

SECTION 047  
SPECIFICATIONS - BACKFILLING

1.0 General

Unless specified otherwise, construction that occurs where there are no lawn areas to be restored or within right-of-ways that are not, nor planned to be, occupied by roadways, backfilling of the trench shall proceed to the surface using the materials taken from the trench. The materials shall be left mounded to provide for settlement.

Except as otherwise specified, the material excavated shall be used as backfill material; however, as specified by the Engineer, backfill placed under paved surfaces shall be either flowable type backfill, in accordance with Section 021 of these specifications, or granular type backfill as detailed below. All surplus excavation materials shall be removed and properly disposed of by the Contractor at his expense.

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 the Engineer. 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. If the character of the work permits, this distance may be less where permitted by the Engineer. Conversely, if the space for the carrying on of such work is not sufficient it shall be increased if ordered by the Engineer.

Under certain conditions or as directed by the Engineer, the Contractor may use flowable backfill (control low strength material, CLSM) in a disturbed roadway. Advantages are the elimination of compaction or jetting, and almost immediate replacement of the roadway top course. All flowable backfill used as both trench backfill material and roadway base course material shall be as detailed in Section 021 of these specifications.

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

2.0 Backfilling – Compaction Methods

Where specified by the Engineer, the Contractor shall backfill excavations with either excavated materials taken from the trench, fine aggregate materials, coarse aggregate materials, or flowable backfill. Materials will be placed in a manner to encourage immediate compaction and eliminate future settlement. For all materials, except flowable backfill, one of the following methods of compaction shall be used:

2.1 Trench Jetting and Water Soaking

Material excavated from the trench may be placed as backfill as detailed in Section 1.0 above. Water shall be induced 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.

All water and equipment required for water soaking or trench jetting shall be the responsibility of the Contractor.

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 the Engineer 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 the Engineer.

### 2.2 Mechanical Compaction

Mechanical compaction will be used in areas where, in the opinion of the Engineer, due to the nature of soil or other factors, the use of jetting or water soaking for compaction will either not give satisfactory structural results or is not a valid backfilling option. All equipment required for mechanical compaction of the backfill shall be the responsibility of the Contractor. The Contractor shall choose the method of compaction considering any potential damage those compaction procedures may cause to the installed pipe and manholes.

Material excavated from the trench may be placed as backfill. Earthen materials shall be placed in layers of twelve (12) inch thickness or less, loose measure, and each layer firmly compacted with tools approved by the Engineer in such a manner as not to disturb or injure the pipe. Materials classified as silts or clays shall be compacted with sheeps 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.

### 3.0 Backfilling for Structures

Backfill shall consist of earth removed from excavation, or approved sand backfill. Backfill using debris, frozen earth or large rocks is not permitted. The backfill shall be placed to elevations shown on the plans or directed by the Engineer, and shall be thoroughly tamped to prevent future settlement. The fill material shall be placed and compacted to ninety-five (95) percent as determined by ASTM D-1557 (Modified Proctor Test). The moisture content of the fill material when placed shall be within two (2) percent of the optimum moisture content as determined by ASTM D-1557 (Modified Proctor Test).

No backfilling is allowed until concrete associated with the structure has reached its designed strength and until said structural concrete has been inspected and approved by the Engineer.

### 4.0 Backfilling, Coarse Aggregate and Fine Aggregate Materials

Where either detailed within the plans and specifications or where ordered by the Engineer, the Contractor shall furnish, transport and backfill the sewer trench with granular materials, 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 at the Contractor's expense. If determined satisfactory by the Engineer, sand or gravel excavated from a sewer trench shall be used as backfill. Unless otherwise specified by the Engineer in Section 009, excavated materials used as backfill will not be paid as a special item separate from the costs associated with the installation of sewer piping.

Excavated sand used as backfill may be unwashed. Pebbles and stones in the sand shall be comparatively few, and not larger than  $\frac{3}{4}$ " diameter, to prevent interference with the working of the sand into the narrow spaces between the bedding and the earth.

Coarse backfill materials shall be CA-6 material graded to Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, requirements. The material shall be crushed gravel or a crushed stone per IDOT's Coarse Aggregate Standards with a minimum of seventy-five (75) percent fractured material, from local sources approved by the Engineer.

### 5.0 Backfilling Under Roadways

Where existing roadways or drives have been disturbed by the sewer construction, the Contractor shall place compacted granular, or flowable, backfill from an elevation of one (1) foot above the pipe up to an elevation consistent with both the City of Peoria roadway restoration guidelines, as illustrated in Section 095 of these specifications and the Illinois Department of Transportation (IDOT) Standard Specifications for Road and Bridge Construction. Granular backfill material shall be placed and compacted to ninety-five (95) percent as determined by ASTM D-1557 (Modified Proctor Test). The moisture content of the fill material when placed shall be within two (2) percent of the optimum moisture content as determined by ASTM D-1557 (Modified Proctor Test). Flowable backfill materials shall be as detailed in subsection 45.0 of Section 021 of these specifications. If approved by the Engineer, a temporary driving surface will be provided by filling the remainder of the trench up to the existing surface with either CA-6 base course material or Sylvax-brand cold patching material, or an approved equal. Before paving the base course will be graded to the proper elevation for the surfacing material specified.

Detailed specifications for pavement restoration are provided in Section 055 of these specifications.

### 6.0 Testing of Backfill

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 200 lineal feet as measured along the centerline of the newly placed pipe, or as required by the Engineer. Testing methods and procedures are to meet the approval of the Engineer, or his Representative.

Compaction of backfill for structure areas shall not be less than ninety-eight (98) percent, and the moisture content of the material when placed shall be within two (2) percent of the optimum moisture content, as determined by ASTM D-1557 (Modified Proctor Test).

Compaction of earthen backfill, where specified by the Engineer, such as in open-field areas, shall not be less than ninety (90) percent, and the moisture content of the material when placed shall be within two (2) percent of the optimum moisture content, as determined by ASTM D-1557 (Modified Proctor Test).

Compaction of either fine aggregate or coarse aggregate backfill shall meet a minimum of ninety-five (95) percent of the Modified Proctor Test, and the moisture content of the material when placed shall be within two (2) percent of the optimum moisture content, as determined by ASTM D-1557 (Modified Proctor Test).

Test results shall be made available to the Engineer or his Representative.

## 7.0 Abandonment of Sewers with Flowable Backfill

Sanitary sewers designated to be abandoned shall be abandoned by filling, as full as possible, the sewer with modified flowable backfill. If so indicated, all bookend manholes are to be abandoned by filling with modified flowable backfill. After insertion of modified flowable backfill is completed, as determined by the Engineer or his Representative, the ends of the abandoned pipe and manhole(s) shall be plugged to the satisfaction of the Engineer by 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 either the Engineer or his Representative. 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 satisfactory to the Engineer.

The Contractor shall be paid based upon the lineal footage of pipe abandoned, measured from center of manhole to center of manhole. No additional compensation shall be allowed for the abandonment of bookend manholes.

Modified flowable backfill shall consist of the flowable backfill mixture detailed in Section 021 of these specifications modified by the addition of air entrainment under name of Durafill, as manufactured by W.R. Grace, or an approved equivalent. The mixing plant supplying the materials shall determine the concentration of air entrainment to be added based upon the specified application.

END OF SECTION