

## **GENERAL INFORMATION AND REQUIREMENTS**

### **1.0 BOARD'S STANDARD SPECIFICATIONS:**

Copies of these Standard Specifications for Water Mains, Sanitary Sewers and Sewage Pumping Stations may be purchased from the offices of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama, 207 N. Catherine Street, Mobile, Alabama 36604.

The standards are intended to provide a basis for system improvements that will result in facilities that will efficiently perform their intended purpose over a useful life that can be expected from the application of quality workmanship and the latest available materials and technology.

As such the standards will change from time to time. Suggestions for improving the Standards should be submitted to the Director. Complaints regarding Standards thought to be unreasonable should also be submitted to the Director, with proposed changes.

### **2.0 DISPOSITION OF PREVIOUS STANDARD SPECIFICATION:**

Upon adoption of these Standard Specifications for Water Mains, Sanitary Sewers and Sewage Pumping Stations contained herein by the Board of Water and Sewer Commissioners of the city of Mobile, Alabama, all previously issued Standard Specifications for Water Mains, Sanitary Sewers and Sewage Pumping Stations shall be null and void. The previous Standard Specifications (dated January 1975) shall remain applicable to contracts that have been bid and for which an award has been or will be made on said Specifications.

### **3.0 JURISDICTION:**

These Standard Specifications shall apply to all proposed water and wastewater mains to be owned, operated or maintained by the Board of Water and Sewer Commissioners of the City of Mobile, Alabama.

### **4.0 PURPOSE:**

These Standards and Specifications are adopted to establish minimum acceptable standards for the design and construction of water distribution and transmission facilities and wastewater collection and transmission facilities owned, operated or maintained by the Board of Water and Sewer Commissioners of the City of Mobile, Alabama. Such facilities include water mains, gravity sewers, wastewater force mains, wastewater pump stations, and miscellaneous related appurtenances associated with such systems.

### **5.0 STANDARDS FOR PLANS:**

Plans for water lines, sanitary sewers, and other appurtenances to the Board's water and sewer systems shall clearly define the Work and all details shall be in conformance with the Board's Standards.

**A. Datum:** All elevations on Plans are to refer to the NGV Datum, in lieu of the old Mobile City Datum. All plans submitted to the Board shall clearly state that the datum reference to NGV.

**B. Locality Maps:** Locality maps, showing the area of the City in which the project is located, shall be included in all sets of Plans.

**C. Review and Approval of Plans:** Copies of all Plans must be submitted to the Board of Water and Sewer Commissioners and to the appropriate state, federal and local agencies for review and approval before advertising and receiving bids.

**D. Record Drawings:** On completion of the project, the Plans are to be revised to show the work as it was actually constructed. The locations of all tees, laterals, fire hydrants, valves and other appurtenances are to be clearly shown and dimensioned. Copies of the record plans and videotape as described in Section 12 are to be furnished to the Board at the time of, or prior to the Board's acceptance of the facilities.

## **6.0 SUBDIVISION SUBMITTAL REQUIREMENTS:**

The following requirements apply to water and sanitary sewer facilities for residential and commercial subdivisions submitted to the Board for review, approval and maintenance.

### **A. General:**

1. Submit three sets of Plans which have an Alabama Registered Engineer's Seal and/or Signature and Registration Number affixed to the cover sheet of each set.

2. All material and construction shall be in strict conformance with the Board's Standard Specifications, latest revision.

3. The Board shall be furnished with permanent easements for water and sewer facilities not located in public right-of-way. The easement shall be exclusively for the use of water and sewer lines, and shall not be joint easements with drainage facilities or other utilities. The minimum width of easements shall be 15 feet, a combined water and sewer minimum will be 20 feet. Easements shall be submitted in a form satisfactory to the Board. Easement descriptions shall be prepared by a professional land surveyor licensed in the State of Alabama, and shall conform to the Minimum Surveying Technical Standards for Land Surveying as adopted by the Alabama Board of Registration for Professional Engineers and Land Surveyors.

4. Permits required for construction of water or sewer facilities located in public right-of-way shall be obtained from the city, county or state and a copy delivered to the Board's office. Permits are to be submitted and approved prior to the start of construction.

5. The following shall be provided on submittal cover sheet:

a. The cover sheet of the Record Drawings submitted to the Board shall include a list indicating, by line size, the length of new water and sewer lines, and number of new fire hydrants and manholes actually installed. Also, calculated peak wastewater flows from the development shall be included on Preliminary and Record Drawings. Preliminary Drawings submitted to the Board shall include calculations showing how peak flows were derived.

b. A vicinity map showing the location of the project shall be included on the Cover Sheet.

c. An estimated construction cost for the Project.

6. Where future phases of construction are planned, two copies of the Master Development Plan shall be submitted to the Board.

7. The Board requires that water and sewer facilities serving commercial and residential properties be designed and constructed such that they may be extended to serve any future development as a result of cutouts from or additions to the initial and subsequent developments. The total cost of water and sewer facilities to serve such cutouts, subdivisions or additions shall be at the expense of the developer. Should redesign of these facilities be required, the revised Plans shall be submitted for review and approval by the Board.

8. Record Drawings shall be provided to the Board and shall include the certification of a professional engineer registered in the State of Alabama. This certification shall state that the Work is constructed in accordance with the Record Drawings and these Standard Specifications. Internal videotape documentation of sewers shall be provided, as specified in Paragraph 12.32, "Internal Video Inspection", of these Specifications.

**B. Water Facilities:**

1. Adequate cover and clearance shall be provided for water lines where they cross sanitary and storm drainage lines. Horizontal separation provided between water and sewer lines shall comply with ADEM regulations. Maintain a 5-foot horizontal separation between water lines and storm drains.

2. Water line sizes shall be adequate for proposed and future service.

3. Fire flow calculations, and expected pressures in the line, for the proposed water system shall be submitted to the Board. The system shall be designed to maintain a minimum pressure of 20 psi at all points in the distribution system under all conditions of flow. The minimum design flow at fire hydrants in residential subdivisions shall be 1,000 GPM. Higher design flows may be required at commercial, industrial and high density residential areas. The normal working pressure in the distribution system shall be approximately 55 psi, but in no case less than 35 psi on the downstream side of a meter. For pressures greater than 90 psi, special provisions may be required.

4. Location of fire hydrants shall be in accordance with AWWA Manual M31, latest edition.

5. Tapping of the water mains, installation of service tubing, curb stops and meter boxes in new subdivisions shall be performed by the developers Contractor and must be coordinated with the Board's Water Service Engineer. Testing and disinfection shall be performed both on the mains and service lines. The Contractor shall perform all removing and replacing of pavement and incidentals necessary for the taps.

6. Where possible, looped water systems shall be considered rather than dead end runs.

7. Potable water supply lines shall not be tied into fire lines or 6-inch fire hydrant lines.

8. Valves shall be installed on all fire line branches off the water main.

9. In cases where individual water meters are installed by other than Board, they shall comply with current purchasing standards of the Board for domestic water meters. Where water meters are installed on private drinking water wells for purposes of calculating sewer bills, the meter location shall be accessible to the Board's meter reading personnel.

**C. Sanitary Sewer Facilities:<sup>1</sup>**

**Sanitary Sewer Design**

Corrosion control measures should be addressed in the design of sanitary sewer facilities. A Best Management Practice (BMP) for design of new sanitary sewer systems is to control corrosion by reducing buildup of sulfides or preventing formation of Hydrogen Sulfide. The purpose of this BMP is to emphasize proactive solutions to potential corrosion in sanitary sewer systems. Limiting the use and length of force mains is probably the single most important factor in minimizing sulfide in collection systems. Closed conduit systems, e.g. force mains, siphons, and surcharged sewers are prime generators of the reduced sulfur compounds that can lead to sulfide buildup and hydrogen sulfide formation. Often times limiting the lengths of force mains is not an option; consequently, force mains should be designed with properly placed air release and/or vacuum valves.

The most significant factor in successful interceptor design is the velocity of the wastewater. Adequate velocity is necessary to assure that deposits do not form in interceptors. The slope of gravity sewer lines shall be sufficient to provide a velocity of 2.1 fps. Minimum slopes are identified in the "Ten States Standards"; however, slopes greater than those (and velocities higher than 2.1 fps) are desirable. The pipe diameter and slope shall be selected to obtain the greatest practicable velocities to minimize settling problems. Oversize sewers will not be approved to justify using flatter slopes.

Turbulence can improve the oxygenation of wastewater flowing through a sewer system and consequently oxidize sulfide to dilute sulfate, rendering it harmless within the flow. However, turbulence can also result in severe localized sulfide release when significant concentrations of sulfide are already present in the wastewater. Turbulence in gravity sewers should generally be avoided. Potential sources of turbulence include manholes with sewer pipe discharges (both gravity and force main) above the invert, manholes with colliding flows from opposite directions, manholes with sharp bends, and sections with slopes producing critical or near-critical flow.

Odor control is not necessarily the same as corrosion control. Localized hydrogen sulfide control can be effective in controlling odors without effective, total control of sulfides downstream of the odor problem. There are numerous different chemicals that can be utilized to control hydrogen sulfide in sanitary sewer systems, and there are several different chemical reactions by which hydrogen sulfide can be controlled. However, there are two general ways to control hydrogen sulfide with chemicals: prevent sulfide formation, or react with sulfides in the stream to prevent the release of hydrogen sulfide. When designing a new gravity sewer or force main, consider the route and detention time of flow from the new sewer facilities through the existing collection system and evaluate the benefits of chemical addition for corrosion control.

**Pipe Materials**

Where potentially corrosive situations cannot be avoided due to constraints of a particular application, the Best Management Practice (BMP) is to control corrosion with corrosion-resistant materials. Section 12 identifies 4 different pipe materials for use in sanitary sewers.

---

<sup>1</sup> Revised & adopted 1/6/03.

- Ductile Iron Pipe
- PVC Pipe
- Reinforced Concrete Pipe
- Polyethylene Pipe

Ductile Iron Pipe can be used in gravity sewers and force mains. All Ductile Iron Pipe and fittings for gravity sewers must have a corrosion-resistant interior lining such as the ceramic epoxy lining specified in Section 12. The cement mortar lining specified in Section 12 is not acceptable for gravity sewers, but is required for all Ductile Iron Pipe and fittings for typical force mains. Ductile Iron Pipe in any portion of a force main that conveys less than full pipe flow should have the same corrosion-resistant interior lining required for gravity sewers. Ductile Iron Pipe is suitable for many gravity sewer and force main applications. Ductile Iron Pipe is specifically required for all gravity sewers and force mains more than 14 feet deep, for all gravity sewers with slopes greater than 10 percent, and for all gravity sewers and force mains located in easements not adjacent to Rights of Way regardless of depth or slope.

The PVC Pipe material specified for gravity sewers is for 8-inch, 10-inch, 12-inch, and 15-inch diameters only. PVC Pipe can be used for all gravity sewers in these diameters in applications where Ductile Iron Pipe is not required.

The PVC Pipe material specified for force mains is for diameters 4 inches through 12 inches. PVC Pipe can be used for all force mains in these diameters in applications where Ductile Iron Pipe is not required. Because PVC will not corrode, it is a good choice of materials for force mains that convey less than full pipe flow. Fittings for PVC Pipe, if necessary, are the same as Ductile Iron Pipe fittings. Fittings in any portion of a force main that conveys less than full pipe flow should have the same corrosion-resistant interior lining required for gravity sewers.

Reinforced Concrete Pipe (RCP) can be used in large diameter gravity sewers. The calcareous aggregate specified for all RCP will extend the time necessary to corrode a given thickness of concrete wall. The use of calcareous aggregate is not a substitute for a corrosion-resistant lining. The ceramic epoxy lining specified for all RCP is a corrosion-resistant interior lining similar to that specified for Ductile Iron Pipe. PVC lining is a corrosion-resistant lining installed in 270 degrees of arc rather than the full circumference of the RCP. PVC lining can be a substitute for ceramic epoxy lining in applications where interior corrosion is anticipated above the normal water surface. If the wastewater contains chlorides, for example, corrosion can be anticipated over the full circumference of the pipe and a full circumference lining such as ceramic epoxy is preferred. A holiday test is required for each type of lining, and it is necessary to perform field welding and subsequent testing at each joint in an RCP sewer. In order to provide sufficient space for a worker inside the pipeline, RCP smaller than 36 inches in diameter should not be used for gravity sewers.

Polyethylene (PE) Plastic Pipe can be used in gravity sewers and force mains. Where pipelines are installed by Horizontal Directional Drilling, PE Plastic Pipe is the material of choice. PE plastic pipe is also the material of choice for gravity sewer rehabilitation by the Pipe Bursting and Trenchless Pipe Replacement Method. Butt fusion welding is used to join PE Plastic Pipe into one continuous pipeline which is ideal for Horizontal Directional Drilling and Pipe Bursting. Depending on the circumstances of installation, this material might be appropriate for installation in an open-cut trench. If pipe sections are joined on top of the ground, the length of open trench is greater than for pipe sections joined in the trench. The trench depth and proposed method of protecting workers in the excavation, e.g. shoring system,

trench shield, benching, etc. should be considered when evaluating PE plastic pipe for installation in an open-cut trench.

### **Manhole Materials**

Section 12 specifies that all manholes are precast concrete with calcareous aggregates. The calcareous aggregate specified for all precast concrete manholes will extend the time necessary to corrode a given thickness of concrete wall. The use of calcareous aggregate is not a substitute for a corrosion-resistant lining, but a corrosion-resistant lining is not necessary in all manholes. Turbulence and splashing are almost impossible to avoid in manholes with discharges from force mains. Where turbulence cannot be avoided, manholes should have a corrosion-resistant lining. The ceramic epoxy lining for precast manholes specified in Section 12 is the same ceramic epoxy lining specified for RCP. The urethane-based material specified for rehabilitation of manholes in Section 19 is also an acceptable corrosion-resistant lining for new precast concrete manholes.

### **Additional Requirements**

1. Adequate cover and clearance shall be provided for sanitary sewers where they cross water and storm drainage lines. Where vertical clearance between sanitary and storm drainage lines is less than 1.5 feet, one section of ductile iron sanitary sewer pipe shall be installed.
2. Sewer lines shall be on grade to allow for future expansion.
3. Manholes shall be a minimum depth of 4 feet.
4. Where a drop occurs between the influent and effluent inverts at a manhole, a full joint section of ductile iron pipe shall be installed on the influent side of the manhole.
5. Where applicable, stubouts of adequate size shall be provided for future expansion.
6. A maximum of 2 laterals may be connected to any manhole, provided that the invert elevation of said laterals matches the invert elevation of the terminating manhole.
7. The Board will accept only 8-inch sewer lines and larger for maintenance.
8. Where a new sewer line connects to an existing manhole, a wing nut plug shall be required in the end of the new pipe. When construction is complete, the manhole shall be plugged upstream and downstream and all debris and water pumped out of the manhole prior to placing it into service.
9. Air testing of sewer lines shall be performed at the time of the Board's final acceptance inspection in the presence of the Board's inspector and after installation of all other utilities.
10. Some lots in subdivisions may be subject to sewage back-ups. The following verbiage, as found in the standard plumbing code, shall be placed on subdivision plats and be recorded as subdivision covenants. "Where a plumbing drainage system may be subject to backflow of sewage (e.g., below the level of the nearest upstream manhole cover), suitable provisions shall be made to prevent its overflow in the building. It shall be the property owner's responsibility to install and maintain suitable devices in accordance with the plumbing code."

11. All new subdivision sewers shall be inspected by internal video in accordance with the construction specifications to document lateral locations. Where developers use existing sewers, the internal video inspection shall also include existing sewers to document lateral location.

## **7.0 PRIVATE FIRE PROTECTION SYSTEMS:**

Fire protection systems shall generally consist of fire hydrants, standpipes or sprinkler systems which are connected to the municipal water supply by means of fire lines. Fire hydrants have threaded outlets for fire department connection, are free standing and are usually located around a building. Standpipes are constructed within a building and provide fire department hose connections. Sprinkler systems can be either connected to standpipes, or connected directly to fire lines. Sprinkler systems can be either wet type or dry type.

Fire protection systems constructed on private property for the protection of privately owned commercial or industrial facilities are generally not eligible for acceptance by the Board for maintenance. Under certain circumstances, the Board will consider acceptance of privately constructed water lines serving commercial or industrial development for maintenance. To be considered for acceptance, the water line shall be of some benefit to the Board, shall be constructed in accordance with Board's standards, shall be provided with an easement, and shall have no dead ends. Water service connections installed on such a line shall be subject to trunk water line service charges, as set forth in the Board's published rates.

Any water line which serves fire protection systems and which connects to the existing municipal water supply, or which connects to a private water line proposed for acceptance by the Board, shall be considered to be a fire line and shall be subject to the fire line connection fee as set forth in the Board's published rates. All fire sprinkler systems, standpipes and fire hydrants are subject to annual rates as set forth in the Board's published rates.

All requests for fire line connections shall be made in writing to the Board. The requests shall be accompanied by drawings showing the connection of the fire line to the municipal water supply, the proposed fire line, and any proposed fire hydrants, standpipes, or connections to sprinkler systems. The requests shall also be accompanied by data sheets showing the number of sprinkler heads, the required fire flow and required minimum pressure. The drawings and data sheets shall bear the seal and/or the signature and registration number of a professional engineer in the State of Alabama.

All fire lines, fire hydrants and standpipe hose connections shall comply with, as a minimum, the materials standards published by the Board. The developer shall bear the responsibility to comply with the local, state or federal regulations which apply to fire protection systems.

All fire lines shall be provided with backflow prevention devices and with fire line master detection meters, all meeting FM and UL approval. Backflow prevention devices shall be either double check valve type or reduced pressure principal type in accordance with the Board's Cross-Connection Policy, see Appendix G.

## **8.0 ACCEPTABLE PRODUCTS AND APPROVED MANUFACTURERS:**

A list of materials and approved manufacturers for the various products specified in this manual is included in Appendix A. It is the intent of the Board to review and update Appendix A, as appropriate, to ensure efficient operation of the services and facilities under the jurisdiction of these Standard Specifications. For this purpose, the Board shall evaluate technical submittals from interested manufacturers or suppliers periodically.

**9.0 STANDARD FORMS FOR INVITATION, PROPOSAL AND CONTRACT DOCUMENTS:**

Copies of the latest version of these forms will be included in the Bid Documents issued for each project.