

# SECTION 02225

## EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Excavate trenches for sanitary sewers and force mains, laterals to two (2) feet on property, manhole excavation and for appurtenances as required.
- B. Compacted bedding under pipe.
- C. Backfilling and compaction of sanitary sewers and force mains, laterals, manholes, and related appurtenances.

#### 1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work
- B. Section 01300 - Submittals
- C. Section 01400 - Quality Control: Testing Fill Compaction
- D. Section 01500 - Construction Facilities and Temporary Controls: Water Control in Excavations
- E. Section 02600 - Utility Piping for Sanitary Sewers
- F. Section 02605 - Manholes
- G. Section 03300 - Cast-in-Place Concrete
- H. Section 11306 - Pump Stations
- J. Appendix A - Standard and Special Construction Detailed Drawings

#### 1.03 REFERENCES

- A. Pennsylvania Department of Transportation Publication 408/Latest Edition
- B. Pennsylvania Code, Title 67, Chapter 459, Occupancy of Highways by Utilities/Latest Edition
- C. Erosion and Sedimentation Pollution Control Plan Narrative
- D. ANSI/ASTM D-698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (304.8mm) Drop.

#### 1.04 SUBMITTALS

- A. Submit under provisions of Section 01300, Sources of Supply for Backfill Materials.

#### 1.05 TRENCHING REGULATIONS

- A. In open trenching or boring on State and Township highways, the Contractor shall be governed by the conditions, restrictions, and regulations made by the Pennsylvania

Department of Transportation and Township Supervisors. All such regulations shall be considered part, as if included plus the ones set down in these Specifications.

- B. The Contractor shall be responsible at all times for carrying out all excavation operations in a safe and prudent manner to protect all workmen and the public from unreasonable hazard. The necessary sheeting and bracing should be determined in accordance with the field conditions encountered. All applicable OSHA requirements must be strictly adhered to.
  - 1. Sheeting and bracing shall be used as required for the safety of employees exposed to the hazard of falling or sliding material from any trench or applicable excavation more than 5 feet above employees' footing. A box shall be used at depths of five (5) feet or greater, and any other time at the discretion of the Inspector.
  - 2. All sheeting and/or shoring devices used in depths over 8 feet shall be designed and certified by a Professional Engineer registered in the State of Pennsylvania. Such certification shall be provided to the Engineer prior to the use of such devices.

#### **1.06 EXCAVATION**

- A. Normally all excavation shall be unclassified.
- B. When rock excavation is classified, pay widths for trenches shall be as shown in Standard Detail Drawings No. 7 and 8.

#### **1.07 BLASTING**

- A. Blasting, if required, shall be permitted only with the written authorization of the Authority. The Contractor shall submit to the Authority his blasting plan of operation at least two (2) working days in advance of intended implementation. Blasting operations shall be performed in conformance with all applicable local and state laws, municipal ordinances and OSHA specifications. The Contractor shall use mats for all blasting work. Blasting operations shall be conducted only during the hours approved by the Authority. The Blaster shall be licensed in the State of Pennsylvania, to perform such work.
- B. The Contractor shall conduct all rock excavation operations, including blasting, in a manner which will avoid damage to structures, properties, and utilities. Any damages resulting from rock excavation operations, including blasting, shall be remedied by the Contractor, at no expense to the Authority. The Contractor shall be solely responsible for defending any claims resulting from his rock excavation operations, including blasting, and shall make whatever adjustment is required at his own expense. Blasting bonds and/or insurance necessary on State, Township, or Borough highway rights-of-way are to be obtained by the Contractor at his own expense in behalf of the Authority.

#### **1.08 TRAFFIC MAINTENANCE**

- A. The Contractor shall be required to submit to the Authority for review and approval his maintenance and traffic control plan prior to beginning construction. The plan shall be based upon the latest publication of the PennDOT Publication 203.
- B. The Contractor shall furnish the necessary guards, watchmen, warning lights and similar items necessary to maintain state highway and other road/street traffic in accordance with PennDOT requirements. In general, the Contractor will not be permitted to interrupt traffic without specific arrangements for detouring traffic in accordance with PennDOT requirements. When traffic cannot be detoured, a minimum of 1/2 the roadway width shall be open at all times with traffic control.

**1.09 WORK DURING INCLEMENT WEATHER**

- A. The Authority reserves the right to order cessation of work during inclement weather, if, in the opinion of the Authority, the safety of the workman is endangered or if the work itself is endangered.

**1.10 ACCESS AND INSPECTION**

- A. All work in this section is subject to Inspection by the Authority or its representative and shall have full access to the project for same.

**PART 2 - PRODUCTS**

**2.01 BACKFILL MATERIALS**

- A. Type I: Granular materials meeting the specifications of PDT Pub. 408, Section 703.3.
- B. Type II: Material such as sand, quarry waste, and screenings all with no gradation larger than one (1) inch.
- C. Type III: Suitable excavated material free of debris, organic material, and rock larger than three (3) inches.

**2.02 CONCRETE BACKFILL**

- A. Concrete shall meet the requirements of Section 03300, Cast-in-Place Concrete for Class B (2500 PSI/28 Days).

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. The Contractor's attention is directed to his responsibilities in accordance with Act 38. Any underground utilities shown on construction drawings should be verified prior to beginning construction.
- B. Maintain and protect existing utilities remaining which pass through work area.
- C. Before starting any earthwork activity under this Section, the Contractor shall insure that all Erosion and Sedimentation Controls are in place.
- D. Verify backfill materials to be used are acceptable.
- E. Verify that survey benchmarks and intended elevations for Work are as shown on the Drawings.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.

- B. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- C. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- D. In the event of damage, immediately make all repairs and replacements as required by the Authority and at no additional cost to the Authority.

### **3.03 EXCAVATION**

- A. Where trenching occurs through bituminous or concrete pavement, the edge(s) shall first be cut through full depth to preclude distortion of remaining edge(s) during excavation.
- B. Excavate subsoil required for sanitary sewer piping, manholes, and appurtenances. Allow for six (6) inches (minimum) bedding/support depth. Use laser to maintain grade specified.
- C. Cut trenches sufficiently wide to enable installation of utilities and allow inspection. Refer to Standard Drawing Detail typical.
- D. Excavation shall not interfere with normal forty-five (45) degree bearing splay of foundations.
- E. Correct unauthorized excavation at no cost to Authority.
  - 1. Unforeseen conditions encountered, such as sinkholes, shall be stabilized at a negotiated price.
- F. Correct areas over-excavated by error by backfilling with Type I or Type II material, satisfactorily compacted.
- G. The Contractor shall dewater all trenches to provide a dry trench bottom for the installation of the sewer pipe. Trench water shall be discharged by pumps or by other means to natural drainage channels, storm drains, or other points upon written approval of the Authority and in compliance with regulations of the Fish Commission, SCS, and DER. Where pumping is required, the Contractor shall provide sufficient pump capacity to maintain the trench bottom in a dry condition.
- H. Remove excess material not being used to an approved on-site waste area or dispose of legally at Contractor's expense.

### **3.04 BEDDING**

- A. Place six (6) inches of Type I or Type II material for pipe bedding (pipe cushion). Continue bedding material to twelve (12) inches over pipe. Hand work material around pipe haunches and pipe to preclude misalignment and grade changes. Pipe that is damaged or moved out of alignment shall be re-laid by the Contractor at his expense.

### **3.05 BACKFILLING**

- A. Backfill trenches to contours and elevations with unfrozen materials of the SPECIFIED type.
- B. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Employ a placement method that does not disturb or damage pipe in trench.
- D. Backfill ABOVE twelve (12) inches over Pipe: Place and compact materials in continuous layers not exceeding 8 inches in compacted depth using standard compaction equipment. No Hydra-Hammers shall be used until two (2) feet over top of pipe is reached.
  - 1. PennDOT roads and improved shoulders - Type I

- A. Check Highway Occupancy Permit
- 2. Township and Borough roads, unimproved PennDOT areas, Commercial and Private areas - Type III if available, if not, use Type I.
- E. Refer to Sub-Section 2.01 for material specifications.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Remove surplus backfill materials from site.

### **3.06 CONCRETE BACKFILL**

- A. In locations where the excavations have been carried beneath existing structures, utilities, or pipes, such that the backfill cannot be compacted in accordance with the requirements of Paragraph 3.08, the Contractor shall furnish and place concrete backfill to support such existing structures, utilities or pipes. Concrete shall be Class B.
- B. Where the volume of concrete backfill required exceeds two (2) cubic yards, boulder fragments of rock excavated during construction may be embedded in the concrete to provide added bulk. Concrete backfill shall be vibrated as necessary to assure the structural support of the existing structure, utility, or pipe.

### **3.07 TOLERANCES**

- A. Top Surface of Backfilling: Under paved area, plus or minus one-half (1/2) inch from required elevation for aggregate base.
- B. Top Surface of General Backfilling: Plus or minus one (1) inch from required elevations.

### **3.08 FIELD QUALITY CONTROL**

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D-698 and with Section 01400.
- C. Compaction testing will be performed in accordance with ASTM D-698 and with Section 01400 if required by the Authority.
  - 1. Compaction Requirements:
    - a. PennDOT, Township, Borough Roadways, and Commercial Areas:
      - (i) 100% of determined dry weight density of backfill material at optimum moisture content.
    - b. Other Areas:
      - (i) 90% of determined dry weight density of backfill material at optimum moisture content.
    - c. Visual inspection of non-movement under compaction equipment may be used where material is too coarse for testing.
- D. The use of HYDRA-HAMMER for compacting backfill in trenches is prohibited until 2 feet over top of pipe is completed by other equipment.
- E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Authority.
- F. Frequency of Tests: Maximum of Every two (2) Feet

- G. In cases where the sewer construction is not on road right-of-way or improved property, it may be permissible to dispense with tamping above two (2) feet beyond the top of the pipe.

**3.09 PROTECTION OF FINISHED WORK**

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic.

**END OF SECTION**