

CHAPTER 8 WASTEWATER SYSTEM STANDARDS

8.1 SCOPE

Wastewater pipelines and appurtenances shall be provided as shown on the plans and as specified herein. Clearing, grubbing, trench excavation and backfill, pipe material, valves, cutting and replacing pavement, and removing and replacing sidewalk shall be as specified in other chapters. All applicable provisions shall be binding upon work covered in this section.

8.2 INSTALLATION GUIDELINES

Piping and appurtenances shall be installed in accordance with the best practice, manufacturer's instructions, and ENGINEER'S direction. Where the pipeline crosses under or is installed on highway or railroad right-of-way, the work shall be done in accordance with such requirements specified in other chapters.

There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which may permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any part of a sewer manhole.

Locations: Piping and appurtenances shall be installed at the locations shown on the plans and to the position, alignment, and grade shown thereon. Prior to beginning work at any location, the CONTRACTOR shall consult with the AUTHORITY and ENGINEER to determine that all rights-of-way, permits and other legalities are in order. CONTRACTOR shall familiarize himself with all conditions and/or limitations of such rights-of-way or permits, and shall fully comply with all such requirements. All work shall be confined to rights-of-way or permit limits and any encroachment beyond such limits shall be the CONTRACTOR'S liability.

Excavation along pipelines shall be as specified in Chapter 2. Pipe and appurtenances shall be hauled to the work site and distributed neatly along the trench prior to installation. Pipe shall be carefully handled to prevent damage by using mechanical hoists or other approved methods. All damaged pipe and appurtenances shall be rejected and removed from the work site.

Sewer lines shall be laid no closer than 10 feet horizontally from any water main. The distance shall be measured edge-to-edge. Where it is impossible to maintain the prescribed 10 feet of separation, the AUTHORITY may at its discretion allow deviation from the 10 foot requirement provided both the water and sewer line shall be constructed to water system standards and pressure tested to a minimum of 150 PSI in accordance with the SCDHEC Standards. Prior approval must be obtained from the AUTHORITY before proceeding.

Sewer lines crossing water mains shall maintain a minimum separation of 18" vertically. Where it is impossible to maintain the prescribed 18 inches of vertical separation, the water line shall be constructed of ductile iron pipe and the sewer line shall be constructed to water system standards and pressure tested to a minimum of 150 PSI in accordance with the SCDHEC Standards.

Installation shall proceed as follows:

A. Installation of Wastewater Force mains: Pipe and Appurtenances:

1. PVC sewer force mains must be installed in accordance with ASTM D-2321, latest revision.
2. Fittings, valves, and other appurtenances shall be installed where shown on the plans or as directed by the ENGINEER. Fittings shall be well restrained as specified on the plans.

3. Connections to existing facilities shall be made where shown on the plans or where directed by the ENGINEER. All connections to existing system shall be performed in the presence of the AUTHORITY Inspector.
4. Pipe and appurtenances shall be kept clean and open ends securely plugged when pipe installation is not in progress. The inside of pipe, bells, and spigots shall be thoroughly inspected and cleaned prior to lowering into the ditch. Care shall be exercised after the pipe is in place to prevent dirt or other extraneous material from getting into the pipe, bells, and spigots.
5. Spigots shall be fully seated in bells, and the pipe shall be uniformly bedded on the bottom of the trench for its entire length, with bells laying in previously dug bell holes sufficiently large to allow for proper bedding and jointing. Pipe shall be cut where necessary. After jointing, a reasonable amount of deflection may be made in the joint. Such deflection shall not exceed 50% of the maximum allowable amount recommended by the manufacturer for each size of pipe.
6. Pipe on piers or supported from bridge shall be ductile iron unless otherwise noted, and shall be properly installed in accordance with the details shown on the plans. Pipe shall be carefully placed in position to the required line and grade. Joints shall be restrained mechanical joints unless otherwise noted, and shall be watertight and trouble-free. All fittings and connections, including transition pieces, shall be provided as required for a complete installation. All hangers, supports, straps, bracing, anchors and other appurtenances shall be a minimum of type 304 stainless steel and shall be provided as detailed or required for proper alignment and support of the pipe.
7. River crossing pipe shall be laid as shown on the plans. Trenching shall be as shown and shall produce a suitable bearing surface for the pipe throughout the length of the trench. After pipe laying has been completed the trench shall be backfilled. Installation of river crossing pipe shall proceed as follows:
 - a) Concrete anchor collars shall be constructed in accordance with the plans.
 - b) Appropriate end of the run fittings shall be provided at each end of the river-crossing run to mate with the pipe approaching and leaving the river.
 - c) A minimum cover of 48" (4 feet) shall be provided over the pipe. When crossing watercourses, which are greater than fifteen feet (15') in width, the following shall be provided.
 - i) The pipe shall be ductile iron of special construction, having flexible watertight joints or of fuse butt-welded polyethylene with concrete anti-flotation collars.
 - ii) Valves shall be provided at both ends of the water crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding. The valves shall be installed in a watertight manhole or vault.
 - iii) Permanent taps shall be made on each side of the valve on the source side to allow insertion of a small meter to determine leakage and for sampling purposes.
8. Connections shall be made with tapping sleeves and valves, except where other type connections are specifically shown.
9. Wastewater force mains shall not be installed closer than 18" to a water main. Wherever possible, the water main shall be located above the sewer.
10. Profile force main after installation to determine high points. At high points install an ARV in such a way to prevent air pockets of more than $\frac{1}{2}$ pipe diameter. Install ARVs

when more than $\frac{1}{2}$ pipe diameter change downward. If an obstruction is encountered which would require a change in the grade of the work, the AUTHORITY and the ENGINEER shall be notified immediately. Air release valves shall be provided where shown on the plans or directed by the ENGINEER and shall be carefully installed in accordance with applicable portions of these specifications.

11. Trenches for wastewater forcemains shall generally follow the final contour of the ground so as to provide a minimum cover of 36" and a maximum cover of 60", unless approved by the AUTHORITY. Force mains crossing hardscapes shall be installed in casing to a distance of 5' outside.
12. Except where necessary to make connections with other lines, pipes shall be laid with the bell facing the direction of installation. For lines of appreciable grade, the bells shall be facing upgrade.
13. Mechanical thrust restraints shall be applied on all pressure pipelines four inches (4") in diameter or larger at all bends tees, valves, and plugs.
14. Manholes, pits, or vaults containing valves, air release valves, or other appurtenances in the collection system shall be sealed watertight with sumps and shall be located where they are not subject to flooding by surface water. Under no circumstances are drains to be connected to any storm or sanitary sewer system.
15. Backfilling of trenches shall be as specified in Chapter 2.
16. Cutting and replacing of pavement shall be as specified in Chapter 4.
17. Force main shall have inline valves at a minimum of 2000' on center. Locate inline valves near ARV or road intersections.
18. Tie-ins to force mains must be made with a valve. Tie-ins of 6" and larger shall also include installation of upstream inline valves
19. All tie-ins shall require flex disc design check valves. Check valves larger than 2" shall be in a vault.
20. Force mains greater than 2", which terminate into gravity system, must discharge into control manhole.

B. Installation of Wastewater Gravity: Pipe and Appurtenances

1. PVC gravity sewer pipe must be installed in accordance with ASTM D-2321, latest revision.
2. Pipe and appurtenance shall be kept clean and open ends securely plugged when pipe installation is not in progress. The inside of pipe, bells and spigots shall be thoroughly inspected and cleaned prior to lowering into the ditch. Care shall be exercised after the pipe is in place to prevent dirt or other extraneous material from getting into the pipe, bells and spigots.
3. Each section of sewer pipe shall be specified to be laid to the appropriate line and grade on #57 stone, as designed, working in the upstream direction with the bell end laid upgrade.
4. Gravity sewer crossing storm drains shall maintain a minimum vertical separation of 12". When crossing separation is less than 18" #57 stone shall be installed between the Storm drain invert and the Gravity Sewer invert.
5. Pipe on piers or supported from bridge shall be ductile iron with stainless steel hardware, and shall be properly installed in accordance with the details shown on the plans.
6. Connections to Existing Facilities shall be made where shown on the plans or where directed by the ENGINEER. All connections to existing system shall be performed in

the presence of the AUTHORITY Inspector. Connections to existing manholes shall be made by core drilling and installation of flexible boots.

7. Where a water line crosses under gravity sewer or within 18 inches above the sewer, sewer lines shall be constructed of C900/DR25 (no joint shall be allowed within 7' of the sewer line) at the crossing. In this case, gravity sewer shall be water pressure pipe from manhole to manhole in accordance with the SCDHEC Standards. Transition from water pipe to SDR class pipe must be in a manhole. Prior approval must be obtained from the AUTHORITY before proceeding. All replacement of sewer pipe shall be performed in a manner to cause the least interference with the operation of existing pipelines.
8. Gravity sewer crossing storm drains shall maintain a minimum vertical separation of 12". Gravity sewer crossing storm drain with separation less than 18" shall be installed as follows:
 - a) The entire area between the bottom of the lower pipe to the bottom of the upper pipe shall be bedded in # 57 stone. The Engineer must certify to BJWSA that stone was installed at such locations.
 - b) Prior approval by BJWSA must be obtained to install a gravity line with less than 12" separation between storm or water line.
9. Gravity sewer and manholes shall be laid a minimum of 10 feet horizontally from any water main. The distance shall be measured edge-to-edge. Where it is impossible to maintain the prescribed 10 feet of separation, the AUTHORITY may at its discretion allow deviation provided both the water and sewer line shall be constructed of pipe which conforms to SCDHEC drinking water standards for material and pressure testing. Prior approval must be obtained from the AUTHORITY before proceeding.
10. Manholes in the collection system shall be sealed watertight and shall be located where they are not subject to flooding by surface water. Manhole top elevations shall be greater than or equal to the 50 year flood elevation, unless watertight covers are provided.
11. Backfilling of trenches shall be as specified in Chapter 2.
12. Cutting and replacing of pavement shall be as specified in Chapter 4.

C. Installation of Sewer Service Laterals: The intent of this Section is to ensure that every service lateral connected to BJWSA's sewer collection system will perform properly for the life of the building it serves. Inspections will emphasize the following criteria: quality of materials used, grade maintained along the full length of the pipe, access to the pipe in the event that service is needed, conformance to all applicable county codes, and construction techniques.

1. If a preexisting sewer lateral is stubbed out at a lot property line, the CONTRACTOR must connect to this pipe at an approved grade. No other taps to the gravity main or manholes shall be made without the approval of the AUTHORITY. The location and elevation of this lateral must be verified before laying out the plumbing plans. The AUTHORITY reserves the right to determine the size of the service lateral to any property. The AUTHORITY shall also determine the extent of piping that is to be deeded to BJWSA for operation and maintenance.
2. Installation of services on existing lines shall normally be accomplished by cutting "Wye" into the line. Only with prior written approval from the Authority, may existing mains be tapped for new services.
3. BJWSA Sewer lateral shall be either 4-inch or 6-inch diameter SDR-25 ASTM-3034 PVC. Private laterals shall be constructed using either gasketed sewer pipe with SDR-

35 gasketed pipefittings or Schedule 40 glue jointed pipe and fittings. Primer is to be purple and glue gray. Petroleum-based pipe lube cannot be used.

4. The slope of the lateral must be at least $\frac{1}{4}$ -inch per foot with no more than 5% deflection. The AUTHORITY will determine if this grade can be modified. A minimum 12 inches of earth cover is required for all lateral piping. Bedding may be required depending on soil conditions.
5. Clean Outs: A dual sweep tee with a cleanout plug must be installed at the building for cleaning in both directions. The dual sweep tee may be waived if cleanouts existing inside the building are turned toward the main. All cleanouts shall be 4" regardless of lateral size and shall terminate with screw cap at final grade. All clean outs, except the dual sweep, are to be installed inside a valve box top with a Sewer lid. The lateral must be constructed in such a way to reduce the number of bends from the building to the street connection. 90 degree bends will not be allowed. If it is determined that an excessive number of bends has been used, the AUTHORITY will require cleanouts to be installed at each bend. All required cleanouts must be turned toward the sewer main. **Maximum distance between cleanouts shall not exceed 70 feet.**
6. When laying pipe, the CONTRACTOR shall run the pipe as straight as possible with the bell end uphill.
7. The CONTRACTOR must call the BJWSA Field Operations Office at **987-9209** between the hours of 7:30 a.m. and 4:00 p.m. to schedule sewer lateral inspections for completed taps. Barring emergencies, inspections will be done on Mondays, Wednesdays, and Fridays only. The AUTHORITY cannot guarantee a specific time for an inspection. The entire lateral from the building to the street connection must be exposed for the inspection; however, in the case of rain, the CONTRACTOR may cover short sections of pipe to keep it from floating up, providing the bells are not covered. If an inspection fails or is not complete, the CONTRACTOR is responsible for correcting the problem(s) and calling the Field Operations Office for a re-inspection. The re-inspection will be scheduled according the above schedule. The inspection form will be left in the CONTRACTOR's plan tube or at the clean-out at the street. A copy of the approved inspection form will be mailed to the appropriate approved Building Codes Department on the next business day. Permanent power connection will not be allowed until the County is notified of the approved sewer inspection.

D. Installation of Sand, Oil & Grease Interceptors: Sand, oil, or grease interceptors shall be provided when, in the opinion of BJWSA, they are necessary for the proper handling of liquid waste containing, sand, oil, grease or other harmful ingredients in excessive amounts. All interceptors shall be of a type approved by the BJWSA and shall be located as to be readily and easily accessible for cleaning and inspection. All interceptors shall be supplied and properly maintained continuously in satisfactory and effective operation by the OWNER at his expense. Sand, oil, and grease shall be removed when approximately 75% of the capacity of the system have been reached. Chemical additives shall not be added to the interceptor system for removal or cleaning of the system without prior approval of BJWSA.

1. Design Criteria:
 - a) The minimum size shall be 1000 gallons. (See Standard Detail S-04.)
 - b) Traps shall be designed to fail closed.
 - c) Sizing shall be based on the volume of wastewater through the unit and shall retain 90% of the oil and grease and 100% of the sand; with a solid retention capacity in pounds equal to at least twice the flow capacity in GPM.

d) Restaurants, hospitals, nursing homes and other commercial kitchens with varied seating capacity shall be computed utilizing the following design guidelines:

$$\text{Size of Interceptor} = (M) x (Q) x (T) x (S)$$

M = Number of meals per peak hour

= Seating Capacity x Meal Factor

Establishment Type:	Meal Factor
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Fast Food (45 min)	1.33
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Restaurant (60 min)	1.00
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Leisure Dining (90 min)	0.67
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Dinner Club (120 min)	0.50
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Q = Waste Flow Rate

Condition	Flow Rate
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With a Dishwashing Machine	6 Gallons
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Without a Dishwashing Machine	5 Gallons
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Single Service Kitchen	2 Gallons
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Food Waste Disposer Only	1 Gallon
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T = Retention Time

Commercial Kitchen Waste Dishwasher	2.5 Hours
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Single Service Kitchen Single Serving	1.5 Hours
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S = Storage Factor

Kitchen Type	Storage Factor
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Fully Equipped Commercial Hours of Operation	
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8 Hours	1.00
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12 Hours	1.50
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16 Hours	2.00
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24 Hours	3.00
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Single Service Kitchen	1.50
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2. Single Service Kitchen is defined as no food preparation (heat/serve only), and which use only paper service items.
3. Should the potential exist for commercial properties to need a grease trap facility, the OWNER/developer must incorporate the space requirements in the original site plan. The minimum space requirement is 20' X 20' and the site must be located in line with building discharge lateral and trap shall be sized according to BJWSA Specifications. Plans and sizing calculations for the installation of any grease trap must be submitted to the AUTHORITY by a licensed engineer and approved prior to initiating construction. A cleanout shall be installed in the lateral on both sides of the grease trap turned toward the manhole.
- 4.

8.3 PIPELINE TESTING PROCEDURES

All pressure piping and gravity sewer piping shall be tested by the CONTRACTOR as specified herein and as directed by the ENGINEER. Testing shall be conducted in the presence of the AUTHORITY or the ENGINEERS representative in a manner to minimize interference with the progress of the work.

- A. Hydrostatic Testing of Pressure Pipelines: Each pressure pipeline or valved section thereof shall be subjected to hydrostatic testing in accordance with all applicable provisions of AWWA C600, Section 4, latest edition.
- B. Pressure Test: Unless otherwise specified pressure lines shall be tested to the working pressure but not less than 100 PSI or greater than pressure rating of pipe based on the lowest point of the section under pressure. Before applying the test pressure, all air, dirt and foreign material shall be expelled completely from the line through air valves, flushing and other means. The test shall be maintained at full pressure for at least two hours. Pressure gauges on test apparatus shall be a minimum of 4" diameter with a minimum of 1 PSI graduations. All damaged or defective pipe, fittings, joints, valves, hydrants and appurtenances discovered after the pressure test shall be repaired or replaced with sound material, and the pressure test repeated until satisfactory to the ENGINEER.
 1. Pressure lines shall be tested to 150% of the working pressure but not less than 100 psi. for a period of 2 hours. No leakage will be allowed. Pipeline must maintain test pressure for 2 hours.
 2. If during the test a pressure drop occurs, the CONTRACTOR shall, at his own expense, locate and repair all defects until there is no leakage or drop in pressure. All visible leaks shall be repaired regardless of the amount of leakage.
 3. Water for testing will be furnished by the CONTRACTOR, who shall furnish the test pump, measuring devices and all necessary pipe or hose extensions or transportation to the point of use, and shall exercise care in the use of water.
 4. If large amounts of water are needed for flushing, the CONTRACTOR must make arrangements with THE AUTHORITY to measure water used.
 5. All valves within the test section shall be completely opened and closed several times during the test period.
- C. Gravity Sewer Testing:
Air Testing: Air testing of gravity sewer pipelines shall be done in accordance with applicable provisions of ASTM F-1417. All lines shall pass the air test before they will be accepted by the ENGINEER. Lines not passing the test shall be repaired and retested as required. Air testing shall not occur until all underground dry and wet utilities have been installed and roads have been subgraded.
 1. Air test shall be conducted in strict accordance with the testing equipment manufacturer's instructions, including all recommended safety precautions. Equipment used for air testing shall be specifically designed for this type of test, and is subject to approval of the ENGINEER.
 2. The CONTRACTOR shall furnish an air compressor which will provide at least three hundred cubic feet of air per minute at one hundred pounds per square inch along with all necessary plugs, valves, air hoses, connections and other equipment necessary to conduct the air test. Pressure gauges on test apparatus shall be a minimum of 4" diameter with a minimum of 1 psi graduations and a maximum range of 0-10 psi. Plugs in sewer eighteen inches (18") in size and larger shall be connected by cable for thrust reaction.

3. For sewer lines 12" and smaller the following procedure shall be used:

The sewer section shall be plugged at both ends and air pressure shall be applied until the pressure inside the pipe reaches 4 PSIG. The pipe shall hold this pressure with no loss for 6 minutes. No leakage will be allowed. If any pressure loss is observed, pipe breakage, joint leakage, or leaking plugs are indicated and the cause must be determined and corrected. After repairs have been made, the sewer sections shall be retested. This process shall be repeated until all sewer sections pass.

4. For sewer lines greater than 12" the ENGINEER shall submit testing procedures. The procedure must be approved by BJWSA before testing.
- D. Pipe Deflection Test: All PVC gravity sewer pipe, 8-inch diameter and larger, shall be tested after installation and backfill by the CONTRACTOR. Testing shall be performed at the CONTRACTOR's expense using a 5% mandrel acceptable to the AUTHORITY to insure that initial deflection of pipe does not exceed 5.0%. All deflection testing shall be performed in the presence of the ENGINEER and the AUTHORITY. CONTRACTOR shall notify the ENGINEER and the AUTHORITY in sufficient time to insure that the both will be present during deflection tests. . Deflection testing shall not occur until roadbed sub base has been installed and compacted to its final density. Deflection test records shall identify the location of each test. Pipe with deflection exceeding the specified limit will be unacceptable, shall be re-bedded to the correct deflection and retested for deflection at the CONTRACTOR's expense. Test records shall be certified by the CONTRACTOR, and shall be furnished to the ENGINEER prior to acceptance.
- E. Visual Inspection: All gravity sewer manholes and pipelines shall be visually inspected by the AUTHORITY'S Inspector. This inspection shall be on a wet system prior to acceptance. Gravity sewer manholes shall be to final grade, have no visible infiltration, contain properly formed and sloped inverts, and be properly coated as outlined in Chapter 9. Gravity sewer pipelines shall be of uniform slope with no portion holding water. Repairs to gravity sewer pipelines shall be performed in manner equivalent to new construction. Flexible style couplings or repair bands shall not be used. If the AUTHORITY suspects that the gravity sewer pipeline does not meet the design criteria, a video inspection, at the CONTRACTOR'S expense, may be required.
- F. Video Inspection: Where, in the opinion of the AUTHORITY, the integrity of the system cannot be determined by the procedures outlined afore, video inspection of all lines in question by an independent sewer inspection service approved by the AUTHORITY will be required prior to issuance of the Service Authorization. The cost of said video inspection and subsequent repair shall be incurred by the CONTRACTOR.
- G. Soil Compaction Test: All trenches suspected of not meeting the compaction requirements stated previously shall be tested for conformance by a BJWSA approved testing laboratory and at the locations and depths requested by the AUTHORITY.
- H. Inspection and Acceptance: All work shall be subject to inspection and approval prior to final acceptance and payment.
 1. Pressure and Leakage Tests shall be as specified in this Chapter.
 2. Cleanup and site restoration shall be as specified in Chapter 3.
 3. Closeout documentation, including as-built record drawings, easement and conveyance documents, shall be as specified in the AUTHORITY's Development Policy and Procedures Manual, latest edition.

END OF SECTION