

SECTION 02200 - EARTHWORK

(Last revised 5/07/07)

1. GENERAL

- A. The Contractor shall furnish all labor, materials, tools, equipment, and perform all work and services for all site clearing, site excavation, grading and embankment, excavation, filling and backfilling for structures, such as drainage structures, curb and gutters, sidewalks, driveways, pavements, including borrow, hauling, wetting, rolling and other operations pertaining thereto within the clearing limits, complete all as shown on the contract drawings and in accordance with these Contract Documents and completely coordinated with all other trades.
- B. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. **NCDOT:** All work on state system streets shall conform to the applicable provisions of the *N.C. Department of Transportation Standard Specifications for Roads and Structures*, latest edition and the Highway Design Branch *Roadway Standard Drawings*.
- D. **Local Government:** Work performed on local government streets or projects shall conform to that municipalities applicable standards, details and specifications except as modified herein and/or where more restrictive.

2. QUALITY STANDARDS

- A. Perform all work in accordance with requirements of state and local codes, with requirements of OSHA, and in accordance with federal requirements.
- B. Refer to the following standard references or specifications with respect to materials, tests, and physical parameters:

1) American Society for Testing and Materials (ASTM).

ASTM C33-97	<i>Concrete Aggregates</i>
ASTM D698-91	<i>Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft) (Standard Proctor)</i>
ASTM D1557-91	<i>Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft) (Modified Proctor)</i>
ASTM D4253-93	<i>Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table</i>
ASTM D2487-93	<i>Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)</i>

ASTM C136-96a	<i>Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates Sieve Analysis of Fine and Coarse Aggregate</i>
ASTM D4318-95a	<i>Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils</i>
ASTM D422-63(1990)e	<i>Standard Test Method for Particle-Size Analysis of Soils (for classification purposes only).</i>
ASTM D1883-94	<i>Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils</i>
ASTM E-154-99	<i>Standard Test Methods for Water Vapor Retarders (Plastic Vapor Barriers) Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover in Crawl Spaces</i>

- 2) **N.C. Department of Transportation** Standard Specifications for Roads and Structures.
- 3) **N.C. Department of Natural Resources, Land Quality Section**, Erosion and Sedimentation Control Requirements.
- 4) Applicable Local Government Authority requirements having jurisdiction over Erosion and Sedimentation Control.
- 5) **N.C. Building Code** (2000 International Building Code with NC amendments) 2002 Edition, latest editions of the applicable Volumes (i.e. International Plumbing Code, Accessibility Code, etc.).
- 6) **AASHTO** **American Association of State Highway & Transportation Officials**

AASHTO T99-86	<i>The Moisture-Density Relations of Soils using a 5.5 - pound Rammer and a 12 inch drop.</i>
AASHTO T180-86	<i>The Moisture-Density Relations of Soils using a 10 pound Rammer and a 18 inch drop.</i>

3. **SUMITTALS**

- A. See Article 55 of the "General Conditions."
- B. Submit to Engineer for approval the source and samples of fill and backfill materials.
- C. Submit to Engineer for approval the source and samples of borrow materials.

4. **MATERIALS**

- 1) **Off-site Borrow and Backfill.** Select material from an approved off-site borrow source approved by the Engineer.
- 2) **Backfill Material Class Definitions** (NCDOT defined Classes).

- a. **Class I:** Angular, *graded stone*, including a number of fill materials that have regional significance such as slag, cinders or crushed stone. Soil shall meet the requirements of AASHTO M145-82, or latest revision, for soil classifications A-1-a or A-1-b. Coarse aggregate shall have a Liquid Limit not greater than 30 and a Plasticity Index not greater than 6.

Sieve Size	Percent by Weight Passing
1 ½ inch	100
#4	35-60
#200	5-15

- b. **Class II:** *Coarse sands and gravels* with maximum particle size of 40mm (1 ½ inch) including variously graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. Class II soil material shall meet the requirements of AASHTO M145-82, or latest revision, for soil classifications A-2-4 or A-3.
- c. **Class III:** *Fine sand and clayey gravels*, including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil type GM, GC, SM and SC are included in this class. Class III soil material shall meet the requirements of AASHTO M145-82, or latest revision, for soil classifications A-5, A-6, A-7-5 or A-7-6 provided the soils have a liquid Limit Less than 50 and a Plasticity Index of between 7 and 20.
- d. **Class IV:** *Silt, silty clays and clays* including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class. These materials are generally not allowed. Under optimum conditions, the material may be allowed for backfill with the Engineer's approval.

- 3) **Sand:** Material shall consist of approved Class II (SW or SP) material.
- 4) **Structural Fill and Embankment:** Materials shall consist of approved Class I, II or III material.
- 5) **Select Materials:** Materials shall consist of approved Class I, II or III material.
- 6) **Granular Fill under Floor Slabs on grade:** Clean crushed, non-porous rock, crushed or uncrushed gravel complying with ASTM C33-97 gradation size No. 67, 3/4 to No. 8.

5. GEOTECHNICAL INVESTIGATION

- A. Soils/Geotechnical Investigation for the work may have been prepared for this project. A copy, if available, may be obtained by contacting the Project Engineer