Section 2 - Trench Excavation and Backfill

Overview

This section includes specifications regarding all material, equipment, and labor required to excavate and backfill the trench for the installation of water, sanitary sewer, and storm drainage pipelines as specified, as shown on the Plans, and as directed by the Engineer.

Chapter 1 – Protection of Existing Improvements

1.00 Streets, sidewalks, driveways, power/ cable/telephone lines, gas lines, water lines, sewers, storm drains and other existing improvements shall be maintained and protected from damage. Any aerial, surface or subsurface improvements damaged during the course of the work shall be repaired to the satisfaction of the Engineer. Satisfactory provisions shall be made for the maintenance of traffic on streets, driveways, and walkways.

Prior to any excavation, the Contractor shall notify all utilities and utility locating services to provide locations for buried utilities. The contractor shall obtain all necessary permits (grading, building, water, sewer, encroachment, etc.) prior to beginning work.

1.01 Care shall be exercised to protect trees to be left standing. Within the branch spread of such trees, all trenching shall be performed with extra care. The trench shall be opened when the work can be installed immediately. Injured roots shall be pruned cleanly and backfill placed as soon as possible.

1.02 The Contractor shall restore all property and facilities to a condition equal to or better than the condition found prior to beginning construction. Such restoration shall include but not be limited to re-grassing with seed or sod, replacing trees/shrubs/flowers, replacing pavement, replacing sidewalks/driveways, and replacing fences.

Chapter 2 – Excavation

Section 2.0 – General Excavation

Trench excavations shall be made by the open cut method to the depths indicated on the drawings or as otherwise specified. All excavated materials not suitable for backfill shall be wasted on site or removed from the site as directed.

The excavated trench shall be at least twelve inches (12”) wider but not more than sixteen inches (16”) wider than the outside diameter of the pipe being installed. The trench shall be excavated true to line to provide six to eight inches (6”-8”) clearance on each side of the pipe. The bottom of the trench shall be accurately graded to provide uniform bearing and support along the pipe barrel. Bell holes shall be excavated to allow sufficient space to make the joint and to insure that the pipe will rest evenly on the bottom of the trench. Bell hole dimensions shall be as recommended by the pipe manufacturer. Excavations for structures and other accessories shall be sufficient to provide at least twelve inches (12”) clearance between the structure and the trench wall.

If rock is encountered, the trench shall be excavated to a minimum depth six inches (6”) below the pipe. The trench shall then be backfilled with select material, compacted in place, to the depth required for pipe installation. Wet or other unsuitable material encountered in the trench bottom shall be removed to a depth required to gain sufficient bearing strength as directed by the Engineer. The trench shall then be backfilled with select material, compacted in place, to the depth required for pipe installation. If rock or other unsuitable material is encountered in the excavation for structures, the excavated area below the structure shall be backfilled with stone or concrete as directed by the Engineer.

Section 2.1 – Stockpiling of Excavated Material

Material excavated from the trench that is suitable for backfill shall be stockpiled a safe distance away from the excavation to allow room for adequate angle of repose and to protect the excavation. No material may be placed within three feet of the nearest edge of the trench. Material unsuitable for backfilling, as determined by the Engineer, shall be wasted on site or removed from the site and disposed of by the Contractor, as approved by the Engineer.

Section 2.2 – Shoring and Sheeting

All shoring, sheeting, and bracing required to perform and protect the excavation and to safeguard employees and the public shall be performed. Whenever sheeting is driven to depth below the elevation of the top of the pipe, that portion of the sheeting below the elevation for the top of the pipe shall not be disturbed or removed. Sheeting left in place shall be cut off not less than 1 foot below finished grade. No sheeting shall be removed until the excavation is substantially backfilled as specified in Chapter 3 of this section.

Section 2.3 – Water Removal

The Contractor shall be required to control groundwater and prevent the accumulation of water within excavations. Water shall be removed via well pointing, pumping, or other methods shall be as approved by the Engineer. The Contractor shall also control surface water runoff to prevent the accumulation of water in excavated trenches. Water shall not be allowed to rise in open excavations after pipe or structures have been placed. No work shall be performed within the trench until the Contractor demonstrates that groundwater and surface water runoff is controlled. If water accumulates within an excavation, the Contractor will be required to remove the water and saturated materials and backfill with approved material. Water removed from excavations shall be discharged at points where it will not damage adjacent property or facilities.

Section 2.4 – Blasting

Explosives are to be used only within legal limitations. Before explosives are used, all necessary permits for this work shall be secured and all precautions taken in the blasting operations to prevent damage to property, persons, or facilities. The Contractor shall assume full liability for any damage that may occur during the use of explosives. No blast shall be set off within fifty feet (50') of existing pipe or pipe already installed in the trench.

Chapter 3 – Backfilling

Trenches and other excavations shall not be backfilled until all required tests are performed and the work has been approved by the Engineer. The trenches shall then be carefully backfilled with approved excavated materials or other material approved by the Engineer. Backfill shall not contain organic material, blasted rock, broken concrete or pavement, construction debris, frozen earth, etc.

For backfill up to a level one foot (1') over the top of pressure pipelines and two feet (2') above the top of gravity pipelines, only selected materials shall be used. Select materials shall be finely divided material free from debris, organic material and rock, and may be suitable job excavated material or shall be provided by the Contractor from other sources. The backfill shall be placed in uniform layers not exceeding 6 inches in depth. Each layer shall be moistened and carefully and uniformly tamped with mechanical tampers or other suitable tools to ninety-five percent (95%) standard proctor compaction. Each layer shall be placed and tamped under the pipe haunches with care and thoroughness so as to eliminate the possibility of voids or lateral displacement.

The remainder of the backfill material shall then be placed and compacted above the level specified above. In areas not subject to traffic, the backfill shall be placed in twelve inch (12") layers, and each layer moistened and compacted to a density approximating that of the surrounding earth. Under roadways, driveways, paved areas, parking lots, along roadway shoulders and other areas subject to traffic, the backfill shall be placed in six inch (6") layers and each layer moistened and compacted to ninety-five percent (95%) standard proctor compaction. Any trenches which are improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and compaction. Along all portions of the trenches not located in roadways, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a neat condition satisfactory to the Engineer. All compaction shall be verified by nuclear density gauge on a random basis as specified by the Engineer in the field. Compaction tests shall be paid for by the contractor and conducted by an approved independent testing laboratory that is certified by AASHTO.

Sheeting not specified to be left in place shall be removed as the backfilling progresses. Sheeting shall be removed in such a manner as to avoid caving the trench. Voids left by the removal of sheeting and shoring shall be carefully filled and compacted. Where, in the opinion of the Engineer, damage is liable to result from withdrawing sheeting, the sheeting will be ordered to be left in place.

Chapter 4 – Pavement Replacement

The Contractor shall replace or repair all road/street/highway pavement and sidewalks that are damaged by this construction as specified herein and/or as required by the SCDOT Highway Encroachment Permit.

Pavement repairs shall be made by saw-cutting the existing pavement outside the damaged area to provide eight inches of bearing on undisturbed soil on each side of the excavation. The existing asphalt and/or concrete and/or base materials shall be removed to the depth required to place the patch. The following requirements are minimum thickness and in all cases the patch shall not be less than the existing pavement thickness.

4.00 Replace concrete street pavement with eight inch (8") thick concrete that is rated at three thousand pounds per square inch (3,000 psi).

4.01 Replace asphalt pavement with two inches (2") thick asphalt concrete (SCDOT Type III) surface course. The backfill of the trench the asphalt is placed over shall be as follows.

4.01.0 Eight inch (8") thick concrete that is rated at three thousand pounds per square inch (3,000 psi).

4.01.1 Controlled Density Fill ("Flowable Fill") poured into the entire depth of the trench.

4.01.2 Compacted fill subgrade compacted to ninety-five percent (95%) Modified Proctor in the entire depth of the trench.

4.02 Replace asphalt pavement edges, parking lots, and driveways with two inch (2") thick asphalt concrete (SCDOT Type III) surface course.

4.03 Replace concrete driveways with six inch (6") thick concrete that is rated at three thousand pounds per square inch (3,000 psi).

4.04 Replace concrete sidewalks with five inch (5") thick concrete that is rated at three thousand pounds per square inch (3,000 psi).