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PREFACE

PURPOSE

PROCEDURES FOR APPROVAL AND ACCEPTANCE

DEFINITIONS

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Class B - The pipe shall be bedded with No. 57 stone bedding material placed on the trench bottom. The bedding shall have a minimum thickness beneath the pipe of 4 inches or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up the side to the springline. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be of the bedding material or carefully placed native soil, compacted. Initial backfill shall be finely divided material free of debris, organic material and stones.

Class C - The pipe shall be bedded in No. 57 stone bedding material placed on the trench bottom. Native soils may be used when approved by the Water and Sewer Department. The bedding shall have a minimum thickness beneath the pipe of 4 inches or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe one-sixth of the outside diameter of the pipe. Initial backfill between the bedding and a plane 12 inches over the top of the pipe, shall be finely divided earth free from debris and stones, and shall be compacted.

Class D - is not allowed.

5.1.2.8 Bedding Requirements for Polyvinyl Chloride Pipe

PVC sewer shall be installed in a granular embedment material as specified herein and as shown on Detail SS-01. The embedment material shall be No. 57 stone. The bedding shall be placed to the top of the pipe in three (3) successive applications. First, a four (4) inch minimum foundation shall be placed to proper grade prior to pipe installation. Following pipe installation, the embedment material shall be carefully placed as haunching to no more than one third of the pipe diameter. The haunching shall be sliced underneath the pipe barrel with a shovel to ensure firm base and side support. Thirdly, the embedment material shall be carefully placed to the springline of the pipe. Initial backfill consisting of suitable native soil shall be carefully placed and compacted to a minimum of 12 inches above the pipe. Initial backfill material shall consist of fine, loose earth containing adequate moisture for thorough compaction. The material shall be free of large stones, clods, vegetable matter, debris, and other objectionable material.

The remainder of the trench backfill shall be in accordance with the section "Backfilling."

5.1.2.9 Concrete Encasement

Concrete encasement, when required, shall completely surround the pipe and shall have a minimum thickness at any point of one-fourth of the inside diameter of the pipe or 4 inches, whichever is greater.

5.1.2.10 Rock Excavation

Remove rock to 6 inches below grade of trench and build back trench bottom with suitable material tamped into place.

When necessary, blasting operations shall be conducted in strict accordance with all existing ordinances and regulations. Blasting shall be conducted by persons licensed to use explosives.

Where blasting is to be conducted along the right-of-way of a state claimed roadway, the Developer shall provide the Water and Sewer Department all necessary information to submit blasting permit applications to the Georgia Department of Transportation for approval. Blasting may be conducted only after this permit is received.

5.1.2.11 Limit of Open Trench

The length of the trench to be opened or the area of surface to be disturbed and restored at any one time shall be limited to that which the Contractor can complete in one day's work, or less in event of apparent inclement weather, or not to exceed 100 feet.

It shall be the Contractor's responsibility to provide adequate barricades, warning signs, flagmen, flashing lights, etc., as necessary to safeguard the public. All trenches must be backfilled by the close of each work day.

5.1.2.12 Disposition of Water

Keep trenches free of water. The Contractor shall furnish all equipment and labor necessary to remove any water found or accumulated in the trench. Other excavation shall be kept clear of water while pipe is being laid or concrete or masonry is being placed. No pipe shall be laid in water and water must not be permitted to flow over or rise upon any masonry or pipe until the work has

been accepted to prevent flow-in of silty water and thus prevent buildup of foreign matter in the pipe.

All water pumped or bailed from the trench or other excavation must be conveyed in an acceptable manner to a suitable point of discharge, i.e. a stream or ditch, where it shall not cause injury to public health, or public or private property, or to work under construction or previously completed or to the street surfaces, or to cause interference with the use of streets by the public.

5.1.2.13 Excavation Near Roads and Railroads

Special care must be exercised in trenching near roads and railroads to protect against collapsing of the roadbed structure. Each situation must be evaluated on account of varying soils. Where excavations encroaching at or near roads and/or railroads will be limited because of scheduled jack/bore methods required for installations under roads and/or railroads, the trench excavated shall be halted at least ten (10) feet from the pavement edge of a road, or more if soil conditions so indicate, and no nearer than twenty-five (25) feet from the centerline of the railroad track nearest the excavation as measured at 90 degrees (right angles) to the railroad.

5.1.2.14 Subsurface Obstructions

In excavating, backfilling and laying pipe care must be taken not to remove, disturb or injure any water, sewer, gas, electric, telephone, or other conduits or utilities without prior approval of the owner of the utility encountered, including private utilities.

If necessary in order to perform the intended work, the Contractor shall sling, shore up, and maintain such utilities in operation, and promptly repair any damage done to them. Before final acceptance of the work, all such utilities shall be made "equal to or better" than prior to construction.

It shall be the Contractor's responsibility to locate underground utilities. In event of damage to the utilities, the Contractor will promptly notify the utility owner (private or public) and must assume full responsibility therefore.

In event pipe or conduits providing service to adjoining buildings are broken, or damaged to some questionable degree of service, the Contractor shall immediately make repairs at his own expense, or be otherwise liable for repair costs incurred by others. The utility owner reserves the right to make repairs, caused by the Contractor, without prior notice. Removal or relocation of a utility encountered may be done upon prior approval by the utility owner given directly to the Contractor.

5.1.2.15 Embankments

Whenever the sewer is to be installed in a fill area or in cut with less than four (4) feet of cover (top of pipe to ground surface), the Water and Sewer Department will require the installation of ductile iron pipe.

5.1.3 Inspection Before Laying of Pipe

Before any pipe is laid in the trench, the pipe shall be subject to inspection. Only first quality pipe with smooth surfaces (interior and exterior), free from cracks, flaws, blisters, etc., shall be used.

5.1.4 Pipe Installation

Pipe installation shall be performed with bell ends up grade without any break in alignment or grade between manholes. A thorough cleaning of all dirt, and foreign matter shall be made of bells and sockets before jointing. Pipe materials shall meet specifications contained elsewhere herein.

5.1.4.1 Handling

Pipe shall be carefully unloaded with a pipe unloader or crane.

5.1.4.2 Laying

Pipe shall be swept clean of trash or dirt before lowering into the trench. After the pipe has been cleaned it shall be lowered into the trench in such a manner that the pipe shall not be damaged. Each joint shall then be lined and brought to a uniform grade upon a solid trench bottom. Bell holes for couplings or bell shall be prepared with a minimum clearance of two inches. Pipe shall be laid in straight lines on uniform grades.

Before stopping work each day all open pipe ends shall be closed with a proper size plug. Protect pipe from floating.

5.1.4.3 Joining

5.1.4.3.1 Mechanical Joints

Clean spigot and bell of foreign material and apply a prepared lubricant solution before slipping gasket and gland over spigot end of pipe. Small side of gasket and lip of gland must face the socket. Paint gasket with lubricant solution and place spigot end of pipe securely home in socket. Push gasket evenly into position in socket, slide gland into position and tighten bolts with fingers.

Tighten bolts with a torque wrench to recommended tightness by tightening bottom bolt and then top bolt. Thereafter, all bolts shall be tightened in sequence of 180° apart until all bolts are within the range of torque recommended by the manufacturer. If effective sealing is not accomplished, disassemble and reassemble after thorough cleaning.

5.1.4.3.2 Slip Joints

Jointing shall be made with rubber gaskets and lubricant furnished by the manufacturer in strict accordance with the manufacturer's recommendations. Prepare field cut pipe by filing 1/8 inch 30° bevel on pipe end to avoid.

5.1.4.4 Connections to Existing Manholes

Connections to existing manholes shall be made at the locations shown on the plans as directed by the Water and Sewer Department. All connections shall be made in a neat and workmanlike manner to avoid damage to the existing structure. Core and boot suitable modification to the manhole bench shall be made to the satisfaction of the Water and Sewer Department.

5.1.5 Backfilling

Backfill material above the pipe embedment shall consist of native earth, free from large stones, clods, debris or other objectionable material.

In traffic areas, particularly roads and streets, parking lots and walkways, the full backfill shall receive thorough tamping in 6 inch layers to a minimum of 95% standard proctor density. The Water and Sewer Department may request that soil compaction test be performed by an outside testing consultant. The developer will be responsible for payment to the testing consultant. Particular attention is directed to driveways and walkways, and areas subject to mail delivery where prompt backfilling is required to prevent inconvenience to the public.

In all areas of construction, the excavated material shall be cleared from the premises and the completed work left in a neat and acceptable condition. Included are such items as broken pavement and other matter not classified as earth.

Trenches and other excavated areas completed by the Contractor shall be kept in a good and safe condition during a one year maintenance period following acceptance by the Water and Sewer Department and regulatory agencies.

5.1.5.1 Time

Trenches shall be backfilled as soon as practical after laying and jointing the pipe. Provisions for traffic as specified under "Trench Excavation" must be adhered to.

5.1.5.2 In Non-Traffic Areas

Initial backfill shall be placed carefully with suitable material in layers not exceeding 6 inches in thickness and thoroughly compacted with mechanical tamps to one foot above the top of the pipe. The remainder of the trench may be backfilled without compaction. The backfill shall be rounded over the trench to provide allowance for future backfill settlement.

5.1.6 Highway and Railroad Crossings

Install in strict accordance with railroad or State Highway requirements and all applicable provisions of the plans and specifications. Perform no work until satisfactory arrangements have been made with the State Highway Department or railroad.

Install casing pipe by jacking, boring or tunneling in strict accordance with the requirements of the Georgia Department of Transportation and FHWA or railroad; diameter of the hole shall not exceed the outside diameter of the pipe. Cement grout shall be pumped around pipe where voids were developed during the installation operation.

Casing pipe shall be steel as previously specified and joints shall be welded. Carrier pipe shall be ductile iron with mechanical joints as previously specified. Welds shall be filled arc weld type performed only by qualified welders, meeting American Welding Society, and American Institute of Steel Construction Standards. Welds shall be continuous, watertight, and develop a greater strength than the pipe.

Install on required grade. Inside and outside of welds shall have all rust, mill scale, flux flumes, oxides, grease and oil removed by chipping and wire brushing immediately before applying touchup coating.

All weld areas and areas where coating has been scratched shall be recoated with coal tar material of same type and thickness as original coating. Outside shall be coated immediately after welding.

Carrier pipe will be pushed into casing on wooden skids to avoid damaging coating in casing.

Seal ends of casing in accordance with Georgia Department of Transportation or railroad requirements.

5.1.7 Asphalt Concrete Paving Replacement (Where Open Cut is Allowed)

Materials and construction methods shall conform to the Georgia State Department of Transportation Standard Specifications, latest edition, and Detail 3-1.

5.1.7.1 Removal

Existing pavement shall be sawed.

5.1.7.2 Excavation and Backfill

Excavation and backfill shall be in accordance with this Section.

5.1.7.3 Base

Base shall be 8 inches of "High Early Strength" concrete in accordance with Section 430 of the Georgia Standard Specifications for Construction of Roads and Bridges.

5.1.7.4 Pavement

Pavement shall be hot mix asphaltic concrete either Type "E" or "F", and shall be in accordance with Section 400 of the Georgia Standard Specifications for Construction of Roads and Bridges.

5.1.8 Manhole Installation

5.1.8.1 Manhole installations shall be provided as shown on the approved plans. Manhole frames and covers shall be of watertight design for manholes in flood prone areas. Excavation for manholes shall be sufficient to provide six (6) inches of clearance between the outer surface of the manhole and the soil, or timber sheathing if required. All manholes shall be provided with steps placed sixteen (16) inches center to center and properly aligned.

5.1.8.2 Testing

Leakage Testing: Testing shall be conducted for each precast structure or manhole in accordance with ASTM C 1244 - Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

Vacuum Testing: Manholes shall be tested after assembly and prior to backfilling. Stub outs, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn. Installation and operation of vacuum equipment and indicating devices shall be in accordance with equipment specifications for which performance information has been provided by the manufacturer. A measured vacuum of 10 inches of mercury (-4.91 psi) shall be established in the manhole. The time for the vacuum to drop to nine inches of mercury (-4.42 psi) shall be recorded. Acceptance standards for leakage shall be established from the elapsed time for negative pressure change from 10 inches to 9 inches of mercury. The maximum allowable leakage rate and instructions for a four foot diameter manhole shall be in accordance with the following:

Testing Instructions:

1. Testing is done after complete assembly of the manhole.
2. The manhole to pipe connection should be a flexible connector, such as Kor-N-Seal or equivalent.

3. All lift holes need to be plugged with a non-shrinking mortar, or equivalent.
4. The seal between the manhole sections shall be in accordance with ASTM-C 923.
5. The contractor must plug the pipe openings, taking care to securely brace the plugs and pipe.
6. With the vacuum tester in place:
 - Inflate the compression band to 40 psi to effect a seal between the vacuum base and the structure.
 - Connect the vacuum pump to the outlet port with the valve open.
 - Draw a vacuum to 10" of Hg. (-4.91 psi) and close the valve.
7. The test is considered passing if the vacuum remains between 9" Hg. and 10" Hg. in a time greater than one minute. If the initial test fails, the contractor can locate the leak, and the appropriate repairs made.

4' dia. Manhole Depth Minimum

Elapsed Time for a
Pressure Change of 1 inch Hg

10 ft. or less
>10 ft. but < 15 ft.
>15 ft. but < 25 ft.

60 seconds
75 seconds
90 Seconds

For manholes five feet in diameter, add an additional 15 seconds and for manholes six feet in diameter, add an additional 30 seconds to the time requirements for four-foot diameter manholes. If the manholes fails the test, necessary repairs shall be made and the vacuum test and repairs shall be repeated until the manhole passes the test. If a manhole joint sealer is completely pulled out during the vacuum test, the manhole shall be disassembled and the sealer replaced.

5.1.9 Service Lines

A sewer service line shall be provided for every existing or proposed lot or building. Services shall extend to the property line of the lot being served and normally be located within ten (10) feet of the lower corner of the lot. The depth of the lines shall be no less than two (2) feet.

5.1.10 Sewage Pump Stations

Sewage pump stations shall be installed at locations as indicated on the approved plans.

5.2 Gravity Sewer Testing

5.2.1 General

All newly installed lines shall be televised following installation. The tape shall then be submitted to the Water and Sewer Department.

When requested by the City of Barnesville Water and Sewer Department, the Contractor shall test the integrity of the installed sewer line by one or more of the following: low pressure air test; a measurement of infiltration; mandrel test, and velocity test. These tests shall be performed upon such lines selected by the Water and Sewer Department.

5.2.2 Low Pressure Air Tests

5.2.2.1 Safety

The Contractor shall have the responsibility to ensure that all air plugs are installed and braced to prevent blowouts. Pressurizing equipment shall include a regulator or relief valve to avoid overpressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

5.2.2.2 Preparation of the Test Line

Secure the plugs in all pipe outlets, including stoppers in laterals, to resist the test pressure. Clean out all debris in the pipe. At the option of the contractor, the interior pipe surface may be wet by flushing the line in order to produce more consistent test results.

5.2.2.3 Procedure

The Contractor shall slowly introduce low pressure air into the sealed line until the internal air pressure reaches four (4) psig. The air supply shall then be throttled to maintain the four (4) psig internal pressure for at least two (2) minutes to permit the temperature of the entering air to equalize with the temperature of the pipe wall. When temperatures have equalized and the pressure stabilized, the air hose from the air supply shall be shut off. The pressure shall then be decreased to no less than 3.5 psig. At a reading of 3.5 psig, or any convenient pressure reading between 3.5 and 4.0 psig, timing shall begin with a stop watch. If the time shown in the table below for the designated pipe size and length elapses before the air pressure drops one (1) psig, the section undergoing the test has passed and shall be presumed to be free of defective joints.

5.2.2.4 Calculation of Test Time

| <u>Pipe Diameter</u> | <u>Minimum Time (min:sec)</u> | <u>Time for Length (sec)</u> |
|----------------------|-------------------------------|------------------------------|
| 8" | 7:34 | 1.520 x L |
| 10" | 9:26 | 2.374 x L |
| 12" | 11:20 | 3.418 x L |

Note: L in Feet

5.2.2.5 Groundwater Conditions

Groundwater should be taken into consideration and calculated for. Add one (1) p.s.i. for every 2.3 ft. of groundwater above the pipe.

5.2.2.6 Retest of Test Section

Any section of line in which a loss of more than 1.0 p.s.i.g. is encountered during the period of test may be retested at the option of the contractor. Failure of a test section of a line shall require location and grouting or other repair or replacement of the source of excessive air loss. The Water and Sewer Department shall approve the method to be used prior to any repair or replacement.

5.2.3 Measurement of Infiltration

The contractor shall furnish an adequate number of plugs of the proper size and acceptable weirs to measure infiltration into the system.

Infiltration greater than 25 gallons per inch diameter of pipe per mile of sewer per day will not be accepted. Any visible or audible leak must be dug up and repaired unless it is found to be in a joint and the Water and Sewer Department has authorized it to be repaired by chemical grouting. Any increase in flow between two adjacent manholes must be corrected.

Measurements of flow shall be performed on any lines with a visible flow of water.

5.2.4 Mandrel Test

At the request of the Water and Sewer Department a Mandrel Test shall be performed on PVC sewer pipe to test for maximum allowable deflection. The mandrel shall be sized to test a 5.0% deflection. The mandrel diameter shall be 5% less than the average reference internal diameter. Minimum diameters of mandrels to be used are as follows: 8" = 7.60"; 10" = 9.50"; 12" = 11.40". The following procedure is recommended:

1. Completely flush the line making sure the pipe is clean of any mud or trash that would hinder the passage of the mandrel.
2. During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line. (A nylon ski rope is recommended.)
3. After the rope is threaded through line, connect the pull rope to the mandrel and place the mandrel in the entrance of the pipe.
4. Connect a second rope to the back of the mandrel. This will enable the mandrel to be retrieved if excessive deflection is encountered.
5. Remove all the slack in the pull rope by gently pulling the rope at the far manhole. After the slack has been removed, place a tape marker on the rope close to the pipe opening where the mandrel will exit. If mandrel encounters excessive deflection, the marker will provide a means of measuring the travel distance of the mandrel so that the deflected area can be located.

6. Draw mandrel through the sewer line.
7. An increasing resistance to pull is an indication of excessive deflection. If this occurs, measure the distance from beginning marker on rope to manhole. Locate section and replace bedding or pipe if visual examination reveals damage.

8. Retest.

5.2.5 Velocity Test

On lines installed at minimum grade or at any time the City of Barnesville Water and Sewer Department suspects that a problem with flow will occur a velocity test of the suspect section may be requested.

The contractor shall add sufficient water at a point upstream of the suspect section. After flow has reached a steady rate, dye or some type of floating object such as a ping pong ball, or fishing float will be passed through the line. The float will be timed as it passes through the section. Any line in which a velocity of two (2) feet per second cannot be obtained, will not be accepted.

5.3 Force Mains

5.3.1 Hydrostatic Test

Force mains shall be hydrostatically tested after the pipe has been laid and backfilled between joints. Each section of pipe shall be subjected by hydrostatic gauge pressure at the rated pressure of the pipe for two (2) hours. Each section of pipe shall be slowly filled with water and brought to the specified test pressure, based on the elevation of the lowest point of the line or Televising shall be performed following installation and a tape provided to the Water and Sewer Department lowest point of the section under test, and corrected to the elevation of the test gauge. The pressure shall be applied by means of a gasoline driven test pump connected to the pipe in a manner satisfactory to the Water and Sewer Department. The contractor shall make arrangements for metering the amount of water used during the test. The contractor shall backfill all pipe and provide all thrust blocking before hydrostatic testing. It shall be the contractor's responsibility to locate and repair any and all leaks that are found. The Water and Sewer Department may direct the contractor to leave certain joints and connections uncovered until testing has been completed. All exposed pipe, fittings, valves, and joints will be carefully examined during the open trench test. Any cracked or defective pipe, fittings, or valves discovered in consequence of this pressure test shall be removed and replaced, and the test shall be repeated until satisfactory.

5.3.2 Leakage Test

In conjunction with the hydrostatic test, a leakage test shall be conducted at the rated pressure of the pipe. This leakage test will be conducted for two (2) hours and the maximum leakage allowed will be ten (10) gallons per inch diameter per mile per day.

5.4 Inspections And Acceptance

5.4.1 General

Before sewage is introduced into a new system, the system must first receive final approval and acceptance from the City of Barnesville Water and Sewer Department.

5.4.2 Inspection for Approval

Authorized representatives of the Water and Sewer Department shall have access to the work for inspection at any reasonable time. The final inspection of all improvements shall be held before conditional acceptance of the work and before the start of the one (1) year maintenance period. When all construction in accordance with these standards has been completed, the Developer shall request by letter a final inspection and acceptance of the system from the Water and Sewer Department.

All permits and drawings will be examined at this time to insure that the work has been completed in accordance with the approved plans and these standards.

5.4.3 Stop Work Order

Any work not meeting the requirements of these standards or the approved plans shall be corrected by the Developer. At any time, throughout construction, should the work not be corrected after notification by the City, a stop work order shall be issued by the City.

5.4.4 Acceptance

After all improvements are complete, the Developer shall provide the City with a one (1) year maintenance agreement to provide for the cost of maintenance of the public improvements (sewer system or parts thereof). The Developer shall also issue the Water and Sewer Department a letter of conveyance, granting ownership of the completed sewer system to City of Barnesville.

If failures occur, in the opinion of the City Engineer, to any public improvements (sewer systems), within a one year period from the date of the letter of acceptance, the Developer shall be notified in writing of the defects and shall be given a reasonable time to correct the problem; otherwise, it shall be deemed a breach of the Maintenance Agreement and the City shall have the right to make the necessary repairs, either by public contract, or using City equipment, and the Developer shall be liable for the full amount of the cost of the repairs.