

**Section 02316****EXCAVATION AND BACKFILL FOR ROADWAYS****1.1 GENERAL****1.2 SECTION INCLUDES**

- A. Excavation of materials for roadways.
- B. Excavation of materials for roadside ditches.
- C. References to Technical Specifications:
  - 1. Section 01200 – Measurement and Payment Procedures
  - 2. Section 01350 – Submittals
  - 3. Section 01760 – Project Record Documents
  - 4. Section 01450 – Testing Laboratory Services
  - 5. Section 01500 – Temporary Facilities and Controls
  - 6. Section 02255 – Bedding, Backfill and Embankment Material
  - 7. Section 01570 – Trench Safety Systems
  - 8. Section 01564 – Control of Ground Water and Surface Water
  - 9. Section 01720 – Field Surveying
  - 10. Section 02220 – Site Demolition
  - 11. Section 02200 – Site Preparation
  - 12. Section 02330 – Embankment
  - 13. Section 01140 – Contractor’s Use of Premises
- D. Referenced Standards:
  - 1. American Society for Testing and Materials (ASTM)
    - a. ASTM D 698, “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort”
    - b. ASTM D 1556, “Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method”
    - c. ASTM D 2922, “Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)”
    - d. ASTM D 3017, “Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)”

**1.3 MEASUREMENT AND PAYMENT**

- A. Measurement shall be by the cubic yard measured in place, including labor, equipment, tools and incidentals necessary to complete the work.

- B. Payment includes control of ground water and surface water, trench safety systems, removal of existing pavements and structures, repair and maintenance of excavated or backfilled areas, and other measures specified in this Section and not included in payment elsewhere.
- C. Refer to Section 01200 – Measurement and Payment Procedures.
- D. No payment will be made for material excavated under the following conditions:
  - 1. More than 2 feet outside of vertical planes behind back of curbs.
  - 2. For portion within limits of trench for utilities constructed by open-cut methods.
  - 3. As indicated otherwise on Drawings.
- E. Construction Surveying shall be performed by qualified personnel under the direction of the Contractor. Contractor shall be responsible for the accuracy and correctness of this work. In the event that the Work consists of significant alteration of the topographic features of natural grade, Contractor shall perform enough topographic survey to substantiate existing pre-construction elevations. No claim shall be made for additional excavation or grade adjustment in excess of quantities contained in the contract documents without demonstrable evidence that such conditions existed prior to start of the Work.
- F. Excavation and Backfill quantities that exceed the construction plans shall be substantiated with topographic survey of finished grade by survey (RPLS) and verified by the Engineer at contractor's expense.

#### 1.4 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01350 – Submittals.
- B. Submit product quality, material sources, and field quality information in accordance with this Section.
- C. Submit field red lines documenting location of roadway excavation as installed, referenced to survey Control Points, under the provisions of Section 01760 – Project Record Documents, 1.04C. Include location of utilities and structures encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

#### 1.5 TESTING

- A. Testing and analysis of product quality, material sources, or field quality shall be performed by an independent testing laboratory provided by the Owner under the provisions of Section 01450 – Testing Laboratory Services and as specified in this Section.

**1.6 PROTECTION OF PEOPLE AND PROPERTY**

- A. Contractor shall conduct all construction operations under this Contract in conformance with the practices described in Section 01500 – Temporary Facilities and Controls.

**2.1 PRODUCTS****2.2 MATERIALS**

- A. Contractor shall provide materials used as embedment, backfill, back-dressing, and embankment identified on the Plans in accordance with Section 02255 – Bedding, Backfill and Embankment Material.

**3.1 EXECUTION****3.2 PREPARATION**

- A. Employ a Trench Safety Plan as specified in Section 01570 – Trench Safety Systems.
- B. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01564 – Control of Ground Water and Surface Water.
- C. Identify required lines, levels, and datum. Coordinate with Section 01720 – Field Surveying.
- D. Identify existing structures and utilities above and below grade. Stake and flag their location.
- E. Remove existing pavements and structures, including sidewalks and driveways, in conformance with requirements of Section 02220 – Site Demolition, as applicable.
- F. Area shall be cleared and grubbed under the provisions of Section 02200 – Site Preparation prior to excavation.
- G. Strip and stockpile topsoil under the provisions of Section 02200 – Site Preparation.
- H. Upon discovery of unknown or badly deteriorated utilities, or concealed conditions, discontinue work. Notify Engineer and obtain instructions before proceeding in such areas.

**3.3 EXCAVATION**

- A. Excavate to lines and grades shown on Plans.

- B. Areas of unsuitable material shall be removed, backfilled with embankment materials, and compacted under the provisions of Section 02330 – Embankment.
  
- C. At intersections, grade back at minimum slope of one inch per foot. Produce a smooth riding junction with intersecting street. Maintain proper drainage.

- D. Fill over-excavated areas in accordance with requirements of Section 02330 – Embankment at no cost to the Owner.

### **3.4 COMPACTION REQUIREMENTS**

- A. Maintain moisture content of embankment materials to attain required compaction density.
- B. Compact to minimum densities at moisture content of optimum to 3 percent above optimum as determined by ASTM D 698, unless otherwise indicated on the Drawings.
  - 1. Areas under future paving and shoulders: Minimum density of 95 percent of maximum dry density.
  - 2. Other areas: Minimum density of 90 percent of maximum dry density.

### **3.5 TOLERANCES**

- A. Top of compacted surface: Plus or minus 1/2 inch in cross section, or in 16 foot length.

### **3.6 FIELD QUALITY CONTROL**

- A. Compaction Testing will be performed in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017 under provisions of Section 01450 – Testing Laboratory Services.
- B. Three or more tests, at Engineer's/Owner's option, will be taken for each 1,000 linear feet per lane of roadway or 500 square yards of embankment per lift.
- C. If tests indicate work does not meet specified compaction requirements, recondition, re-compact, and retest at Contractor's expense.

### **3.7 CLEAN-UP AND RESTORATION**

- A. Perform clean-up and restoration in and around construction zone in accordance with Section 01140 - Contractor's Use of Premises.
- B. In unpaved areas, grade surface as a uniform slope from installed appurtenances to natural grade and stabilize as indicated on Plans.

**3.8 PROTECTION OF THE WORK**

- A. Maintain excavation and embankment areas until start of subsequent work. Repair and re-compact slides, washouts, settlements, or areas with loss of density at no cost to the Owner
- B. Prevent erosion at all times. Maintain ditches and cut temporary swales to allow natural drainage in order to avoid damage to roadway. Do not allow water to pond in excavations.
- C. Distribute construction traffic evenly over compacted areas, where practical, to aid in obtaining uniform compaction. Protect exposed areas having high moisture content from wheel loads that cause rutting.

**END OF SECTION**