

## SECTION 02300

### EARTHWORK

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The proposed construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" latest edition. A copy of these Standard Specifications must be available at the project site during construction.

1. Division 2 - Earthwork
  - a) Section 226 – Comprehensive Grading.
  - b) Section 228 – Pre-Splitting of Rock.
  - c) Section 230 – Borrow Excavation.
  - d) Section 235 – Embankments.
  - e) Section 240 – Ditch Excavation.
  - f) Section 260 – Proof Rolling.
  - g) Section 270 – Fabric for Soil Stabilization.
2. Division 15 – Utilities
  - a) Section 1530 – Adjust, Abandon or Remove Utilities.
3. Division 16 – Erosion Control.
  - a) Section 1605 – Temporary Silt Fence.
  - b) Section 1610 – Stone for Erosion Control.
  - c) Section 1615 – Temporary Mulching.
  - d) Section 1620 – Temporary Seeding.
  - e) Section 1622 – Temporary Slope Drains.
  - f) Section 1630 – Construction and Maintenance of Silt Detention Devices.
  - g) Section 1631 - Ditch Liner and Erosion Control Blankets.
  - h) Section 1632 – Rock Inlet Sediment Trap.
  - i) Section 1633 – Temporary Rock Silt Checks.
  - j) Section 1635 – Temporary Rock Sediment Dams.
  - k) Section 1635 – Rock Pipe Inlet Sediment Trap.
  - l) Section 1636 – Temporary Rock Silt Screen.
  - m) Section 1638 – Stilling Basin.
  - n) Section 1660 – Seeding and Mulching.
  - o) Section 1675 – Response for Erosion Control.

- B. This Section includes the following:
1. Preparing subgrades.
  2. Excavating and backfilling.

##### 1.2 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.

- B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations.
  - 1. Additional Excavation: Excavation below subgrade elevations as directed by Owner/Owner Agent. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Owner/Owner Agent. Unauthorized excavation, as well as remedial work directed by Owner/Owner Agent, shall be without additional compensation.
  - 3. Rock Excavation: The removal of a formation that cannot be excavated without systematic drilling and blasting. Rock shall be material that can not be ripped with a crawler tractor rated at a minimum of 50,000 pounds draw-bar pull at one mile per hour, pulling a single-tooth ripper. Boulders larger than ½ cubic yard shall be classified as rock. The contractor shall be required to expose and clean the rock material for inspection and measurement by the project engineer. Any material moved or removed without the measurement and approval by the engineer will be considered as normal or earth excavation.
  - 4. Normal or earth excavation: A formation that, when plowed and ripped, breaks down into small enough pieces to be easily moved, can be loaded in hauling units and can be readily incorporated into an embankment or foundation in relatively thin layers.
  - 5. Trench Rock Excavation: The removal of a formation that cannot be excavated without systematic drilling and blasting. Trench rock shall be material that can not be removed with a backhoe equipped with a minimum ½ cubic yard heavy-duty trenching bucket placed on a machine capable of a lifting capacity of 7,500 pounds at a trench depth of 10 feet. The contractor shall be required to expose and clean the rock material for inspection and measurement by the project engineer. Any material moved or removed without the measurement and approval by the engineer will be considered as normal or earth excavation.
- E. Fill: Soil materials used to raise existing grades.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- H. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

### 1.3 PROJECT CONDITIONS

- A. Excess cut material shall be removed from the University of North Carolina at Charlotte property. The University shall have access, at their option, to excess spoil material without incurring additional costs for the material. The cost associated with the excavation, loading, hauling and placing of spoil material taken by the University will be addressed by either addendum to this project or by hiring another contractor.

- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner/Owner Agent and then only after arranging to provide temporary utility services according to requirements indicated.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Satisfactory Soils shall be free of rock or gravel larger than 5 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Backfill and Fill: Satisfactory soil materials.
- D. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.
- E. Warning Tape: Polyethylene film warning tape minimum 6 inches wide and 4 mils thick, continuously marked with a description of the utility.

## PART 3 - EXECUTION

### 3.1 UNIVERSITY GUIDELINES

- A. Purpose: To provide guidelines for digging and excavation operations on university property.
- B. Scope
  - 1. Applies to all university departments and activities, as well as other persons on university property.
  - 2. Applies to ALL penetrations of soil on university property accomplished with shovels, backhoes, trenchers, axes, posthole diggers, tent stakes, or ground rods.
- C. Policy
  - 1. General Statement.

In accordance with North Carolina Occupational Safety and Health (NCOSHA) standards, any individual who has a need to dig or excavate on university property must receive written permission from the Director of the Physical Plant (or designee) before commencing digging or excavation operations. The Director of the Physical Plant is responsible for ensuring that all applicable regulations are followed during any digging/ excavation processes performed by Physical Plant employees or by any personnel contracted by the Director of Physical Plant. When other labor is used, the person(s) conducting the digging/excavation operations are responsible for ensuring all applicable regulations are followed.

## 2. Responsibility for Damages

Any persons or organizations digging without proper authorization will be responsible for repair costs to damaged underground utilities.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
- E. Temporary Silt Fence:
  - 1. Temporary silt fence shall be installed in accordance with the construction plans, and/or as directed by the Engineer.
  - 2. Temporary silt fence shall meet the requirements of Article 1605-2 of the NCDOT Standard Specifications. Temporary silt fence shall be installed and maintained in accordance with Articles 1605-3 and 1605-4 of the NCDOT Standard Specifications.
- F. Stone For Erosion Control:
  - 1. Stone for erosion control shall be installed in accordance with the construction plans, and/or as directed by the Engineer.
  - 2. Stone for erosion control shall meet the requirements of Article 1042-1 of the NCDOT Standard Specifications. Sediment control stone shall meet the requirements of Section 1005 of the NCDOT Standard Specifications. Stone for erosion control, including sediment control stone, shall be installed in accordance with Articles 1610-3 of the NCDOT Standard Specifications.
- G. Silt Excavation:
  - 1. Silt excavation shall meet the requirements of Articles 1630-2 and 1630-3 of the NCDOT Standard Specifications.

### 3.3 EXCAVATION

- A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

- B. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of ductbank or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.
  - 1. Excavate trenches deeper than bottom of pipe elevation, 6 inches deeper in rock, 4 inches deeper elsewhere, to allow for bedding course. Hand excavate for bell of pipe.
- C. Explosives: Explosives are not to be used without written authorization from Owner/Owner Agent.
- D. Blasting: When blasting will occur, the General Contractor shall implement traffic control measures.
- E. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- F. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
- G. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.
  - 1. Stockpile borrow materials in areas as directed by Owner/Owner Agent.

### 3.4 BACKFILLS AND FILLS

- A. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for ductbank and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
  - 1. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
  - 2. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- B. Fill: Place and compact fill material in layers to required elevations.
- C. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
  - 1. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
- D. Compaction: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

- E. Compact soil to not less than the following percentages of maximum dry density according to ASTM D 698:
1. Under structures, building slabs, and steps, compaction rates shall be as specified by the Architect responsible for each individual building. Unless otherwise directed scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
  2. Under pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
  3. Under walkways and pedestrian plazas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
  4. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.
- F. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus 3 Inches.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

### 3.6 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- D. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300