

SECTION 035
SPECIFICATIONS - PIPE INSTALLATION USING EXCAVATION METHODS

Unless provided within either these Specifications or on the project plan sheets, information about underground conditions within and near the area of work has not been obtained by GPSD. The Contractor shall either determine the underground conditions near the proposed sewer construction or repair locations and determine the effect of such conditions upon the proposed work. The Contractor shall assume all risks and accept all costs attributable to unknown and unforeseen underground conditions. Underground conditions such as the presence of underground obstructions or poor soil conditions that unfavorable to the means of sewer construction or reconstruction shall not be a basis for claims for additional compensation.

This Section shall govern all aspects of pipe installation performed using excavation methods. However, all aspects of pipe installation using excavation methods, including, but not limited to, joint construction, bedding, pipe material, concrete thrust block design and construction, backfilling, trench construction, maximum loading imposed on pipe in the trench, and material testing, shall also conform to the Manufacturer's Specification for the particular type of pipe specified; however, when in conflict, these Specifications shall govern. It shall be the responsibility of the Contractor to notify the Manufacturer at the start of the work and to request the Manufacturer to have a field representative on the job to instruct the Contractor, the Contractor's personnel, Engineers and Inspectors of the latest construction and installation methods.

Not included in this Section are specifications for the construction, repair or replacement of sanitary sewer using methods other than excavation. Specifications governing sewer construction, repair or replacement using methods such as pipe bursting, pipe reaming and horizontal directional drilling are included within additional sections made part of these Specifications.

Unless specified otherwise by GPSD, when constructing pipe using excavation methods, connections between pipes of dissimilar materials, or of unequal outside diameters, shall be made using Fernco-brand flexible-type couplings. The flexible type coupling shall fit over plain ends of both pipes and then tightened to make a water tight seal. Couplings for pipes under twelve-inches in diameter shall be 5000 Series, Strong Back (RC) shielded flexible-type couplings as manufactured by Fernco.

1.0 Staking

Refer to Lines and Grades in Section 021 of these Specifications for staking requirements. Staking requirements shall apply to both gravity sanitary sewers and force main sewers

2.0 Excavation

The Contractor shall make all excavations to the width and depth necessary for proper construction of the sewers and other structures in accordance with the Plans and Specifications. Excavation shall include the following: the clearing of the site of the work; the excavating, loosening, classifying, loading, removing, transporting and disposing of all materials, wet or dry, necessary to be removed for purposes of construction; trenching and all trench shoring including sheeting and bracing; all draining and pumping of water; disposal of all excavated materials; and all incidental work. The bottom of the trench shall be smooth and cleared of stones or protruding hard objects. All materials such as trees, brush, debris, etc. removed in site clearing shall be disposed of by the Contractor.

Trench widths shall be sufficiently wide to permit tamping around the pipe. The following specifications for trench dimensions shall apply to all conditions except where pipe construction is within strata of rock as defined in the subsection below titled "Rock Excavation". Trench widths measured at the top elevation of the

pipe shall not exceed the limits for pipe sizes as follows: when the inside, nominal diameter of the pipe is from eight inches to and including twelve inches, the trench width as measured at the top elevation of the pipe shall not exceed the outside diameter of the pipe plus twenty inches; when the inside, nominal diameter of the pipe is greater than twelve inches to and including thirty-six inches, the trench width as measured at the top elevation of the pipe shall not exceed the outside diameter of the pipe plus sixteen inches; and when the inside, nominal diameter of the pipe is greater than thirty-six inches, the trench width as measured at the top elevation of the pipe shall not exceed the outside diameter of the pipe plus twenty-four inches. Whenever the trench widths measured at the top of the pipe exceed these limitations, the Contractor shall at his own expense remove any disturbed earth and shall refill the excavated trench from wall to wall with approved granular bedding, concrete cradle, concrete encasement or a combination thereof as directed by GPSD.

3.0 Bedding

The following specifications for bedding dimensions shall apply to all conditions except where pipe construction is within strata of rock as defined in the subsection below titled "Rock Excavation". All sewer trenches shall be excavated to a depth of not less than six (6) inches lower than the lowest elevation of the sewer pipe and a minimum of six (6) inches of approved granular bedding shall be placed in the bottom of the trench. Except when constructing sanitary sewers using ductile iron pipe or when depths are greater than sixteen (16) feet, an additional amount of approved granular bedding shall be tamped and cradled around and over the pipe to a level of one (1) foot above the top of the pipe. When constructing sanitary sewers using ductile iron pipe at depths less than sixteen (16) feet, an additional amount of approved granular bedding shall be tamped and cradled around the pipe to the top of the pipe. At all times throughout the construction of pipes, over its entire length of pipes, underlying and surrounding bedding shall be constructed and maintained to evenly support loading and to avoid non-uniform loading at any point.

If the ground conditions are not suitable for bedding as outlined, the Contractor must excavate and dispose of the unsuitable material and add approved granular bedding material to support the pipe, as determined by GPSD. The bedding shall be built up in six (6) inch to twelve (12) inch layers of approved granular backfill to the bottom of the sewer pipe with an additional amount of approved granular backfill allowed for tamping and cradle beneath, around and over the pipe to a level of one (1) foot above the top of the pipe. The above work shall be made part of the contract amount.

3.1 Approved Bedding Material

Granular pipe cradle and envelope shall be constructed with granular materials from approved local deposits graded to Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, the Section for Coarse Aggregate Standards. Acceptable graduations for the granular pipe cradle and envelope are CA-7 and CA-11. The material shall be crushed gravel or crushed stone as per IDOT's Coarse Aggregate Standards with a minimum of 75% fractured material, from approved sources as determined by GPSD. A listing of approved granular sources is included in the appendices of these Specifications. When constructing PVC pipe using excavation methods at depths between sixteen (16) feet to twenty (20) feet or ductile iron pipe using excavation methods at depths greater than twenty (20) feet, granular materials used for bedding purposes shall be CA-7 or CA-11 white rock crushed stone.

3.2 Concrete Encasement

Where sewers are laid at shallow depth or where shown on the plans and where ordered by GPSD, the pipe shall be encased in concrete in accordance with the drawing for concrete encasement in Section 095 of these Specifications.

4.0 Placement of Fill or Embankment

Where a sewer is shown or ordered by GPSD to be placed in a fill section, the Contractor shall remove any and all weeds, tree roots, large rocks, or frozen material that will decay, or other material unsuitable for compaction of the fill area. The existing ground area of the fill section shall be plowed or disked before the fill is started to aid in bonding the fill section and the existing ground together.

The fill material shall be free of large rocks, frozen ground, material that will decay, or any other substance that might cause future settlement of the fill area. As far as it is practical, each layer of fill material shall extend the entire length and width of the fill area. Each layer shall be disked to break up oversize lumps and to mix different layers of the fill to provide a uniform moisture content. The fill material shall be placed in layers not to exceed eight (8) inches in depth. Each layer shall be rolled with either a pneumatic roller weighing twenty-five (25) tons or an equivalent sheeps-foot roller. Other types of equipment must be approved by GPSD. Should the fill material contain insufficient moisture to provide satisfactory compaction, the Contractor shall, at his own expense, apply water as directed. The fill material shall be placed and compacted to meet the following requirements: the moisture content of the fill material when placed shall be within two (2) percent of the optimum moisture content as determined ASTM D-1557 (Modified Proctor Test); compaction shall meet the requirements of ninety-five (95) of the ASTM D-1557.

All fill and compaction shall be completed to an elevation of not less than three (3) feet above the top of the pipe before installing the sewer. After the sewer has been installed and back filled, the Contractor shall dress the fill or embankment as specified on the plans.

5.0 Constructing Non-Pressurized Pipe

Pipe shall be constructed in conformity with the alignment and elevations as directed by GPSD and in the presence of an inspector authorized by GPSD. All pipe shall be constructed using a laser and with the bell located at the upstream end.

There are a number of lasers used in construction; hence, the method used to set up the laser prior to laying the sewer shall be approved. However, an above-ground spinning laser is unacceptable as the only laser used to check the grade of the sewer. Beginning at the first manhole, the laser will be leveled and set on line and grade. As the sewer construction reaches the next manhole, the laser will be moved to that new manhole, leveled, and line and grade reset for the next reach of sewer with the percent of grade given on the Plans. The laser will be checked for level, line and grade each morning and noon or at such other times as the construction is resumed after any delay in the work or at such times as in the opinion of GPSD the line and grade is in question as to its accuracy and conformance with the Plans. Upstream or downstream of each manhole, using a method independent of the laser and approved by GPSD, the elevation of pipe will be checked at the end of the first pipe laid, twenty-five (25) feet from the manhole and at hundred-foot intervals thereafter.

Before adjoining pipes connected, the interior of the pipe already constructed, including the bell thereof, shall be thoroughly cleared of all solids. A watertight plug shall be placed in the last pipe placed and not removed except to connect another pipe which in turn must be plugged. Pipes shall not be constructed where water has not been removed from the trench. Foreign materials inside constructed pipes shall be removed by the

Contractor to the satisfaction of GPSD.

The Contractor shall have a District approved ventilation system on site. The system shall be ready and available for use by the construction crew. The system shall be of adequate size to ventilate the manhole and pipes in order to remove condensation.

6.0 Constructing Pressurized Pipe

For pressure pipe construction, thrust blocks and locking glands shall be constructed where the pipe changes directions, changes size, terminates or is expected to develop thrust at valves. Slopes for force mains shall be uniform in order to maximize pumping efficiency. Unless specifically directed by GPSD, any vertical or horizontal deflections of force pipe shall be removed and replaced by the Contractor. Minimum cover over the crown of all force main pipe shall be not less than four (4) feet.

Where necessary, properly designed combination air release and air inlet valves, suitable for operating under a specified working pressure, shall be furnished at specified locations. The valve shall be designed to exhaust large quantities of air when the line is being filled; to exhaust small air accumulations when the line is in service; and to allow large quantities of air to re-enter the pipe in case of loss of pressure in the line. The valve shall be installed as per manufacturer's instructions. A District approved valve shall be installed at the base of the air release valve. The valve shall be a ball valve, a gate valve, or a plug valve.

A No. 10, solid insulated copper tracer wire shall be buried with all force mains regardless of pipe material. Tracer wire shall be brought to the surface within six (6)-inch PVC risers located approximately every five hundred (500) feet. Risers shall have a cast iron cap; however, risers shall not be constructed in driveways, drainage ways, or property lines.

7.0 Water Removal

The Contractor shall at all times during construction provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering excavations or other parts of the work and shall keep said excavations dry until the structures to be built therein are complete. No water or unauthorized sewage shall be drained into work built or under construction.

8.0 Rock Excavation

The following specifications shall apply where pipe construction is within strata of rock. Where rock is encountered, the Contractor shall excavate the sewer trench to a depth of six (6) inches below the bottom of the pipe and to a width of sixteen (16) inches plus the outside diameter of the pipe. All loose material shall be removed from the trench. A minimum of six (6) inches of approved bedding shall be tamped in place under the pipe with an additional six (6) inches of bedding tamped and cradled around the pipe. Additional bedding material shall also be added to a height of twelve (12) inches over the top of the pipe.

Rock shall be that material occurring in a natural state which requires blasting, barring, or wedging for removal from its original bed and having a compressive strength in excess of three hundred (300) pounds per square inch. It specifically includes all ledge rock, bedrock or boulders larger than one (1) cubic yard in volume.

9.0 Explosives

Approved explosives may be used where such blasting will not injure existing utilities, structures or improvements as determined by GPSD, however, such approval does not relieve the Contractor from the responsibility and liability for damages as a result of the use of explosives. Local news media shall be notified twenty-four (24) hours before blasting is scheduled to start. GPSD may provide the Contractor with some contact names and telephone numbers that shall be placed on the Contractor's listing of media contacts before the commencement of blasting.

The explosive charges used shall not make the excavation unduly large or irregular nor shall it shatter the rock upon which masonry structures are to be placed. Each charge shall be covered with heavy timber, steel mats, or other approved cover and shall be placed no closer than fifty (50) feet from the completed sewer pipe or structure. No blasting or storage of explosives will be permitted closer than three hundred (300) feet from high frequency or welding equipment.

Before use or storage of explosives is permitted, the Contractor must secure at his own expense such permits or bonds as may be required from the governing agency having jurisdiction and shall comply with all ordinances and regulations of such authority.

10.0 Connection to Existing Sewer

When a Contractor is directed to connect an outlet sewer to an existing sewer, he shall immediately provide a temporary bulkhead at the closest manhole. Connections to existing sewers shall be performed using methods detailed in these Specifications.

11.0 Erosion Control

Where an area is disturbed due to excavation, erosion and sediment control measures shall be taken to prevent soil erosion and sediment runoff from the site. Erosion and sediment control measures shall be placed at locations shown on the Plans. All erosion and sediment control measures shall be placed on the downstream side of disturbed areas such that no sediment escapes from the site. These control measures shall be constructed and fully functional prior to initiating construction activities and shall remain in place until the ground is stabilized with permanent ground cover. GPSD shall judge when the ground has been stabilized and where erosion prevention and sediment control devices shall be necessary. All control measures shall be properly maintained by the Contractor to ensure effective operation. When stockpiling earthen materials, control measures shall be placed downstream to prevent erosion and sediment runoff of the stockpiled material.

When allowed by GPSD, the Contractor shall be responsible for removing and disposing of materials used in erosion control.

The Contractor shall comply with all requirements of erosion control permits from the City of Peoria, Peoria County, and/or the Illinois Environmental Protection Agency.

END OF SECTION