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**SECTION 02220  
EXCAVATION, BACKFILLING & COMPACTION**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Without limitation, the work of this Section includes the following:
  - 1. General site excavation for all improvements
  - 2. Grading.
  - 3. Testing of materials to be used.
  - 4. Topsoil Stripping, Stockpiling and Re-spreading
- B. Classification: All excavations within the project limits shall be "Unclassified", defined as removal of all materials regardless of its nature including rock and unsuitable material excavation.
- C. Rock excavation shall include rock in definite ledge formation and boulders, or portions of boulders, one (1) cubic yard, or more, in volume.
- D. Unsuitable Material Excavation: Defined as any material containing vegetation or organic matter, such as muck, peat, organic silt, sod or any other encountered material having unsuitable in-situ bearing properties (clay). All encountered unsuitable materials shall be removed and disposed legally off the site.

**1.02 STANDARDS**

- A. References to Form 814A mean the State of Connecticut Department of Transportation "Standard Specification for Roads, Bridges and Incidental Construction, 1988", including the supplemental specifications.

**1.03 QUALITY ASSURANCE**

- A. Field Quality Control: Compaction testing will be done by Contractor – See Section 02121.

**1.04 TESTING LABORATORY**

- A. The Contractor shall be responsible for compaction tests required under this Section – See Section 02121.

**1.05 SUBMITTALS**

- A. None.

**1.06 PROTECTION**

- A. Protect existing structures, tubes, vegetation, etc. that are designated to remain.
- B. Protect above and below grade utilities which are to remain.
- C. Notify CTARNG of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- D. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- E. Repair damage at no additional cost to the Owner.

**1.07 LAWS AND REGULATIONS**

- A. All work under this Contract shall be accomplished in accordance with State of Connecticut "Form 814A", the safety provisions of applicable laws, building and construction codes and the latest edition of the OSHA 2207 Code. The Contractor shall consult with UI, SNETCO and other utility companies to determine applicable standards, which may apply.
- B. The contractor shall contact CALL BEFORE YOU DIG at 1-800-922-4455 at least two working days prior to beginning any excavation. The Contractor shall also contact Range Control at that time.

**1.08 SUBSURFACE DATA**

- A. INVESTIGATIONS
  - 1. Subsurface investigations have not been made for this project.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Comply with applicable sections of "Form 814A" and as modified herein.

**PART 3 EXECUTION**

**3.01 GENERAL**

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A. Without limitation, comply with Sections of "Form 814A" and as modified herein.

1. Roadway Excavation, Formation of Embankment, Disposal of Surplus Materials and Channel Excavation

Section 2.02.03

B. Blasting will not be permitted under this Contract.

**3.02 PREPARATION**

A. Verify existing conditions and required lines, levels, contours and datum.

B. Stake and flag existing, known above and belowground utilities.

C. Coordinate with respective utility companies or others doing work in the vicinity.

D. Upon discovery of unknown utility or concealed conditions, discontinue affected work and notify the CTARNG.

**3.03 GENERAL EXCAVATION**

A. Excavate all material required for proposed work as indicated on the Contract Drawings.

B. Excavate to the working elevations indicated. Allow ample room for forming, inspection and other required work.

C. Excavation shall not interfere with normal 45 degree bearing of any foundation.

D. Hand trim excavations and leave free of loose matter.

E. Remove lumped subsoil boulders, loose rock and other debris from excavation.

F. Correct unauthorized excavations at no cost to the Owner.

G. Fill over excavated areas or unsuitable material excavations with compacted gravel fill, approved concrete, or as directed by the CTARNG.

H. Stockpile excavated material in approved designated on-site area for reuse. Remove excess excavated material from site.

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**3.04 UNSUITABLE MATERIAL EXCAVATION AND BACKFILL**

- A. Excavate unsuitable materials to required limits as shown on the plans or as directed by the CTARNG. Unsuitable materials shall be disposed of off site, backfill with compacted gravel.

**3.05 BACKFILLING AND EMBANKMENT**

- A. Backfill systematically, as early as possible. Use unfrozen materials. Do not backfill over porous, wet spongy or frozen subgrade surfaces.
- B. Place and compact gravel fill in continuous layers not exceeding eight inches. Depths indicated refer to compacted thickness.
- C. Use placement method that will not disturb or damage adjacent structures, utilities or other work.
- D. Maintain optimum moisture content of backfill materials to attain required compaction densities.
- E. Backfill uniformly against supported foundation walls or structures. Backfill simultaneously on each side of unsupported walls or structures.
- F. Slope backfill grade away from building or structure.
- G. Make changes in grade gradual. Blend slopes into level areas.
- H. Remove surplus backfill materials from site.
- I. In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

**3.06 ROUGH GRADING**

- A. Coordinate subgrade elevations with required depths for pavement cross-sections, slabs and footings, selected or imported fill and topsoil areas.
- B. Shape subgrade elevations, less required controlled fill depths, to within reasonably close conformity to the lines and elevations indicated on the Contract Drawings.
- C. All ruts or rough places that develop shall be smoothed and re-compacted.

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- D. Provide uniform slopes and contoured subgrade surfaces to provide positive drainage. Remove stones larger than two-inch diameter and other debris.

### 3.07 COMPACTION REQUIREMENTS

- A. Compact all subgrade soils thoroughly prior to placing required controlled fills.
- B. Fills indicated on the Contract Drawings refer to compacted thickness. The dry density after compaction under utilities, in fill areas, embankments and backfills under proposed roadways and buildings shall not be less than the following dry density for that soil when tested in accordance with AASHTO T-180, Method D.
  - 1. Under structures/SACON™ panels: 95%
  - 2. Fill Under Landscaped Areas: compact lightly with roller or other equipment.

### 3.08 COMPACTION CONTROL TESTS

- A. This specification shall govern the determination of the maximum density, field density, and percent compaction of those materials for which a minimum percent compaction is specified. It covers the basic procedures to be followed in performing the test for maximum density, field density, and percent compaction. In all cases, density shall be stated as the dry weight in pounds per cubic foot.
- B. Maximum density is defined as the maximum dry weight in pounds per cubic foot obtained when a material is mixed with different percentages of water and compacted in a standard manner. The percentage of water at which maximum density is obtained is termed the optimum moisture content.
- C. Laboratory Compaction Tests: The maximum density shall be determined by the appropriate method shown below: (Equivalent ASTM Tests may be substituted.)
  - 1. All particles passing a 3/4" sieve shall be tested in accordance with AASHTO T180, Method D.
  - 2. Where the material contains particles larger than 3/4 inch, follow the replacement procedure given in the note under Method C of AASHTO T99 or T180.
- D. Field Density: Field density refers to the dry density expressed in pounds per cubic foot of a layer of compacted material in place at the site as determined by a sample representative of the compacted layer. The field density shall be

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determined in accordance with AASHTO T147, AASHTO T181, ASTM D1556, ASTM D2167, or other methods approved by the CTARNG.

E. The percent compaction is defined as the density of the compacted layer expressed as a percentage of the maximum density of the material when tested in accordance with these specifications.

F. The percentage of compaction is computed by the formula:

$$\text{Percent Compaction} = \frac{\text{Field Density} \times 100}{\text{Maximum Density}}$$

The mold to be used for testing will be 6.11 inches high.

G. Unless otherwise directed, one density test per lift for every 200 square feet of controlled fill under building slabs and one for every 1,000 square feet of controlled fill under site pavement shall be performed.

H. If tests indicate work does not meet specified requirements, remove work and replace at no cost to the Owner.

END OF SECTION