

## SECTION 312000

### EARTH MOVING

This specification section is being re-issued as part of Addendum 3. Paragraph 3.4 has been revised concerning the statement that there will be sufficient quantities of satisfactory fill material on-site.

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical Engineering Reports for this project were prepared in November 2012 by Specialized Engineering and in May 2018 by GeoConcepts Engineering, Inc. The recommendations in those reports apply to this project and this specification. The reports are available from Loudon County Department of Procurement.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Excavation of pond and construction of dam embankment.
  - 2. Preparing subgrades for walks, pavements, parking areas, turf and grasses, and plants.
  - 3. Base course for asphalt paving.
  - 4. Finish course for aggregate base parking and roads.
  - 5. Excavating and backfilling trenches for utilities and associated structures.
- B. Related Requirements:
  - 1. Section 033000 CAST-IN-PLACE CONCRETE.
  - 2. Section 311000 SITE CLEARING for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
  - 3. Section 312100 ROUGH AND FINE GRADING.

##### 1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Satisfactory Soils: Soil materials meeting the criteria in Part 2 and to be used for compacted fill for support of athletic fields, parking areas, footings, floor slabs, concrete pads and pavements and for Final Backfill in storm sewer and culvert trenches.
- C. Base Course: Aggregate layer placed between the subbase course or subgrade and hot-mix asphalt paving and all layers of aggregate base roads and parking areas.

- D. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
  - 1. For waterlines, sanitary sewers, and force mains: in accordance with the Town of Lovettsville (TOL) requirements. If the TOL does not have requirements, then Loudoun Water requirements shall govern.
  - 2. For storm sewers and culverts: VDOT No. 57 stone or AASHTO M43, No. 8 stone.
- E. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner. Unauthorized excavation, as well as remedial work directed by Owner, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. 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.
- I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

#### 1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct pre-excavation conference at Project site.
  - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
    - a. Personnel and equipment needed to make progress and avoid delays.
    - b. Coordination of Work with utility locator service.
    - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
    - d. Extent of trenching by hand or with air spade.
    - e. Field quality control.
    - f. Haul routes

#### 1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Geotextiles.
  - 2. Warning tapes.

- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance for each on-site and borrow soil material proposed for Fill, Backfill, Satisfactory Soils, Base Course, Bedding, and Borrow as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to AASHTO T-99, Method A.
- C. Blasting plan: Blasting is not allowed.
- D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.
- E. Pre-Installation meeting minutes.

#### 1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

#### 1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Contractor will be required to coordinate with the Lovettsville Elementary School to ensure that construction does not create safety hazards or unduly inconvenience the operation of the school.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify "Miss Utility" for area where Project is located before beginning earth-moving operations.
- C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 312500 "Erosion and Sediment Control" are in place.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. Contractor shall provide a cubic yard price with the bid for undercutting and replacing unsatisfactory materials.
- B. Satisfactory Soils: Soil Classification Groups CL, ML, SC, SM, GC, GM, or GW according to ASTM D 2487, with a liquid limit less than 40 and plasticity index less than 20. Fill material shall be free from topsoil, organics and rock fragments having a major dimension greater than 3 inches.
- C. Unsatisfactory Soils: Soils not meeting the requirements for satisfactory soils.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Base Course: Refer to plans for materials.
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

### 2.2 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.
- B. Detection Wire for Non-Metallic Piping: Insulate a single strand, solid copper detection wire with a minimum of 12 AWG. Wire shall be required in addition to detectible warning tape.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include decomposed to weathered rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions. Bidders are advised to review the Geotechnical reports carefully to ascertain existing site conditions.
  - 1. ~~Based on the owner's earthwork takeoff there is an excess of cut material. It shall be assumed that there will be sufficient quantities of satisfactory fill material on site and it may be necessary to remove either or both satisfactory and unsatisfactory material from the site.~~ Disposal of excess material shall be per Section 3.19. Bidders are encouraged to perform their own earthwork quantity takeoff to confirm quantities of cut and fill. The suitability of material for use in fills shall be determined by the County Inspector in consultation with the geotechnical engineer. The County's determination of satisfactory material shall be considered final. If there is found to be insufficient quantity of satisfactory fill material on-site, ~~a change order will be negotiated for the~~ the Contractor shall import of satisfactory borrow material at Contractor's expense.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  - 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 16 inches higher than top of pipe or conduit unless otherwise indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
- D. Trenches in Tree- and Plant-Protection Zones:
  1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

### 3.8 SUBGRADE INSPECTION

- A. Notify Owner when excavations have reached required subgrade. Allow sufficient time for inspection by the Geotechnical Engineer to be arranged before proceeding with fill operations.
- B. If Owner determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below parking areas, roadways and building slabs with at least two (2) passes with a loaded dump truck that has a minimum axle load of 10 tons or similar equipment. Do not proof-roll wet or saturated subgrades.
  1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner or their representative, and replace with compacted backfill or fill as directed by the project Geotechnical Engineer.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner, without additional compensation.

### 3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring, bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.11 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Warning Tape: Install warning tape directly above utilities.
- D. Detection Wire: Install detection wire over all non-metallic piping. Detection wire is in addition to warning tape.

### 3.12 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal (4:1) so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use satisfactory soil material.
  - 4. Under building slabs, use satisfactory soil material.
  - 5. Under footings and foundations, use satisfactory soil material.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

- D. Fill material placed under buildings areas shall extend a minimum of 10 feet outside of the building footprint.
- E. Fill material placed under parking areas and roads shall extend a minimum of 5 feet outside of the pavement edges.

### 3.13 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. 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.

### 3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Unless otherwise noted herein or on the drawings, place backfill and fill soil materials in lifts not more than 8 inches in loose depth.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Backfill waterlines, sanitary sewers, and force mains in accordance with TOL requirements. If the TOL does not have requirements, then Loudoun Water requirements shall govern.
- D. Backfill for storm sewer and culverts:
  - 1. Bedding: Place bedding material and compact it with approved tampers to a height of at least one foot above the pipe as shown on the drawing details. Bring up the bedding in 6-inch maximum lifts evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Compact bedding at springline before proceeding. Compact bedding to 12 inches above top of pipe to 95 percent of ASTM D1557 maximum dry density.
  - 2. Final Backfill: Place final backfill up to the required elevation in 8-inch maximum loose lifts under roads and parking areas and 12-inch maximum loose lifts under sidewalks, trails, and turfed areas.
- E. Compact soil materials to not less than the following percentages of maximum dry unit weight according to AASHTO T-99, Method A:
  - 1. Under structures, building slabs, steps, curb and gutter, driveway approaches pavements and gravel parking and roadways scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent. The upper six inches of the subgrade shall be compacted to at least 100 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.



### 3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

### 3.16 BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
  - 1. Install separation geotextile on prepared subgrade as shown on the plans and according to manufacturer's written instructions, overlapping sides and ends.
  - 2. Shape base course to required crown elevations and cross-slope grades.
  - 3. Place base course 4 inches or less in compacted thickness in a single layer.
  - 4. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 5. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to AASHTO T99, Method A.

### 3.17 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving 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 materials to depth required; recompact and retest until specified compaction is obtained.

### 3.18 PROTECTION

- A. Protecting Graded Areas: 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 due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Owner; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.
- D. Existing Site Improvements to Remain: Protect existing site improvements to remain from damage during construction. All items damaged as a result of construction activities shall be restored to their original condition or replaced in-kind, as acceptable to the Owner, at the contractor's expense.

### 3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property. Removal and disposal will be at Contractor's expense.

END OF SECTION