

SECTION 8  
INSTALLATION/CONSTRUCTION

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## SECTION 8

### INSTALLATION/CONSTRUCTION

#### 8.01 General

This section shall provide general, minimum requirements for the installation and construction for Town of Bargersville Utilities.

#### 8.02 Excavation

##### A. Dewatering and Control of Surface Water

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, etc. necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the standing water in the trench, the Contractor shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of Class No. 2 crushed stone (Indiana Department of Transportation aggregate Classification) in the over-excavated area.

The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.

UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR  
GROUNDWATER BE DISCHARGED TO, DISPOSED OF, OR ALLOWED TO FLOW  
INTO THE TOWN'S SANITARY SEWER SYSTEM.

##### B. Excavation

###### 1. Clearing

Preparatory to excavation, the site of all open cut excavations, embankments, and fills shall be first cleared of obstructions and existing facilities (except those which must remain temporarily or permanently in service). On all public or private property where grants or easements have been obtained, and on the property of the **Town, the Contractor shall remove and keep separate the top soil, and shall carefully replace it after the backfilling is completed.**

###### 2. Pavement Cutting

Prior to excavating paved areas all excavation edges falling within the pavement shall be saw cut in a neat, straight manner. Cutting shall be performed with a saw designed specifically for this purpose. The cut shall penetrate the entire pavement thickness where possible. If the existing pavement is more than 6 inches thick, then a cut of not less than 6 inch depth shall be made. If pavement cuts are made in streets which are opened to

traffic prior to excavation, then the cuts shall be thoroughly filled with sand and maintained full until the excavation is performed.

3. Protection of Existing Improvements

Before any excavation is started, adequate protection shall be provided for all existing utilities and Town structures.

4. Protection of Trees and Shrubs

No existing trees or shrubs in street right-of-ways and easements or contiguous properties shall be damaged or destroyed. Where branches of trees or shrubs interfere with the Contractor's operations, they shall be protected by tying back wherever possible. No limbs or branches shall be cut. If his operations will not permit saving certain trees, the Contractor shall be wholly responsible for satisfying all claims for restoration or restitution resulting from their damage or removal.

If small trees and shrubs are moved or pruned to permit more working space, pruning shall be done in accordance with Home and Garden Bulletin No. 83, U.S. Department of Agriculture, "Pruning Shade Trees and Repairing Their Injuries". However, the Contractor shall obtain, in writing, the Town's permission to move or prune trees or shrubs.

5. Maintenance of Public Travel

The Contractor shall carry on the work in a manner which will cause a minimum of interruption to traffic, and may close to through travel not more than two (2) consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges to street intersections and driveways. The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets the Contractor shall notify responsible municipal authorities.

All traffic control shall be in accordance with the latest edition of the Indiana Manual on Uniform Traffic Control Devices (MUTCD).

6. Utility Interruption

The Contractor shall proceed with caution in the excavation and preparation of the trench or pit so that the exact location of underground structures may be determined. Prior to proceeding with trench excavation the Contractor shall contact all utility companies in the area to aid in locating their underground services.

The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify the responsible official of the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring services and shall assume all costs, charges, or claims connected with the interruption and repair of such services.

7. Open Cut Excavation

Open cut excavation shall be safely supported and of sufficient width and depth (and only to such width and depth) to provide adequate room for the construction or installation of the work to the lines, grades and dimensions.

a. Trench Dimensions

The bottom width of the trench at and below the top of the pipe and inside the sheeting and bracing, if used, shall not exceed the recommendations as contained in the applicable ASTM Standard for the pipe being used.

Trench sheeting and bracing or a trench shield or box shall be used as required by the rules and regulations of OSHA. The bottom of the trench shall still meet the above standards.

If the trench widths are exceeded with the written permission of the Town, the pipe shall be installed with a concrete cradle or with concrete encasement or other ASTM approved methods as approved by the Town's engineering representative.

b. Excavations With Sloping Sides, Limited

The Contractor may, at his option, where working conditions and right of way permit (as determined by the Town's engineering representative), excavate pipe line trenches and pits for structures with sloping sides, but with the following limitations:

- (1) In general, only braces and vertical trenches will be permitted in traveled streets, alleys, narrow easements and for pit excavations more than ten (10) feet deep.
- (2) Where pipe line trenches with sloping sides are permitted, the slopes shall not extend below the top of the pipe, and trench excavations below this point shall be made with near vertical sides with widths not exceeding those specified herein before.
- (3) Slopes shall conform to all OSHA regulations.

8. Earth Excavation

Earth materials shall be excavated so that the open cuts conform with the required lines, grades and dimensions.

- a. Unsuitable Foundation: When the bottom of the excavation is unsuitable as a foundation, it shall be excavated below grade and then refilled with concrete or crushed stone to the grade as the Town or its representative may direct. The crushed stone refill shall be mechanically compacted in six (6) inch layers or as directed by the Town.
- b. Unauthorized Excavation: Unauthorized excavation below grade shall be filled with crushed stone or concrete and compacted as ordered and directed by the Town or its representative.
- c. Excavated Earth For Backfill: Excavated earth materials may be used for backfill subject to the approval of the Town's engineering representative. Such material may be used only where its class is allowed.

9. Boring and Jacking

Construction of the pipeline by boring and jacking methods under highways, railroads, and streams will be permitted unless otherwise specified on the plans.

- a. Backstop: The backstop shall be of sufficient strength and positioned to support the thrust of the boring equipment without incurring any vertical or horizontal displacement during such boring operations.

- b. Guide Rails: The guide rails for the boring equipment may be of either timber or steel. They shall be laid accurately to line and grade and maintained in this position until completion of the boring operations.
- c. Casing Pipe: Steel casing pipe shall be new, conform to ASTM A 139 and shall be of the size (diameter) sufficient to install and support the carrier pipe. The lengths of pipe shall be welded as they are installed. Where lengths of casing pipe are joined during the boring operations, care shall be taken to insure that the proper line and grade is maintained.

The minimum wall thickness for casing pipes under highways, railroads and streams shall be 0.375 inches. Steel shall be Grade B under railroads and Grade A at all other locations. Stream crossings shall be a minimum of three (3) feet from the stream bottom (as defined by the regulating agency) and the top of the casing pipe. Railroad and highway crossings shall be a minimum of five (5) feet as measured from the top of the casing pipe to grade.

### **8.03 Bedding and Backfill**

#### **A. General**

All trenches or excavations shall be backfilled to the original surface of the ground or such other grades as required or directed. In general the backfilling shall be carried along as speedily as possible in order to avoid open excavations.

#### **B. Backfill Materials**

The following materials shall be used for backfill in accordance with and in the manner indicated by the requirements specified herein.

- Class I      Angular, six (6) to forty (40) mm (1/4 to 1 1/2 inch), graded stone such as crushed stone.
- Class II     Coarse sands and gravel with maximum particle size of forty (40) mm (1 1/2 inch), including various grades of sands and gravel containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.
- Class III    Fine sand and clay gravel including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this class.
- Class IV     Silt, silty clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class. These materials shall not be used for bedding.

#### **C. Backfill of Trench Excavations for Pipes and Conduits**

Bedding and Backfill materials samples shall be submitted to the Town prior to start of construction.

#### **D. Backfill Above Pipe**

##### **1. Method A • Backfill in Areas Not Subject to Vehicular Traffic**

For purposes of this standard, trenches shall be considered subject to vehicular traffic if all or any portion of the excavation is located within four (4) feet of a roadway or alley which is routinely traveled by powered vehicles. In the event of any question regarding the susceptibility of an area to traffic, the Town's decision shall govern.

- The trench between a level twelve (12) inches above the top of the pipe and the ground surface shall be backfilled with Class I, II, or III materials, as described above, deposited with mechanical equipment in such a manner that it will "flow" onto the bedding and not free fall. The Utility may at their discretion allow Class IV material for backfill. The Contractor must have written approval from the Utility prior to such use. The Contractor shall consolidate the backfill by the back and forth travel of a suitable roller, wheeled device or other similar heavy equipment until no further settlement is obtained. Heavy equipment shall not be used until there is a cover of not less than three (3) feet over the pipes. To assist in promoting maximum settlement, the surface of the trench shall be left in a slightly rounded condition. Periodical dressing of the backfill in the trench to promote the drainage and safety conditions shall be made during the course of the work.
2. Method B • Backfill in Areas Subject to Vehicular Traffic (Mechanical Compaction)  
The trench between a level of twelve (12) inches above the top of the pipe and the surface, which are located in areas subject to or possibly subject to vehicular traffic, shall be backfilled with Class I or II materials. The initial lift of backfill shall be placed in a manner to minimize lumps and voids, but not requiring mechanical tampers. Equipment for compaction shall be used on backfill after there are two (2) feet of backfill over pipe barrel. Additional lifts of no more than six (6) inches in depth shall be placed and compacted with compaction equipment to a depth of twelve (12) inches below finished grade. Completion of backfill to finished grade shall be done with compacted aggregate. Compacted aggregate shall conform to the Indiana Department of Transportation Standard Specifications for Compacted Aggregate Base. The aggregate shall be thoroughly compacted by means of compaction equipment. The compacted aggregate is intended to serve as the base for the permanent pavement replacement. Any settlement that occurs shall be immediately refilled and compacted with aggregate. The Contractor shall apply an approved dust preventative as necessary to avoid or eliminate dust complaints from nearby residents.

All backfill placed under this Method B shall be tested in accordance with AASHTO-7-99 and immediately prior to permanent pavement replacement. Compaction shall not be less than ninety-five percent (95%) Standard Proctor Density.

E. Temporary Surfaces Subject to Traffic

The Contractor shall open streets to traffic immediately after completing the backfill operation. He shall accomplish this by installing the compacted aggregate base immediately after granular backfill. *The use of Class II backfill as a temporary surface is specifically prohibited.*

F. Maintaining Trench Surfaces

All surface settlement of the backfill along trenches located beneath streets, roads, alleys, driveways and parking lots which are subject to traffic shall be kept filled level with or slightly above the original paved surface at all times with compacted aggregate base material until the permanent pavement is satisfactorily restored. When temporary asphalt pavement is used, depressions and "pot holes" shall be promptly filled with the temporary asphalt material. Special attention shall be given by the Contractor to the timely and proper maintenance, leveling and grading of the surface of all backfilled trenches, especially those

subject to traffic and especially following rains. The surface of streets, roads and alleys shall be maintained smooth and free of ruts and water trapping depressions by periodic power blading, scarifying; and/or filling settled areas, ruts, pockets, or holes with compacted aggregate base material or temporary asphalt where used.

As a dust preventive, the Contractor shall apply, calcium chloride over the surface of the compacted aggregate base in such amounts and at such times as are necessary to avoid or eliminate dust complaints from nearby residents. In event of any question regarding the existence or nonexistence of a dust nuisance, the Town's decision on the matter will govern. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of seventy-seven percent (77%). Unless otherwise specified or ordered by the Town, the rate of application shall be one-and-one-half (1 ½) pounds per square yard of surface covered.

Wherever surface settlement is not important, unless otherwise specified or directed, the backfill shall be neatly rounded over the trench to a sufficient height to allow for settlement to grade after consolidation. Just prior to the completion of all work under the contract, any surface settlement below original ground surface shall be refilled in a satisfactory manner, and reseeded as specified if required.

#### **8.04 Laying of Sewers**

##### **A. General**

This section on the Laying of Sewers shall be divided into two (2) classifications: rigid and non-rigid conduit. Pipe materials such as reinforced concrete, steel, and ductile iron pipe are considered rigid conduits. Thermoplastic (PVC) pipe, corrugated metal pipe, HDPE, and PVC truss pipe shall be considered non-rigid or flexible conduits.

##### **B. Rigid Conduit Installation**

All rigid conduit for sewer pipe shall be laid to the lines and grades, unless otherwise directed by the Town's engineering representative. All rigid pipe shall be laid in accordance with the details for the First Class Pipe Laying Method. This First Class Pipe Laying Method may be achieved by Class B bedding methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this Class B bedding Method, the pipe shall be bedded in compacted granular material (Class I or Class II) placed on a flat trench bottom. The bedding shall have a minimum thickness of six (6) inches below barrel or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All granular bedding material shall be placed in the trench in approximately six (6) inch layers. Compaction shall be accomplished by hand or mechanical tamping or by "walking" the granular material in. From the halfway point on the pipe (Springline) to a point twelve (12) inches above the top of the pipe shall be a Class I, II or III material placed in six (6) inch lifts and thoroughly compacted to prevent settlement. Class III material shall not be used when the trench is in an area subject to vehicular traffic.

The laying of pipe in finished trenches shall be commenced at the lowest point, proceeding upstream, with the barrel sections pointing the direction of flow.

No blocking under pipes will be permitted, except as approved by the Town for pipe to be encased in concrete or laid in concrete cradles.

The practice of blocking pipe up to grade with bedding material, then backfilling under is prohibited. The entire length of the bed section is to be at proper grade before installing pipe.

The supporting strength of the pipe is dependent upon its foundation and trench width. To develop normal strength, the pipe shall have a firm uniform foundation under the entire lower quadrant of the barrel. No weight should be supported by the bell. The maximum trench width as recommended by ASTM at the level of the top of the pipe shall be maintained as narrow as possible, taking into consideration the limitation of the excavation equipment except as may be permitted by the Town's engineering representative upon investigation of the soil conditions, laying methods and earth loadings.

All pipes and specials shall be carefully inspected before being laid, and no cracked, broken or defective pipe or special shall be used in the work. All pipe shall be carefully inserted in the bell in such a manner that there will be no unevenness of any kind along the bottom half of the pipes and so that there is a uniform joint space all around.

All pipe that is field cut shall have the homing-marks reestablished, insuring for proper seating depths. Pipes that are field cut shall have the cut ends re-tapered, by grinding or filing, as close to the original taper provided by the manufacturer as possible. When homing pipe with a spud-bar or other mechanical equipment, other than by hand, place a piece of wood between pipe and tool to prevent damage to bell end-section.

Pipe laid in open cut shall have all trench spaces and voids solidly and completely filled with suitable earth materials from the excavations, which shall be thoroughly and solidly rammed into place, unless otherwise specified.

The ends of the pipes shall be protected to prevent the entrance of dirt or other foreign substances. Such protection shall be placed at night or whenever pipe laying is stopped for any reason. Suitable plugs designed for use with the pipe material shall be provided and properly secured and used to cap all slants and branches.

C. Flexible Conduit Installation

Plastic sewer pipe (PVC) and other flexible pipe shall be carefully installed in accordance with the above standard for Rigid Conduit Installation, except where the following paragraphs modify those standards.

Flexible conduit for sewer pipe shall be installed in accordance with "Underground installation of Flexible Thermoplastic Sewer Pipe" ASTM Designation C 2321.

The Contractor shall take special precautions when homing PVC pipe not to over-seat past the home-marks. The pipe installation must include adequate bedding to hold its proper placement, prior to installing the next section.

The Contractor shall use caution when stringing thermoplastic pipe. Excessive spans, in sunlight, will cause bowing damage; and said damaged spans will be rejected.

In addition to the construction and testing procedures outlined in other sections of these standards, the Contractor shall be required to install the flexible pipe in such a manner so that the diameter deflection of the pipe shall not exceed five percent (5%) when tested in accordance with the Final Acceptance Test. Bedding materials surrounding the pipe shall be compacted to the densities required to meet the five percent (5%) maximum deflection requirement. The area requiring compaction shall be included in the bed and side fill material and also the material placed above the pipe for a distance of twelve (12) inches over the top of the pipe.

The First Class Pipe Laying Method for Flexible conduit may be achieved by Class B Bedding Methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this Class B Bedding Method, the pipe shall be bedded in compacted granular material (Class I or II) placed on a flat trench bottom. The bedding shall have a minimum thickness of six (6) inches below barrel or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend twelve (12) inches above the top of the pipe level and full width of the trench. All granular bedding material shall be placed in the trench in approximately six (6) inch layers (before compaction).

Compaction shall be accomplished by hand or Mechanical Tamping or by "Walking" the granular material in for Class I materials only. When Class II materials are used compaction shall be accomplished by mechanical tamping only to a minimum eighty-five percent (85%) Standard Proctor Density. Backfill from a point twelve (12) inches above the top of the pipe to the trench surface shall be as specified.

Plastic pipe shall not be blocked, except where the plans or standards call for concrete encasement or concrete cradles for the pipe. Blocks shall be encased in concrete also, or removed. Where plastic pipe is to be installed below maximum ground water table, adequate weights shall be provided to prevent flotation of the pipe.

Pipe and fittings shall be carefully inspected before being installed. Cracked, broken or otherwise defective pipe shall not be used.

## **8.05 Laying of PVC Force Mains**

### **A. Installation of Buried PVC Pipe**

In general, the installation of buried mains shall conform to the requirements of the manufacturer or the AWWA standard for the pipe being installed.

PVC pipe shall generally be installed to conform with Laying Condition F as defined by ANSI A 21.1 and conform with the backfilling and trench maintenance requirements as specified under these standards.

Plastic pipe shall be firmly bedded in Class II or Class III materials and the bedding thoroughly compacted. Bedding shall be carefully formed by hand to provide complete support of full length of pipe barrel and shall extend to a point twelve (12) inches above the top of pipe. Bell holed shall be formed as necessary. No gravel or stones larger than three sixteenths (3/16) inch shall be permitted within three (3) inches of outer surface of pressurized plastic pipe. Plastic pipe fittings shall be blocked as required. Backfill above the bedding zone shall be as required.

Pipe and fittings shall be carefully inspected before being installed. Cracked, broken, bent or otherwise defective pipe shall not be used in work. Exposure to sunlight will be avoided when possible, if pipe is to be exposed for a two (2) week period or longer, it shall be covered to protect from UV damage.

Jointing of PVC pipe shall be performed in the ditch, in accordance with recommendations of manufacturer.

Where metal harnesses for thrust protection are necessary, only ductile iron fittings with slotted hydrant lugs, specially made for use with plastic pipe shall be used.

A continuous wire shall be taped to the top of any non-metallic force main to facilitate line location. Beginning at the lift station, and every eight hundred (800) feet thereafter, the wire shall be accessible from the surface as indicated in the Appendix A - Standard Details or at Utility Inspector's discretion. Any splicing of the wire underground shall be soldered in a watertight and insulated manner so that the wire does not ground. A continuity test shall be performed at the completion of construction to confirm proper installation.

At each valve the wire shall be brought to the surface inside the valve box or structure as applicable. Where the main connects to a structure the wire shall extend inside the structure and be brought to six (6) inches below the casting.

In addition, marking tape shall also be installed between eighteen (18) inches minimum and twenty-four (24) inches maximum below finish grade and directly above the installed pipe line. It shall be laid in such a manner that it is not damaged by backfilling.

**B. Fittings**

All fittings of 1 1/4 degree bends and greater, including tees shall be properly anchored by concrete thrust blocks of sufficient size not to exceed a soil pressure of two (2) tons per square foot. This blocking shall be installed prior to backfilling and testing.

**8.06 Structure Installation**

All manholes, inlets and catch basins shall be installed on a minimum of a six (6) inch No. 8 stone base. **This material shall be compacted.**

Internal chimney seal installation shall be as follows:

The surfaces against which the sleeve and extension are to be compressed shall be circular, clean, reasonably smooth and free of any loose material and excessive voids. If the masonry surface is rough, sloped, or irregular and would not provide an effective seal, an approved non-shrink patching mortar shall be used to prepare a uniformly vertical surface for the bottom of the sleeve and extension of seal against. Any flaws in the manhole frame such as cracks, pits or protrusions, shall be repaired by either filling with mortar or grinding smooth.

After the rubber sleeve and extension, where needed, has been placed in the proper position, the stainless steel expansion bands shall be installed in the band recessed and individually expanded as required to provide a watertight seal.

Installation shall be in accordance with the manufacturer's instructions.

Exterior joint collar installation shall be as follows:

The collar shall be designed so that when it is applied around the joint the ends shall overlap at least 6" and when the straps are secured a layer shall completely cover the strap protecting them from moisture and rust. After removing the protective paper, the band shall be placed around the manhole, mastic side to the pipe and spanning the joint. The steel straps shall be secured with the proper tools. The closing flap shall cover all remaining exposed strap.

Installation of preformed gasket material:

The installation of the preformed gasket material used in the installation of the adjustment rings and/or casting shall include the use of a compatible primer or solvent as recommended by manufacturer of butyl base material to prepare surfaces prior to application of butyl base material.

## **8.07 Pavement Installation**

### **A. Sub-grades**

Sub-grades for all pavements shall be compacted no less than 95 percent of their maximum density at optimum moisture based on the modified Proctor compaction test (modified AASHTO [1978], Designation T-180, and ASTM [1980], Designation D 1557).

### **B. Concrete Pavement**

Concrete pavement and base course shall be constructed in close conformance with the Indiana Department of Transportation Standard Specification, Section 500, latest edition. Pavement shall be broom finished.

### **C. Bituminous Pavement**

Bituminous pavement, including base course, shall be placed and compacted in accordance with the INDOT Standard Specification Sections 300, 400, and 600 as applicable.

### **D. Traffic Control**

The Contractor shall plan construction activities to minimize impact to traffic. Local traffic access must be maintained at all times. The Contractor shall so schedule his work whenever possible and make suitable provisions for access by local residents, school buses, police, emergency, fire and mail delivery vehicles. The Contractor shall keep fire hydrants and other public utility valves accessible at all times. To maintain traffic movement, appropriate traffic

control devices shall be used. Such traffic control devices shall comply with the latest edition of the Indiana Manual on Uniform Traffic Control Devices and Sections 104.04, 107, and 801 of the Standard Specifications.

**8.08 Installation of Building Sewers (laterals)**

A. Connection to Sanitary Sewers

Connections to new sanitary sewers shall only be made at the manufactured fitting. Connections to existing sanitary sewers shall be made at existing manufactured fitting, as shown on the approved record drawings. In the event that no manufactured fitting exists in an existing sanitary sewer, and if approved by the Town, a service connection may be made using a saddle connection or by cutting into the sewer and installing a manufactured fitting using owner approved couplings.

B. Connections to Sanitary Manholes

Connections to sanitary manholes shall not be made without the prior approval of the Town. Building sewers shall connect to the manhole, when approved, at an elevation of not more than twenty-four (24) inches above the base of the manhole. No inside drop connections shall be allowed without the prior approval of the Town of Bargersville.

C. Bedding and Backfill

Bedding and backfill per the standard of PVC flexible pipe shall be required.

D. Laying of PVC Building Sewer

The point of commencement for laying of the building sewer pipe shall be at the connection to the sanitary sewer and shall be laid with the bell end pointing upgrade.