

**SECTION 33 32 19
WASTE WATER PUMP STATION**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Lift Stations
- B. Force Mains

1.2 REGULATORY REQUIREMENTS

- A. Lift Station and Force Main shall comply with the Palm Beach County Water Utilities Department Minimum Engineering and Construction, Standards, "Potable Water, Reclaimed Water and Wastewater Systems" or by the construction standards of the municipality having jurisdiction.

1.3 REFERENCE DOCUMENTS

- A. ASTM A48/A48M - Standard Specification for Gray Iron Castings
- B. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- C. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- D. AWWA C210, Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
- E. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtenances
- F. 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
- G. AWWA C905, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In through 48 In (350 mm Through 1,200 mm) for Water Transmission and Distribution

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Prior to installation, the Contractor shall furnish to the Project Consultant the manufacturers' literature and data for all materials installed under this section for his approval.
- C. Complete As-Built information and plans required before final acceptance of the system.
 - 1. Contractor shall provide accurate record of complete system relative to manholes, cleanouts, services, fittings, pipe size, pipe material, pipe lengths, and the like.
 - 2. Registered Surveyor shall provide all horizontal and vertical information in the Contractor's As-Built information.
 - 3. Provide final approval of the project "As-Built" information from the regulatory agencies having jurisdiction.

1.5 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this section.
- B. Section 31 20 00 Earthwork

1.6 WARRANTY

- A. The unconditional labor and material warranty period for the lift station (5-years for the corrosion barrier system, 5-years for lift station pump and motor assemblies, and 1-year for all other components) commences with the discharging of wastewater into the lift station.
 - 1. The warranty for the Owner initiated lift station rehabilitation projects begins at the time of the Owner's final payment to the Contractor and shall cover all materials and labor associated with the rehabilitation project, includes but is not limited to, site restoration, flow by-passing, and temporary power.

PART 2 PRODUCTS

2.1 PUMPS

- A. Barnes No Clog Submersible pumps or owner approved equivalent unit.
 - 1. Provide a certification from the factory authorized pump supplier confirming compliance with these specifications for each pump application prior to the pre-construction meeting.
 - 2. In phased construction projects, master lift stations with minimal flows for an extended time shall have temporary impellers of reduced capacity, not less than 50% of a permanent pump.
 - 3. The electrical equipment, pump housing and motor shall meet the ultimate flow condition.
 - 4. Provide a second set of impellers for full flow conditions just prior to lift station start-up.
 - 5. The pumps and electrical system shall allow for a minimum of one future impeller upgrade.

PART 3 EXECUTION

3.1 LIFT STATIONS

- A. Provide lift station and force main if conditions require.
 - 1. Submit details of the lift station and force main in accordance with the details and specifications of the municipality having jurisdiction.
- B. Waterproof lift station inside and outside.
 - 1. Locate lift station adjacent to a public street (for eventual takeover by the utility company).
- C. Top of lift station and top of concrete water valve pit to be 6" above finish grade and above 100 year, three-day flood elevation.
- D. Lift stations owned by the School District do not require telemetering equipment.
 - 1. Provide sign, "IN THE EVENT OF TROUBLE CALL *district SPA to provide phone number*".
- E. The standard lift station shall be a belowground, submersible pump type with two grinder pumps.
- F. No deviation from these standards permitted without prior approval.

3.2 PUMPS

- A. Two or more wastewater pumps are required.
 - 1. When providing only 2-units, each shall be capable of handling the anticipated maximum flow.
 - 2. The capacity of each pump (discharge flow rate) shall not exceed the ultimate peak wastewater inflow rate by more than 25%.
 - 3. The hydraulic pump efficiency at operating point under ultimate flow conditions shall be a minimum of 40%.
 - 4. The pump and impeller shall pass 3" spherical solids.
 - 5. The Architect shall to ensure that pumps operate satisfactory under the minimum and maximum pressure conditions at the time of the lift station start up.
- B. Guide Rail System:
 - 1. Provide a sliding guide rail system for the easily installation and removal of the pump.
 - 2. Sealing of the pump at the discharge flange shall be by a single downward linear motion of the pump with the entire weight of the pump guided by two 2" diameter stainless steel guide rails or one 2" stainless steel t-bar guide rail.
 - 3. Then, pressing against the discharge connection, no part of the pump shall bear directly on the sump floor and no rotary motion of the pump shall be required for sealing.
 - 4. Sealing at the discharge shall insure and guarantee a positive, leak-proof system under all operating conditions, and for ease of removal of the pump.
 - 5. Do not use nuts, bolts, or other forms of fastenings for pump connection; prevent the need for personnel to enter the wet well to remove the pumps.
 - 6. Additional support brackets shall be required for guide rails over 20' long.

C. External Parts Materials:

1. Provide a factory-applied coating to all external pump and motor parts to resist mild corrosive liquids and chemical attack.
2. The design shall use a lifting cover, stator-housing impeller and volute casing constructed of ASTM A48 Class 30 minimum, gray cast iron.
3. The lifting handle shall be cast iron or stainless steel and be large enough to hook the pump with a standard hook from heights of 20'.
4. Machine the interfaces between the major castings for metal-to-metal contact, and additionally protect with circular cross section O-rings.
5. Construct all nuts, bolts, washers, and other fastening devices of stainless steel.
6. Grommet and O-rings are to be oil resistant.

D. Volute/Impellers:

1. Do not use volutes and impellers with parts requiring periodically adjustments to correct tolerances due to normal wear.
2. "Open" impeller design is not acceptable.
3. Use a dual wear ring system to provide efficient sealing between the volute and the suction inlet side of the impeller.
4. Equip each pump with a stainless steel wear ring, or Nitrile rubber coated stainless steel insert driven, fitted into the volute inlet.

E. Seals/General:

1. The seals shall require neither maintenance nor adjustment and shall be easily replaceable.
2. Conventional lip seals or double mechanical seals with a single or double spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces are not equal to the tandem seal specified.
3. Do not use impeller to hold seals in place.
4. Acceptable Seal Systems:
 - a. TYPE "A" – The mechanical shaft seal shall be a balanced tandem-type "Enclosed Block" design, which locates both upper and lower sets of seal faces in one compact AISI type 316 stainless steel casing.
 - i) The O-rings used in the enclosed block seal shall be all circular cross section (Viton or Buna-N) material for sealing protection.
 - ii) The seal faces shall be of high quality silicon carbide held in place by 2-independent sets of eight AISI type 316 stainless steel coil springs immersed in an oil bath.
 - iii) As each set of eight coil springs is equally spaced around the shaft, a balanced spring force is exerted upon the seal faces, which is required if the mechanical seal is to be considered "balanced."
 - iv) They shall be completely isolated from the pumped media on the impeller side.
 - b. TYPE "B" – Provide each pump with a tandem mechanical shaft seal system.
 - i) The upper of the tandem set of seals shall operate in an oil chamber located just below the stator housing.
 - ii) This set shall contain one stationary silicone carbide ring and one positively driven rotating carbon ring and shall function as an independent secondary barrier between the pumped liquid and the stator housing.
 - iii) The lower of the tandem set of seal's functions as the primary barrier between the pumped liquid and the stator housing.
 - iv) This set shall consist of a stationary ring and a positively driven rotating ring both of which shall be silicone carbide.

v) Hold each seal interface in contact by its own spring system.

F. Shaft Bearings:

1. The oversized pump shaft is to be one piece
2. No couplings or shaft extensions allowed
3. The shaft material shall be AISI type 420 stainless steel
4. No carbon steel shafts or shaft sleeves allowed
5. The bearings shall be all spherical ball rolling type angular contact with minimum 40,000-hour L10 life throughout the pump curve.
6. Bearings shall be permanently lubricated type.
7. The upper bearing shall be a single row ball bearing, the lower bearing shall be a double row thrust ball bearings and protected by a short shaft overhang that limits deflections of the shaft.

G. Pump Motors:

1. Pump motors shall be housed in a water-tight casing constructed of ASTM A48/A48M, Class 30 minimum, gray cast iron, and shall have moisture-resistant Class F insulated copper windings.
2. Motors shall have cooling characteristics suitable to permit continuous operation in totally, partially, or non-submerged conditions.
3. Motors shall be able to withstand 10 starts per hour, voltage fluctuations of + 10% of name plate rating and is a NEMA design B rated at 155°C maximum.
4. Pump motors shall have a minimum 1.15 service factor. All pumps/motors shall have a stainless steel data plate.

H. Cable Entry/Terminal Board:

1. The electric cable entry to the motor shall be watertight and have strain relief.
2. The power and control cables shall enter the motor housing through an isolated chamber that is completely isolated from the stator chamber.
3. Seal the Hypalon power and control cable jackets via a compressible Buna-N grommet flanked by washers forming the first isolation point of the assembly.
4. Terminate the cables on brass terminal lugs of the terminal board, thereby sealing the cable entry chamber completely from the stator housing to the extent that it traps any moisture entering the cable entry chamber.
5. Use a the terminal board designed to short out in the event that moisture has found its way into the cable entry chamber, thus signaling that the motor must have service.
6. Size cables to permit voltage conversion without replacing the cable.

I. Service: Pump suppliers shall have adequate repair/service facilities and parts inventories to ensure parts delivery within 24 hours and efficient repair of all equipment supplied.

1. The pump supplier shall provide a reference list of existing installations upon request.

J. Warranty: Pump manufacturer shall have a minimum of 5 years experience in submersible pump manufacturing and service.

3.3 CONTROLS

A. The pump control system is required.

1. Locate the floats where the flows into the wet well or by the pump suction do affect them.
2. May omit the floats, if it is determined that high flow rates into the wet well may adversely affect their performance.
 - a. In such a case, only high and low level floats will be required with an approved level sensor for the remaining outputs.

3. For new lift station installations, the "alarm" float elevation shall be set at a minimum of 6" below the lowest influent level.
 4. Design the wet well capacity to provide a minimum of 6" vertical separation between floats.
 5. Make provision in the control system to automatically, alternate the pumps in use.
- B. The standard duplex control elevations will be:
1. High alarm
 2. Lag on
 3. Lead on
 4. All off
 5. Low alarm
- C. If a Utility-company owns the lift station, follow their standards for a remote transmitting unit (RTU) is for each station, compatible with the utilities telemetry system.
- 3.4 VALVES AND PIPING
- A. A gate valve is required on the discharge line of each pump with a pressure gauge tap and isolation valve on the discharge side of the gate valve, installed with a double strap saddle.
1. A check valve is required between the pump and gate valve.
 2. Use only resilient seated gate valves in force mains.
 3. Gate valves shall be right hand close operation, check valves shall have an external weight arm; no springs permitted.
- B. Install a 4" or 6" tee and valve with 4" or 6" companion flange and plug on the pump-station discharge (FM) as an emergency by-pass.
1. The emergency by-pass connection with an aluminum male cam-lock with cover shall be the same size as the pump discharge, and shall be accessible above ground level.
 2. A gate valve located between valve vault and emergency by-pass connection is required.
- 3.5 WET WELLS
- A. A minimum diameter wet well is 6'.
1. The Utility Department may require the an odor control system if a long cycling time, or close proximity of the lift station to occupied structures may create an odor control problem.
- B. The effective capacity of the wet well or utilized capacity shall provide a holding period not to exceed 15 minutes for the design flow.
1. Use pump controls designed to start pumps no more frequently than once every 10 minutes.
 2. Use precast units for the underground structures unless otherwise specifically approved.
 3. All openings shall be precast.
 4. Generally, no core-drilled holes allowed for structures with a solid cast-in liner.
 5. The Supplier of the wet well shall certify that calcareous aggregate is in the concrete mix (minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings).
 6. Certification on the submitted shop drawings is acceptable.
 7. The wet well floor shall have a minimum slope of one-to-one to the pump intake.
 8. A corrosion barrier system is required for the interior of the wet walls and valve vault.
- C. All metal hardware in the wet well shall be stainless steel.
1. Wet wells with any leakage are not acceptable.
- 3.6 POWER SUPPLY
- A. Design all lift stations for 460-volt, 3-phase, and 60-cycle electrical service.
- B. Each pump shall have horsepower and speed rating (RPM) as shown on the design drawings.
- C. Connect District owned lift stations in to the school's emergency power system (480-volt, 3-phase, 60-cycle system).

- D. Provide Utility Company owned lift stations with standby power receptacles on the driveway side of the control panel. Use the Utility Company approved plug and receptacle.
- E. Provide phase monitor at all pumping stations.
 - 1. The maximum length of the electrical conduit from nearest transformer/hand hole to the lift station control panel shall be 50'.
 - 2. Locate the power supply feed to the lift station within a utility easement and show on record drawings. Electric power and control systems must comply with all local Codes, Ordinances, and National Electric Code requirements.
 - 3. Show power sources and feeders on the as-built drawings.

3.7 FENCED ENCLOSURES

- A. Enclose all lift stations with a 6' high chain link fence with a 12' wide double gate centered on the wet well, may use decorative fencing or landscaping in addition to the chain link fence.
- B. Chain link fence, post and gates shall meet the requirements of section 32 31 13 "Chain Link Fence and Gate" of these specification.

3.8 SITE SELECTION AND LAYOUT

- A. Provide direct vehicle access for maintenance purposes.
 - 1. An easement or right-of-way of sufficient size is necessary for access (typically 20' wide).
 - 2. Design the exterior top of the wet well at or above the 100-year flood elevations and not be more than 1' above the road grade adjacent to the station and in no case shall be at a lower elevation than the adjacent road.
 - 3. The driveway shall be no less than 30' in length from the edge of the ultimate right-of-way road pavement to the gate with a maximum grade of 3%.
 - 4. The layout of the station should be such as to provide easy access without interference between control panel and truck access.
 - 5. Place a plastic vapor barrier with 6" thick concrete pad (broom finish) in the fenced area.
 - 6. The concrete pad shall extend 12" beyond fenced area.
- B. The site for a lift station shall be selected to be easily accessible (preferable not from a major collector or arterial road).

3.9 WATER SERVICE

- A. Provide a 1½" un-metered potable water line with a Reduced Pressure Principle Backflow Assembly to each lift station site.
- B. The Contractor shall be responsible for the initial testing and certification of the assembly prior to the lift station start-up.
- C. The Backflow Prevention Assembly shall be located so that it will not interfere with panel opening or create a tripping hazard.

3.10 LIFT STATION ACCEPTANCE PROCEDURE

- A. A representative of the Architect shall be present at final inspections/start-up of a lift station, the following is a basis of acceptance:
 - 1. The pumps are reasonably pumping on the design-pumping curve.
 - a. Revised pumps, electrical systems, and/or impellers may be required if the force main system conditions changed since the initial approval of the pump design.
 - 2. The installation does not exceed the design amperage.
 - 3. The telemetry unit is functioning properly, if required.
 - 4. The station is functioning as designed.
 - 5. The station is constructed in accordance with these standards.
 - 6. The Contractor submitted the completed lift station checklist to the Architect prior to the lift station start-up.

7. Contractor submitted all legal documents.
8. Contractor submitted copy of the latest electric utility bill.
9. Contractor submitted a copy of backflow prevention assembly testing and certification.

3.11 SANITARY FORCE MAINS

- A. Force mains (FM) shall generally not be less than 4" ID and with an ultimate design flow velocity of no less than 2.0 FPS nor greater than 4.0 FPS.
 1. The District will consider force mains less than 4" in diameter on a case-by-case basis, with proper justification.
 2. Design standards for FMs will be generally the same as for potable water mains.
 3. FMs shall not enter a manhole from a direction contrary to the flow out of the manhole.
- B. Design Standards For Force Mains Are As Follows:
 1. Minimum Cover: Minimum cover to finished grade over FM shall be 36".
 - a. Mains installed at depths of more than 60" without justification are not acceptable.
 - b. Design and install pipe as level as possible to minimize high points.
 2. Horizontal Separation (Wall to Wall):
 - a. 15' to buildings, roof overhangs, canopies, walls, fountains, and other structures
 - b. 10' to potable water lines
 - c. 5' to other public utility lines
 - d. 5' to power poles, light poles and drainage pipes
 - e. 3' to drainage structures and reclaimed water lines
 3. Vertical Separation: Maintain minimum 18" separation between all pipes with FM crossing under potable water mains and reclaimed water mains whenever possible.
 4. Layout: Place FM in ROW whenever possible
 5. Valves and Appurtenances (FM):
 - a. Provide vales on all systems to facilitate the isolation of each section of pipeline.
 - b. All valves 3" or larger shall be gate valves of resilient seat design with right hand closed operation.
 - c. Valves 16" and larger may be of eccentric plug valve design.
 - d. Locate air release valves at the high points of the force main (2' minimum size).
 - e. In all instances, effectiveness of placement shall be the primary criteria in determining valve location.
 - f. Valves placed in curbs are not acceptable.
 - g. Maintain a minimum clearance of 18" or one pipe diameter, whichever is greater, between all fittings (bells, valves, flanges, etc.).
 - h. All isolation valves shall have:
 - i) A standard locking type valve box
 - ii) Operator nuts centered in the valve box
 - iii) Mechanical joint or flanged ends
 - iv) Valve operator nuts located 36" or more below final grade shall be equipped with an approved mechanically connected valve extension.
 - v) All fittings, bends, crosses, etc., shall have mechanical joint or flanged ends unless previously approved flexible joint restraint is used.
 6. Thrust Restraint:
 - a. Restrain all bends, tees, crosses, reducers, valves, and dead ends through an approved means of mechanical or approved flexible joint restraint.

The School District of Palm Beach County

Project Name:

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- i) Contractor may use thrust blocks consisting of poured-in-place concrete having a minimum compressive strength of 2,500 psi after 28 days cure only if necessary for connections to existing piping system.
 - ii) Any line terminated as a construction phase that is a known future extension, shall have a plugged valve placed at the end, and restrained with approved mechanical or flexible joint restraint.
 - b. An adequate number of pipe lengths shall be restrained using approved mechanical joint restraints (MJ pipe), flexible joint restraints (DIP push-on joint pipe), or pressure pipe bell restraints (PVC or DIP push-on joint pipe) to handle 150-psi working pressure and 250-psi surge pressure.
 - i) Licensed Engineer shall design the restrained pipe lengths based upon the soil conditions and show the information on the design drawings and record drawings.
 - c. If flexible joint restraints are utilized, the following requirements must be met:
 - i) The Architect must witness the installation of flexible joint restraints.
 - ii) A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.
7. Force Main Materials:
 - a. Force mains greater than 3", less than or equal to 24" in diameter shall be PVC AWWA C900 and AWWA C905 SDR 18 Class 150 pipe.
 - b. PVC force mains shall be marked with one continuous strip of 6" wide, brown coded magnetic tape imprinted with 2" high lettering reading: "CAUTION – FORCE MAIN BURIED BELOW," and located approximately 12" above the crown of pipe every 3'.
 - c. Do not encase any force main concrete.
 - d. Flanged ductile iron pipe is required for exposed installation.
8. PVC Pipe (gasket joint) and Fittings Force Main Application:
 - a. Pipe 4" or larger in diameter shall conform to the requirements set forth in AWWA C900 and AWWA C905 with dimension ratio DR 18.
 - i) Make provisions for contraction and expansion at each joint, or with rubber ring and an integral bell as part of each joint or by rubber ring sealed coupling.
 - ii) Fittings shall be cast or ductile iron.
 - iii) Pipe shall have cast iron pipe equivalent outside dimensions.
 - b. All pipes smaller than 4" in diameter shall conform to the Commercial Standard CS 256 and ASTM D2241.
 - i) Make provisions for contraction and expansion at each joint, with a rubber ring and an integral bell as part of each joint, or by a rubber ring sealed coupling.
 - ii) Pipe shall be made from SDR 21,200 psi clean, virgin NSF approved Type I, Grade 1 PVC conforming to ASTM D1784; clean reworked material generated from the manufacturer's own pipe production may be used.
 - iii) Fittings for pipe smaller than 4" in diameter shall be PVC.
9. Coatings: All ductile iron pipe and fittings shall have a ceramic epoxy lining and a bituminous coating on the exterior, per AWWA C210.
 - a. Apply the coating and lining in accordance with the manufacturer's recommendations.
10. Pressure Tests:
 - a. The test shall be of 2-hour duration.
 - b. During the test, the pipe shall maintain a pressure of not less than 150 psi.
 - c. All pipes shall be pressure tested in accordance with the current AWWA C600 Standard with a no leakage tolerance.

- d. Do not test more than 500' of gravity wastewater main or 1000' of force main at one time.
- e. Pressure tested gravity wastewater mains and laterals located in well field zones 1 and 2 shall be PVC AWWA C900 SDR18.
- f. The tested portion of the laterals shall end at the "upper" bend using a temporarily mechanical joint restrained cap.

3.12 SANITARY FORCE MAIN CONSTRUCTION

A. Installation:

1. Installation of force main pipe and associated fittings shall be in accordance with current AWWA specifications, and manufacturer's requirements for their particular products.
2. All mains shall have a minimum of 36" clear cover to finished grade.
3. Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details.
 - a. Place all pipes in trenches having a dry and stable bottom.
 - i) Backfill shall be free of boulders and debris.
 - ii) Fully support the pipe along its entire length.
 - iii) Replace all sharp or rocky material encountered in the base with proper bedding.
 - iv) Place the pipe on line and grade as designed.
 - b. Changes in pipe alignment are allowable with appropriate fittings or pipe deflection.
 - i) Pipe deflection at the joint is allowable with ductile iron pipe and with specially designed PVC pipes (see Approved Materials Lists).
 - ii) The deflection shall not exceed 75% of the Manufacturer's recommended maximum joint deflection.
 - iii) Joint deflection is not allowable at the joint for PVC pipe unless acceptable by the pipe manufacturer.
 - iv) Install appropriate bends to align PVC pipe if the manufacturer does not allow joint deflection.
 - c. Place all valves according to plans unless the Architect approves relocation.
 - i) As-build drawings shall reflect the actual location of all mains and valves.
 - ii) All taps must be at least 18" from a fitting or bell.
 - iii) Do not install force mains in fuel-contaminated areas.
 - d. All road crossings and pavement cuttings shall be in accordance with the requirements of the particular authority governing the area.

B. Connection to Existing System:

1. Make all connections to existing mains under the inspection of the Architect.
2. Operation of valves on existing mains shall be by Utility Department personnel or under their direct supervision.
3. Using a cut-in tee or a tapping sleeve is an acceptable method of connecting to an existing force main (minimum branch size shall be 4").
4. Tapping sleeve and valve shall be pressure tested prior to tapping.
5. A reverse tap due to pre-existing conditions is acceptable only if previously approved by the Department (construction detail required).
 - a. The Utility Department requires at least 7-days notice to make necessary notifications if it is necessary to cut to existing Customers.
 - b. The Contractor or Owner may be required to assist in notifications.
 - c. In this event, Contractor shall be ready to proceed with as much material pre-assembled as possible at the site to minimize the length of service interruption.

- d. The Utility Department will postpone a service cut-off if the Contractor is not ready to proceed on schedule.
 - e. Consider such connections be done at night to minimize effects.
- C. Cleaning:
1. Keep all foreign material out of pipe or clean from pipe prior to installation.
 2. Flush the mains upon completion of installation, and the properly dispose the water without creating a nuisance.
 3. Cap the open ends of the any pipe at the end of each day with a pipe lug to prevent contamination.
- D. Testing:
1. Pressure test all force mains in accordance with the current AWWA C600.
 2. Supply water to the main and pump to the required pressure, 150-psi.
 3. Test no more than 2,500' of pipeline at a time.
 4. The standard test duration is 2-hours.
 5. The maximum quantity of water supplied into the subject pipe to maintain pressure within 5 psi of the test pressure shall not exceed 50% of the AWWA C600 Standard.
 6. Pressure test the force mains within road rights-of-way and under traffic areas after the installation of the road base/rock and "tack-coat", and before the asphalt installation.

END OF SECTION