

SECTION 047
SPECIFICATIONS - BACKFILLING

Backfilling of the trench shall proceed to the surface using the materials as specified based upon the type of surface improvements (e.g. paved surface or non-developed). Non-developed (grassed, landscaped or agricultural areas) areas may be backfilled utilizing excavated trench material provided it meets the specifications. The materials shall be left mounded to provide for settlement. All surplus excavation materials shall be removed and properly and legally disposed of by the Contractor at their expense. Where required in the specifications or directed by GPSD, backfilling shall be performed using materials detailed including fine or coarse aggregate materials, structural backfill materials and flowable backfill materials (CLSM).

Excavations shall be filled completely or to other elevations specified by GPSD. Fill materials shall be placed in a manner to encourage immediate compaction and eliminate future settlement. No large stones or debris shall be placed in the trench at any point. The trench may be backfilled by machine or by hand, but the work shall be done in such a way as to prevent dropping of materials directly on top of the pipe or through any great vertical distance onto the material covering the pipe. In no case will backfilling material be allowed to fall directly onto sewer pipe or other underground utilities or structures. The placing of the backfill shall be performed in a manner such that no undue loads are placed on any structure or utility.

Backfilling shall be completed promptly as pipe laying advances. The time elapsed before backfilling begins shall be subject to the approval of GPSD. In general, the distance between the end of the last pipe placed to the general work of backfilling shall not be less than twenty-five (25) feet in order to provide ample room for work such as the laying of the pipe, the construction of concrete cradles, the building of service risers, etc.

All work shall be performed in accordance with Illinois Public Act 90-0761.

1.0 Backfilling – Compaction Methods

For all materials, except flowable backfill, one of the following methods of compaction shall be used:

1.1 Mechanical Compaction

The Contractor shall choose the method of mechanical compaction considering any potential damage those compaction procedures may cause to the installed pipe and manholes.

Earthen materials shall be placed in layers of twelve (12) inch thickness or less, loose measure, and each layer firmly compacted. Materials classified as silts or clays shall be compacted with sheep's foot compactor designed for use in a trench.

Material classified as Coarse Aggregate Graduation or Fine Aggregate Graduation (as per IDOT Standard Specifications for Road and Bridge Construction, current edition) shall be placed in twelve (12) inch lifts and compacted with a vibrating plate or smooth drum-vibrating roller.

The Contractor shall provide compaction reports to GPSD.

1.2 Trench Jetting and Water Soaking

Jetting may only be used when other methods have been exhausted and must be pre-approved by GPSD.

Material excavated from the trench may be placed as backfill as detailed above. Water shall be introduced starting at the point of lowest elevation of the trench and work up along the trench. Jetting and water

soaking shall not begin until the trench has been backfilled to within six (6) inches of the finished surface.

Jetting holes shall be centered over the trench backfill and at longitudinal intervals of not more than six (6) feet. Additional holes shall be provided if deemed necessary by GPSD to secure adequate settlement. All holes shall be jetted to a point one (1) foot above the top of the pipe.

The water shall be injected at a pressure and rate just sufficient to sink the holes at a moderate rate. After a hole has been jetted to the required depth, the water shall continue to be injected until it begins to overflow the surface.

Surface depressions resulting from backfill subsidence caused by trench jetting and water soaking shall be filled with earthen materials and re-compacted by tamping or rolling to the satisfaction of GPSD.

2.0 Backfilling for Structures

Backfilling for structures, also referred to in plans and these Specifications as structural backfill, shall be completed using either earth removed from excavation or approved course or fine aggregate materials. The fill material shall be placed and compacted to ninety-five (95) percent as determined by ASTM D-698 (Standard Proctor Test). The moisture content of the fill material when placed shall be within ten (10) percent of the optimum moisture content as determined by ASTM D-698 (Standard Proctor Test). Backfilling shall not be allowed until concrete associated with structures in proximity to excavations to be filled has reached design strength and been inspected and approved by GPSD.

3.0 Backfilling, Coarse Aggregate and Fine Aggregate Materials

The Contractor shall furnish, transport and fill excavations with either fine aggregates or coarse aggregates, beginning one (1) foot above the top of the pipe. Where such backfilling is required, the earth material excavated from the trench shall be disposed of by the Contractor.

Excavated sand may be used as backfill. Pebbles and stones in the sand shall be comparatively few, and not larger than 0.75" diameter, to prevent interference with the working of the sand into the narrow spaces between the bedding and the earth.

Aggregate backfill materials shall be graded to the requirements of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. Aggregate backfill materials shall be either CA-6 or FA-6 materials. The material shall be crushed gravel or crushed stone as per IDOT's Aggregate Standards with a minimum of 75% fractured material. The use of slag will not be permitted.

4.0 Backfilling under Roadways

Backfill placed under or within five feet (5') of paved surfaces or anticipated roadways shall be either controlled low-strength material (CLSM, commonly referred to as flowable fill) or granular type backfill as specified in Section 3.0. The Contractor shall place compacted granular backfill or CLSM from an elevation of one (1) foot above the pipe up to an elevation specified by the local roadway authority, as illustrated in Section 095 of these Specifications. CLSM mix design, design criteria, mixing, proportioning, materials, equipment, sampling and testing are to be in accordance with the Illinois Department of Transportation (IDOT) Standard Specifications for Road and Bridge Construction.

Pavement restoration shall be in accordance with local regulations.

5.0 Waterway Backfill

Waterway backfill shall be constructed using IDOT Gradation RR1 coarse aggregate materials. Waterway backfill materials are to be placed in lifts not to exceed twelve (12) inches in vertical depth. Compaction testing of waterway backfill materials will not be required.

6.0 Testing of Backfill

Unless specified otherwise by the Engineer or within applicable project plans, and not including waterway backfill as defined above, compaction of backfill shall be completed such that the density is not less than eighty-five (85) percent of the maximum dry density as determined by ASTM D-698 (Standard Proctor Test) when the moisture content of the material when placed is within two (2) percent of the optimum moisture content. Often, within plans and these Specifications, compaction to this standard is referred to as agricultural backfill. As specified within applicable project plans, agricultural backfill shall be completed using earthen materials, coarse aggregate materials or fine aggregate materials. Within applicable project plans, any note or notes that specify requirements for the compaction of backfill other than that specified above shall supersede the requirement of this Section.

Unless specified as not required, all backfill shall be tested in lifts not to exceed twelve (12) inches in vertical depth. The backfill shall be tested after placement of each lift at a minimum of twice for every two-hundred (200) lineal feet as measured along the centerline of the newly placed pipe, or as required by the Engineer. The appropriate testing method from the following list shall be used:

- ASTM D6938: In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
- ASTM D2937: Density of Soil in Place by the Drive-Cylinder Method
- ASTM D1556: Density and Unit Weight of Soil in Place by the Sand-Cone Method

Test results shall be provided to GPSD in a written report specifying the test method utilized, test result, reference soil density-moisture curve, test date, test time, test location and name of tester.

7.0 Abandonment of Sewers with Flowable Backfill

Sanitary sewers designated to be abandoned shall be abandoned by filling the sewer as full as possible with modified flowable backfill (CLSM specified above, with the addition of a superplasticizer). If so indicated, all bookend manholes are to be abandoned by filling with modified flowable backfill. During backfilling the downstream end shall be vented. After insertion of modified flowable backfill is completed, the ends of the abandoned pipe and manhole(s) shall be sealed using brick and mortar or another approved method.

Not only shall the mainline sewer be filled with modified flowable backfill but all other voids either upstream of the mainline sewer or outside of the sewer pipe shall also be filled. Upstream connections shall include, but not be limited to, wye connections, tee connections, taps and laterals. Voids outside of the mainline pipe caused by broken and missing pipe and the subsequent erosion of supporting pipe materials shall also be filled as much as possible.

The Contractor shall continue filling the line to be abandoned to the satisfaction of GPSD. Designated bookend manholes shall be abandoned by plugging all connections other than the connection to the pipe to be abandoned then filling the manhole full of flowable backfill material. The Contractor shall remove the existing casting and lid, and then restore the surface to a condition consistent with its surroundings.

END OF SECTION