construction within their right-of-way.

B. ON-SITE

- 1. The water main shall be either polyvinyl chloride (PVC) pipe or ductile iron pipe (DIP) and shall have push on rubber gasket joints.
- 2. Pressure pipe (4" and larger) PVC pipe shall be pressure pipe with iron o.d. class 150 (SDR 18) for domestic water and class 200 (SDR 14) for fire mains, conforming to AWWA C900.
- 3. Ductile iron pipe (4" and larger) shall be cement-mortar lined and seal coated, class 150 for domestic water and class 200 for fire mains, mechanical, or push-on joints.
- 4. Pressure pipe (under 4") Polyvinyl chloride (PVC) pressure pipe schedule 40 conforming to ASTM D1785 or SDR 21 conforming to ASTM D2241 with cement-solvent welded joints.
- 5. Miscellaneous: ¾" threaded tie-rods shall be cadmium plated and painted with a coal tar base paint following installation.

2.2 FITTINGS

- A. Fittings for ductile iron and PVC pipes (4" and larger) shall have a pressure rating of 250 psi; use mechanical joints and conform to the latest revision of AWWA C110.
- B. Mechanical joint fittings shall conform to the latest revision of AWWA C110.
- C. Flanged fittings shall conform to ANSI Specifications for Class 125.
- D. Brass fittings shall conform to AWWA C800, with all exposed threads covered with a protective plastic coating.
- E. Fittings for PVC pipe shall be cast iron mechanical joint type having a pressure rating of 250 psi and conforming to AWWA C110.

2.3 VALVES

- A. Gate valves 2½" or less in size shall be standard 125 pound, non-rising stem, bronze, double-disc, screwed type, equipped with hand wheel.
- B. Gate valves over 2½" shall be resilient seat gate valves with iron body, non-rising stem, fully coated disc with rubber seat ring manufactured in accordance with AWWA C500.

2.4 VALVE BOXES

- A. Valve boxes shall be of standard extension design manufactured with top cover marked "water."
- B. The top section shall be adjustable for elevation and shall be set to allow equal movement above and below grade.
- C. Provide valve box appropriate in size for the required valve.
- D. Center the base of valve box over the valve and rest firmly on compacted backfill and the entire assembly shall be plumb.
- E. Valve boxes shall be like Figure H-10364, as manufactured by Mueller Company, or an approved equal.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

## 2.5 HYDRANTS

- A. Hydrants shall have a minimum 6" mechanical joint base pipe connection, 5¼" main valve opening, two 2½" hose nozzles, and one 4½" pumper nozzle.
  - 1. Threads shall be National Standard.
  - 2. Hydrants shall be cast iron body, fully bronze mounted, suitable for a working pressure of 150 pounds, and shall be in accordance with the latest specification of the AWWA.
  - 3. They shall be of the O-ring seal type.
  - 4. Operation nut shall open counter-clockwise and be of the pentagonal shape, measuring 1½" from point to opposite flat.
- B. Provide hydrants with a breakaway feature that breaks cleanly upon impact.
  - 1. This shall consist of a two-part breakable safety flange with a breakable stem coupling.
  - 2. The upper and lower barrels shall be fluted and ribbed above and below the safety flange or have an extra strength lower barrel.
- C. Paint hydrants with one coat of zinc chromate primer and two finish coats of an approved paint of Architect approved color.
  - 1. Hydrants shall be Number A-423, Traffic type, as manufactured by Mueller Company, or an approved equal.

## 2.6 SERVICE CONNECTION AND METER

- A. The Contractor shall install or have the City install water meters complete with dual backflow preventer, valves and meter vault, at the locations shown on the drawings, and in accordance with the specifications as shown on the drawings.
- B. Contractor shall submit shop drawings for meter, valves, and backflow preventer.
- C. Contractor is responsible for all costs associated with providing and installing water meters, vaults, backflow preventers, valves, and connections in accordance with the applicable local utility or Palm Beach County Standards.

## 2.7 SERVICE METERS (3" Maximum)

- A. Service water meters shall be of the rotating disc, bronze split case housing type.
- B. The meter shall be of the straight reading type, recording flow in gallons, and shall be of the sealed register type.
- C. Meters shall conform to applicable specifications of AWWA and shall be as manufactured by Neptune Meter Company, or an approved equal.

## 2.8 METER BOXES

- A. Meter boxes shall be precast concrete with a two-piece reinforced concrete cover including a round concrete reading lid. All meter boxes must also meet local utility company requirements.
  - 1. Meter boxes for ⅝" or ¾" meters shall be Model 36R, as manufactured by Brooks Products, Inc.
  - 2. Meter boxes for larger meters shall be of suitable size for the enclosed meter.
- B. Contractor shall submit shop drawings for meter boxes larger than ¾".

## 2.9 BACKFLOW PREVENTERS

- A. Backflow preventers shall conform to AWWA Standard C506 and shall be of the "reduced pressure principle type".
  - 1. Provide the backflow preventer as an assembly from one manufacturer.
  - 2. The assembly shall include two isolation valves, two check valves, and all other fittings or accessories needed to satisfy referenced design standards.
- B. Paint backflow preventers with one coat of zinc chromate primer and two finish coats of an approved paint of Architect approved color.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

- C. Provide chain and padlock, then chain and lock valves on all backflow preventers together.
- D. Provide 6' high chain link fence around the device with 12' access gate.

2.10 PRESSURE GAGES

- A. Pressure Gages: Pressure gages for line pressure measurement shall conform to Federal Specifications GG-G-76, Class 1, Style A, Type 1, 3½" diameter with phenolic case, or as indicated on the drawings.

2.11 CHECK VALVES

- A. Check valves shall be AWWA standard for 175-psi working pressure, swing type, iron body, or bronze mounted, leather faced disc, suitable for vertical or horizontal position.
- B. Valves shall be Mueller Figure A-2600 or approved equal.
- C. Where designated on the plans, check valves shall be spring loaded, double half disc-wafer check valve, manufactured by TRW Mission, or approved equal.
- D. Spring shall be of sufficient tension so valve will close without appreciable slam.

2.12 WATER SERVICES

- A. Polyethylene Tubing – Material shall comply with ASTM D1248 and the following:
  - 1. Polyethylene extrusion compound for extruding the polyethylene tubing shall comply with applicable requirements for PE-3406 or 3408 ultra high molecular weight polyethylene plastic material
  - 2. Tubing shall have a working pressure rating of 160 psi at 73.4°F.
  - 3. Tubing must be capable of maintaining pressure of 340 psi at 73.4°F for 1,000 hours when tested in accordance with ASTM D1599.
  - 4. Tubing surfaces shall be free from bumps and irregularities. Materials must be completely homogeneous and uniform in appearance.
  - 5. Tubing dimensions and tolerances shall correspond with the valves listed in ASTM D2737 with a standard dimension ratio (SDR) of 9.
  - 6. Provide label on tubing with brand name and manufacturer, NSF Seal, size, type of plastic material, and ASTM applicable designation with which the tubing complies.
- B. Copper tubing shall be type "K" and conform to AWWA Specification 75-CR and ASTM B88 with a working pressure rating of 160 psi at 73.4°F.
- C. Other service materials may be considered for specific installations, upon submissions of specification and approval by the Architect.
- D. Joints:
  - 1. Joints for polyethylene or copper tubing shall be of the compression type utilizing a totally confined grip seal and coupling nut.
    - a. Provide stainless steel tube stiffener insert for P.E. tubing service.
  - 2. Other type joints may be considered for specific installations, upon submissions of specifications and approval by the Architect.

2.13 METER VALVES

- A. Meter valves shall be of bronze construction in accordance with ASTM B62.
- B. Meter valves shall be closed bottom design and resilient "o" ring sealed against external leakage at the top.
- C. Provide a shut-off with a resilient pressure actuated seal so positioned in the plug as to completely enclose the flow way in the closed position.
- D. The inlet side of all meter valves shall have a compression type fitting as detailed in Section C Part 1.
- E. Meter valves for meter size 1" and under shall be equipped with a meter-coupling nut on the outlet sides.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

F. Meter valves for 1½" and 2" meters shall have flanged connections on the outlet sides.

G. Provide meter valve over 2" on individual basis for the particular installation.

#### 2.14 CURB STOPS

A. Curb stops shall be of the inverted key type with tee-head shut off.

B. Curb stops shall be made of brass alloy in accordance with ASTM B62.

#### 2.15 CORPORATION STOPS

A. Provide corporation stops manufactured of brass alloy in accordance with ASTM B62.

B. Inlet thread shall be taper thread in all sizes in accordance with AWWA C800.

C. Outlet connections shall have a compression type fitting as detailed in Section C Part 1.

#### 2.16 TAPPING SLEEVES

A. Ductile iron tapping sleeves shall be of the mechanical joint type having a flat-faced ductile iron flange, recessed for a tapping valve with all end and side gaskets totally confined.

B. The contractor shall determine the outside diameter of the existing main before ordering the sleeve.

### **PART 3 EXECUTION**

#### 3.1 UNLOADING MATERIAL

A. The Contractor shall exercise care in unloading and handling pipe, valves, fittings, and all other material.

B. Do not drop pipe from trucks or allow pipe to roll against other pipe.

#### 3.2 EXCAVATION

A. All excavation to conform to Section 31 20 00

#### 3.3 SEPARATION OF WATER AND SEWER MAINS

A. See design plans for water and sewer separation statement and requirements.

#### 3.4 WATER METER

A. Domestic water service; provide a water meter (max. 3") and dual backflow preventer assembly. (Meter bypass with gate valve), (gate valve, meter, gate valve), (bypass reconnection), and (gate valve, backflow preventer, gate valve).

1. All service pipes for 3" water meter shall be 4" ductile iron pipe with 4" gate valves with flanged fittings for above ground use, and mechanical fittings with retainer glands for underground use.

B. Fire line system; provide a double-detector check valve assembly and a fire department connection.

1. Provide gate valve, (¾" meter bypass with a gate valve and check valve).

C. Locate both assemblies adjacent to property line, and provide either 6' high chain link fence around the assembly or chain lock the valves as indicated on the plans.

#### 3.5 INSTALLATION OF PIPE

A. Obtain permission of the Health Department, Water Department, and the Fire Department having jurisdiction, before installing water mains.

B. All installation of pipe shall conform to AWWA C600.

1. Do not roll or push pipe into the trench from the bank.

2. Contractor shall thoroughly inspect all pipes before lowering into the trench, to insure its sound condition and eliminate the possibility of leakage or bursting under test pressure.

3. Do not use pipes, valves, fittings or any other materials showing defects.

4. Remove all such defective materials from the construction site immediately.

5. Before lowering pipe into the trench, swab or brush it to insure that no dirt or foreign matter is in the finished line.
- C. Lay pipe on a flat bottom trench and backfill tamped to 6" above the top of the pipe.
  1. Pipe installation shall conform to "Type B Method" as adopted by Committee A21 of the American Standards Association.
  2. Provide a firm even bearing throughout the length of each section of pipe.
  3. Pipe shall not bear on any un-yielding structures, nor shall it support any other structures.
  4. Plug or cap all dead ends, anchor, and hold in place with concrete backing as required.
  5. Except while work is in progress, plug all pipe openings to prevent entrance of water or any foreign matter.
  6. Remove material deemed unstable for providing adequate support for pipe and replace with a suitable material.
  7. Provide an adequate backfill material on the pipe to prevent floating, remove, and relay any pipe that floats as directed by the Architect.
- D. Use one of the three following methods to connect new systems to existing mains:
  1. Method-A, involves a reduced size temporary connection between the existing main and the new main.
  2. Method-B, involves a direct connection between the new and existing mains using two gate valves separated by a sleeve with a vent pipe.
  3. Method-C, involves a tap with one gate valve requiring disinfection of the new system prior to conducting the pressure test.
- E. The water utility company shall approve and witness the connection method.

### 3.6 JOINTS

- A. All joints shall be suitable for the type of pipe being jointed and shall be made in accordance with manufacturer's recommendations.
- B. Mechanical Joints:
  1. Mechanical joints shall be of the stuffing box type.
  2. Place the gland, followed by the rubber gasket over the plain end of the pipe inserted into the socket.
  3. Then push the gasket into position to evenly seat in the socket.
  4. Move the gland into position against the face of the socket, insert bolts, and make finger tight.
  5. Using a ratchet wrench suitable to the pipe size, tighten bolts alternately bottom then top, etc., until the joint is complete.
- C. Compression Joints:
  1. Compression joints shall be a rubber seal joint, made pressure tight by a molded rubber gasket and lubricant to facilitate assembly.
  2. Make the joint tight by inserting the plain end into the bell after lubrication.
  3. The compression joint shall be similar and equal to "Altite" b as manufactured by Alabama Pipe Company.
  4. Follow the manufacturer recommendations in making up the joints.
- D. Flanged Joints:
  1. Use rubber gaskets to make flanged joints, with bolts having rough square heads and hexagonal nuts made to American Standard rough dimensions that are chamfered and trimmed.
  2. Bolts shall be the recommended size for the diameter of pipe being joined and be tightened to evenly distribute the stress in the bolts and bring the pipe in alignment.

3.7 INSTALLATION OF FITTINGS

- A. Applicable portions of these specifications shall apply to installation of fittings.
- B. Provide reaction or thrust blocking where changes in pipe diameter occur at reducers or fittings, bends, and tees.
- C. Refer to details for concrete strength and dimensions.
- D. Provide restrained joints for all fittings in the public right-of-way.

3.8 INSTALLATION OF FIRE HYDRANTS

- A. Applicable portions of these specifications shall apply to installation of fire hydrants.
- B. All hydrants shall stand plumb and burial line shall be set at finished grade.
- C. Place sufficient concrete thrust blocking as shown on the plans or as directed by the Architect.

3.9 INSTALLATION OF VALVES

- A. Applicable portions of these specifications shall apply to installation of valves.
  - 1. All valves shall stand plumb unless otherwise shown on the plans or directed by the Architect.
  - 2. The operation of installing tapping sleeves and an experienced contractor who has been engaged in this type of work not less than one-year with a representative list of successful installations shall install the valves.
- B. Provide appropriate shut-off in a valve box approximately 5' from the building on domestic water line to each building.

3.10 PRESSURE TESTS

- A. After adequately backfilling the pipe and at least seven days after placing the last concrete thrust blocking, pressure test all laid pipe for two hours at 150-psi minimum, in accordance with AWWA C600-93.
- B. The pressure test shall not vary more than  $\pm 5$  psi during the test.
- C. Remove all air is from the pipe prior to pressure tests.
- D. The Contractor shall provide such means of venting the pipe as are required.
- E. The Contractor shall replace any material or installation proving defective.
- F. A representative of the City/County and the Architect shall witness the pressure test.

3.11 LEAKAGE TESTS

- A. Bring the main up to test pressure, and hold at this pressure.
  - 1. Carefully measure the make-up water, by use of a displacement meter or by pumping the water from a vessel of known volume.
  - 2. Walk the length of the pipeline and inspect all joints for leakage and movement of pipe.
  - 3. Repair all visible leaks.
  - 4. Should any section of pipeline disclose joint leakage greater than that permitted, the Contractor shall at his own expense locate, and repair the defective joints until leakage is within the permitted allowance.
- B. All pipe, etc. shall be tested under a constant pressure of 150 psi (fire main at 200 psi) for a minimum test of two hours and shall not exceed the leakage requirements as per AWWA specifications of C600-93 leakage formula:
  - 1.  $Q = \frac{SD \sqrt{P}}{133,200}$ 
    - Q = allowable leakage in gallons per hour
    - S = total length of pipe tested in feet
    - D = diameter of the pipe tested in inches
    - P = average test pressure in pounds per square inch

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

### 3.12 BACKFILL

- A. Backfill shall comply with Section 31 20 00 Earthwork.
- B. On completion of pressure and leakage tests, the exposed joints shall be backfilled to a depth of 12" above the top of the pipe.
  - 1. Backfill shall be carefully compacted until 12" of cover exists over the pipe.
  - 2. Place the remainder of the backfill and compacted thoroughly by puddling and tamping.
  - 3. When directed, the contractor may backfill the trench neatly rounded to a sufficient height allowing for settlement to grade after consolidation.

### 3.13 STERILIZATION OF COMPLETED PIPELINE

- A. Before final acceptance of completed pipeline, all requirements of the County and State Board of Health shall be satisfied.
  - 1. Forward satisfactory bacteriological test results from these agencies to the Architect.
- B. Prior to chlorination of mains, remove all dirt and foreign matter by high velocity flushing through fire hydrants or other approved blow-offs.
  - 1. Disinfect the main in accordance with the application sections of AWWA C651 and with local health department requirements.

### 3.14 RESTORATION OF SURFACES AND/OR STRUCTURES

- A. The Contractor shall restore and/or replace paving, curbing, sidewalks, fences, sod, survey points, or other disturbed surfaces or structures to a condition equal to that before the work was begun and to satisfaction of the Architect, and shall furnish all labor and materials incidental thereto.
- B. Restoration of surfaces and/or structures shall comply with all requirements of the applicable governing agencies including City, Town, County, and State.

### 3.15 CLEANING UP

- A. The Contractor shall remove surplus pipeline material, tools, temporary structures, etc., and as directed by the Architect, shall dispose of all dirt, rubbish, and excess earth.
- B. The construction site shall be left clean, to the satisfaction of the Architect

### 3.16 INSPECTIONS

- A. The Contractor shall notify the City, Architect, and the Owner 24 hours prior to beginning construction to arrange the required inspection of the water system.

### 3.17 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain accurate and complete records of work items completed.
- B. Prior to the placement of any asphalt or concrete pavement, the Contractor shall submit to the Architect, "as-built" plans showing water improvements.
  - 1. Paving operations shall not commence until the Architect has reviewed the "as-built."
- C. All "as-built" information submitted to the Architect shall be sufficiently accurate, clear, and legible to satisfy the Architect that the information provides a true representation of the improvements constructed.
- D. Upon completion of construction, the Contractor shall submit to the Architect five complete sets of "as-built" construction drawings and one set of mylars.
  - 1. Clearly mark these drawings "as-built" show all construction changes and dimensioned locations and elevations of all improvements and signed by the Contractor.
  - 2. A Professional Land Surveyor registered in the State of Florida shall sign and seal the "As-Built drawings.
- E. "As-built" information on the water system shall include vertical and horizontal locations of all valves, fittings, fire hydrants, water services, and connection points.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

1. They shall show the associated pipe size and material type, and must also show the sample points and the sample point numbers must conform to the numbers used on the bacteriological test results.

### 3.18 FIRE PROTECTION SYSTEM

- A. The domestic water system is separate loop from the fire protection system.
- B. Buildings with fire pumps; install the Fire Department connection pipe on the discharge side of the pump.
- C. Fire line extension from the main to the building, will be installed by a licensed fire sprinkler contractor. Test fire sprinkler pipe to 200 psi.
- D. All fire-fighting equipment (fire department connection, hydrants, double detector check valve, and gate valves) to be more than 40' away from the building.
  1. Maintain 7' clearance around each fire hydrant.
- E. Provide flow and pressure test reports according to NFPA 24.
- F. All points on each building will be within 200' of an existing or proposed fire hydrant.
- G. Verify the fire protection water systems and hydrant locations are approved by the fire-fighting authority having, jurisdiction.
- H. Multi-building campus; provide to each building or group of buildings a fire service pipe that contains a post indicator valve, backflow device, and a fire department connection, and a fire hydrant within 150'.
- I. Use ductile iron pipe for fire hydrant branches, fire main service (from the loop to the building), and fire department connections.

END OF SECTION