

Division 31 - Earthwork

## 31.1. General

- a. Materials shall comply with the following Virginia Department of Transportation (VDOT) Road and Bridge Specifications (Latest Edition).
- b. Clearing and grubbing shall comply with VDOT Road and Bridge Specification Section 301 – “Clearing and Grubbing.”
- c. Erosion control measures shall be in place prior to the commencement of clearing and grubbing – without exception.

## 31.2. Unclassified Materials

- a. Unclassified excavation includes the satisfactory removal and disposal of all materials (except contaminated materials) encountered regardless of the nature of the materials and shall be understood to include, but not be limited to, blast rock, bedrock, earth, hardpan, fill, foundations, pavements, curbs, piping, railroad track and ties, cobblestones, footings, bricks, concrete, abandoned drainage and utility structures, and debris.
- b. The Contractor shall immediately halt soil movement activities and notify the ODU Project Inspector / ODU Project Manager if visual, olfactory, or other evidence suggests that soils may be contaminated with oil or hazardous materials. Contractor shall provide reasonable assistance to Old Dominion University for access to potential contamination areas for proper assessment of hazardous conditions. The ODU Project Manager shall contact an environmental professional, test and evaluate any earth materials suspected of containing hazardous waste per the Department of Environmental Quality (DEQ) Virginia Hazardous Waste Management Regulations. If mitigation and/or removal of contaminated materials is required, the ODU PM, the A/E and the Contractor shall negotiate time and expenses and coordinate available soil management, disposal, and recycling options prior to the commencement of any work. ODU reserves the right to negotiate and contract with other entities for remedial work, which the Contractor shall make reasonable accommodations for others to perform this work.

## 31.3. Site Clearing

- a. Strip all objectionable growth. Remove from the site all debris resulting from the stripping operations at frequent intervals to prevent accumulation of material. On campus disposal of material will not be permitted.
- b. Strip topsoil to a depth of 8". Excavate to subgrade elevations regardless of the character of the surface and subsurface conditions encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- c. Document method and location of material disposal to the ODU Project Inspector.
- d. Grading operations shall avoid soils and debris spillover. Large areas to be graded shall limit clearing the ground too far in advance, to limit erosion. Dust control shall be provided during all grading operations.
- e. Protect new grade areas from the elements. Repair all settlement and erosion and re-establish grades to the required elevations prior to acceptance.
- f. Unclassified excavation materials may include rock, soil and any unforeseen obstructions. No changes in the contract sum or the contract time shall be authorized for rock excavation or removal of obstructions without prior consent from the University. Unit prices shall be carried for removal of

- unsuitable soils, rock, debris or other unforeseen obstructions. The A/E to include estimated quantities of unsuitable soils in the bid documents as per the CPSM. Remove unsuitable material encountered at subgrade elevations, backfill with material and compact as required.
- g. Rock is not anticipated on ODU sites at the Norfolk or Virginia Beach campuses, but if rock is encountered during excavation, the general contractor shall notify the A/E to establish the quantity of rock to be removed. Rock excavation shall be performed to eliminate water pockets in the excavated rock subgrade.
  - h. Coordinate stockpile location with the ODU Project Manager; the location should not interfere with construction activities. Topsoil to be reused shall be free from roots, brush and debris. Coordinate the location of excess topsoil on University property with the ODU Project Manager and ODU Grounds Manager. Note: normal conditions on campus are to bring in necessary fill.
- 31.4. Earth Moving
- a. No excavation work shall begin until all temporary E&S controls and plant protection measures are in place. This includes any on-site or off-site borrow, on site or off-site stockpiling or disposal of waste materials.
  - b. The general contractor is responsible for all tipping fees when materials are disposed of in a non-university owned location. Intent to remove excavated materials from the site shall be reviewed with the University no later than the preliminary design phase. All logs, stumps, brush, wood and refuse shall be disposed of away from University Grounds in an approved manner. On-site burning is prohibited.
  - c. Refer to **APPENDIX W – ANNUAL STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT** for stockpiling requirements.
  - d. All open excavations shall be protected by temporary fencing or other approved means to ensure public safety. After inspection of a completed trench, the general contractor shall backfill trench immediately. All wires, pipes, etc. shall be removed from the excavated fill material prior to replacement in the trench.
  - e. Contractor shall furnish, erect and maintain all shoring, sheeting, bracing and pumping equipment required to support and protect all excavations. Contractor shall provide all barriers, signs, and lights required to protect workmen and the public in and around excavated areas.
  - f. All pipe ends shall be closed while unattended.
  - g. Control the temporary grading so that ground is pitched to prevent water from running to excavated areas, damaging other structures, or adjacent properties.
  - h. Where soil has been softened or eroded by flooding, equipment, traffic, or placement during unfavorable weather, or such other conditions, it shall be removed and replaced by the Contractor with suitable material, and at no cost to the University.
  - i. Exercise care to preserve the material below and beyond the lines of excavation. Where excavation is carried out below indicated grade or beyond the lines of excavation, Contractor shall backfill and compact the over excavation with structural fill to the indicated grade, at no additional cost to the Owner and at the direction of the Engineer.
  - j. Limits of excavation are such that all unsuitable material shall be removed to firm natural ground in the manner specified below. In building areas, unsuitable materials shall be removed to a distance of five feet (5') beyond the building lines. Limits of unsuitable material excavation also apply to areas below exterior column footings. All abandoned pipes within building areas shall be removed and the excavations shall be properly backfilled.

- k. Unsuitable materials which are classified as organics such as peat, trash, fill, stumps, debris, material determined to be hazardous, and topsoil and subsoil when determined by an Engineer to be unacceptable for incorporation into the work shall be removed.
- l. Under pavement areas, existing fill shall be densified in place and shall not be excavated. Topsoil need not be excavated from pavement areas if located more than three feet (3') below finish pavement grades.
- m. Abandoned pipes, that are buried more than four feet (4') from finish grade to the top of the pipe and that do not interfere with utilities to remain or to be installed, shall be capped and/or grouted at both ends and left in place unless required to be removed for construction of the work. Abandoned pipes less than four feet (4') from finish grade shall be removed and the trench shall be appropriately backfilled with structural fill.
- n. All suitable material, as determined by the Engineer, may be reused on the site provided it meets the gradation requirements for the given materials in the information of fill sections, embankments, subgrades, backfills, etc.
- o. Do not over excavate below proposed design grades for the purpose of obtaining borrow for use off-site.
- p. The general contractor shall excavate for all drainage pipes, utilities, and related structures and accessories and for any other trenching necessary to complete the work. Machine excavation of trenches is permitted with the exception of preparation of pipe beds which will be hand work. Excavate by hand or machine methods to at least six inches (6") below the bottom of pipe. Excavation to final grade shall maintain the undisturbed bearing character of the soils exposed at the excavation level. Utilities or piping shall not be laid directly on rocks, cobbles, or other hard material. If this type of material is found, the material shall be removed to a minimum of six inches (6") below the bottom of pipe and backfilled or compacted.

31.5. Dewatering

- a. Do not allow water to accumulate in excavations. Contractor shall be responsible for de-watering the site to lower water level as required for installations of building slab and foundations.
- b. Maintain excavations and trenches free of water 24 hours a day. Dewatering shall be considered part of the construction contract and shall be included in the bid price.
- c. Water from excavations shall be pretreated and then disposed of in such manner as will not cause injury to public health, public and private property, existing work, work to be completed or in progress, roads, walks, and streets, or cause any interference with use of same by public. If a drainage system or water course is silted or becomes blocked due to dewatering operation, it shall be cleaned by the Contractor at no additional cost to the Owner.
- d. Any enforcement actions or fines resulting from improper dewatering and/or discharge of turbid water and sediment to protected areas shall be the sole responsibility of the Contractor.
- e. The contractor shall prevent damage to adjacent properties, buildings, structures, utilities and other facilities, modifying dewatering equipment and procedures when operations threaten to cause damage to adjacent areas not within the Limits of Work.
- f. No pipe shall be laid in water. No masonry shall be laid in water, and no water shall be allowed to inundate new concrete and new brick masonry within 48 hours after installation. Contractor shall

constantly guard against the possibility of flotation of pipe or structures after installation. Backfill or other means shall be placed promptly to prevent this occurrence.

- g. If the dewatering methods have not been adequate and the bearing soils are disturbed, remove disturbed soil and replace with compacted Structural Fill at no additional cost to the Owner.

#### 31.6. Termite Control

- a. The A/E shall specify termite control on all new construction. Soil treatment termiticide must have a minimum effectiveness of not less than five years, from the date of substantial completion, against infestation of subterranean termites.
- b. Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.
- c. Prior to soil treatment, remove foreign matter such as extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations. Remove impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
- d. Treat soil as follows, before construction or as recommended in treatment manufacturer's installation instructions.
  - i. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
  - ii. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footings, piers, and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
  - iii. Masonry: Treat voids.
  - iv. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
  - v. Treat soil in crawlspaces, areas around entrance platforms, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
- e. Post warning signs in areas of application.
- f. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

#### 31.7. Vermin Protection

- a. All demolition/construction sites shall be pretreated by a pest control contractor to include placing bait stations/mechanical devices near demolition site and/or the perimeter of nearby occupied buildings to curtail rodent activity from moving to nearby occupied buildings.

#### 31.8. Tree | Vegetation Protection

- a. The A/E is responsible for defining protection of trees, shrubs, and irrigation systems to remain in the contract documents for all projects, no matter what size and shall indicate on the drawings boxes,

- fences or other protection required based on proximity of construction activities. Protection shall cover tree tops, trunks and roots. Trees to be saved shall be labeled on all site plans including, but not limited to, demolition and grading plans.
- b. Grassed and planting areas generally have irrigation systems below grade; verify location of these systems and all other underground utilities in Work or staging areas prior to the start of construction.
  - c. The General Contractor shall not permit heavy equipment or material stockpiles within tree drip line. Any pruning required shall be with the approval and direction of the University Grounds Manager/Arborist. The General Contractor shall be responsible for the survival of protected trees for seven years after the date of substantial completion. The ODU Project Inspector shall document tree, shrub and irrigation system protection during construction. The contractor shall be responsible for any tree that is considered to be in declining health (by a certified arborist) due to improper protection. If trees with a trunk diameter 8" or less, measured 4 feet above the finished grade, is determined to be in declining health or has not survived seven years after construction, then the tree shall be replaced at the General Contractor's expense with the same size caliber and species tree. If a tree with a diameter greater than 8", measured 4 feet above finished grade, is determined to be in declining health or has not survived seven years after construction, then the general contractor shall pay the appraised value of the tree to the university using the *Guide for Plant Appraisal*, current edition, authored by the Council of Tree and Landscape Appraisers (CTLA).
  - d. All associated costs for the removal of the declining tree(s) and any required professional assessments shall be the responsibility of the Contractor.
  - e. Replace any trees, shrubs, lawns or plantings damaged by the Contractor or its agents during the Work of this project within two (2) weeks of occurrence.
  - f. Repair and pay all costs associated with damaged utilities and site features.
- 31.9. Tree Protection Fencing
- a. Tree protection fencing must be installed around all existing trees noted to remain on plans within the fenced staging area. Fencing shall extend a distance from the trunk of 1.25 feet per each inch of trunk diameter or 6', whichever is greater. For example, a tree with a 12" trunk diameter shall be fenced 15' from the trunk (30' diameter)
  - b. Fencing shall be galvanized chain link, 4' minimum height.. Plastic fencing and wood stakes, or snow fencing are NOT acceptable.
  - c. Fence shall be maintained for the duration of the project, and shall not be removed without the owner's permission.
  - d. No material storage, vehicles or any other activity shall occur at any time within tree protection fencing.
  - e. Contractor may be required to pay tree replacement and/ or soil compaction remediation costs if there is any incursion in to tree protection zones.
- 31.10. Backfill
- a. Backfill only with acceptable materials that can be compacted, without containment. A/E to specify densities and compaction requirements.
  - b. Backfill on inside of buildings, under slabs on grade, paving, pads, stairs and similar items.
  - c. Trench and utility backfill under paving and within 10 feet of paved areas.
  - d. Backfill around manholes, drainage structures and underground structures.

- e. 98% of the Max Dry Density under ASTM D698 (standard proctor) of top 12" of sub-grade under roadways, drives, parking areas (95%), foundations, backfill, footings, pads, paved pedestrian walks and courts, loading docks and paving primarily for vehicle traffic.
- f. Imported fill shall be tested to be free and clean of all hazardous materials. Test results shall be provided by a certified testing lab.
- g. Place backfill and fill soil materials in layers not more than 8" in loose depth for materials compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- h. All fill shall be of proper type and proper compaction. All final grading shall be smooth and blended with existing contours. All exposed stones and other debris shall be removed prior to application of topsoil or any other fill.

31.11. Topsoil

- a. Minimum depth for topsoil shall be 6" for grass and depth as recommended by the ODU Grounds Manager for other planting materials.

31.12. Piles

- a. The A/E, ODU PM and the CMaR shall discuss potential risks and impacts to the university from pile operations, early in the design. The discussion shall include, at a minimum the following:
  - i. Coordination of pile installation and the academic calendar
  - ii. Potential impact to adjacent buildings including, but not limited to, classes, operations, and research from pile driving operations
  - iii. Cost impact for auger cast piles
- b. The design of the piles shall not be delegated, it shall remain with the structural engineer of record. The design shall comply with the recommendations in Precast Concrete Institute (PCI) Committee Report: "Recommended Practice for Design, Manufacture and Installation of Prestressed Concrete Piling."
- c. The quality-control standard for precast concrete piles shall be PCI MNL-116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- d. The installation of static test piles shall be coordinated with the academic calendar and approved by the ODU PM, prior to scheduling.
- e. Test piles should be 60 inches longer than production piles.
- f. Dynamic pile analysis shall be used to provide supplemental information for evaluating pile hammer performance, driving stresses, and bearing capacities. Dynamic testing shall be conducted during the entire time piles are initially driven or redriven and during pile restrrike testing. Equipment to obtain dynamic measurements, record, reduce and display its data shall be furnished and meet the requirement of ASTM D 4945 and have been calibrated within 12 months thereafter throughout the contract duration.
- g. The Geotechnical Engineer shall be experienced in the pile driving process, monitoring of test pile installation, and in the use of the Pile Driving Analyzer and its related equipment.
- h. Dynamic pile analysis shall be performed per Geotechnical Engineer's recommendations.
- i. Test piles shall be identical to those required for Project, and be driven with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.

31.13. Storage Tanks

- a. Underground storage tanks (USTs) are not permitted.

- b. If undocumented existing UST's are discovered during excavation, stop work and notify the ODU PM immediately.
- c. All UST's found during site survey's shall be removed as part of the scope of the project. Notify the ODU PM when such elements are discovered during existing conditions surveys.

31.14. Dimensional Mesh Soil Stabilization

- a. The dimensional mesh soil stabilization elements shall be, "Netlon Advanced Turf System (GEOGRID REINFORCED SOIL) three-dimensional fiber or approved equal," (tape type two-dimensional fibers are not acceptable as a soil reinforcing material, GrassPave 2 is not acceptable) a compacted layer of pre-blended rootzone material, being a mixture of sand, soil, organic material, and Netlon mesh elements at an inclusion rate of 5kg/m<sup>3</sup> (8.4 pounds per cubic yard).
- b. The rootzone/mesh thickness layer shall be 8 inches for Emergency Vehicle Access Lanes. The system shall also include a 4 foot wide reinforced transition zone which shall be the same pre-blended rootzone material having a mesh element inclusion rate of 2.5 kg/m<sup>3</sup> (4.2 pounds per cubic yard) and a layer thickness of 4 inches.
  - i. Rootzone Thickness: As determined by Netlon Limited (8 inches). Note that the design sections of the reinforced mesh elements do not eliminate the requirement to provide a full depth rootzone cross-section at all locations.
  - ii. Rootzone Mix Properties: Rootzone blend shall be tested by GridTech for conformance to the project specifications.
  - iii. Netlon Mesh Elements: Rootzone mesh shall have the following properties:
    - 1. Polymer: Polypropylene homopolymer
    - 2. Rootzone Topping: Shall be the same specifications as "Rootzone Mix" but shall not include a mesh incorporation component.
- c. The mesh elements shall be installed by the use of specialized installation equipment which is designed for such purpose. This equipment is a 'Netavator' by Blec Equipment, a specialized reverse-tine tillage machine. Due to equipment width of 6 feet, the 4 foot transition section shall include a 2 foot portion of the full depth stabilization section which must be reworked with the appropriate loading to develop a full depth 8 inch section.
- d. Unless modified by documented site conditions and geotechnical recommendations, vehicular dimensional mesh stabilization shall be:
  - Bermuda Sod
  - 1" Amended Sand
  - 8" Amended Sand Base Zone with Netlon Stabilization Fibers (Max 4" Lifts)
  - 4" Washed #57 Sone Drainage Layer
  - Uncompacted subgrade
- e. Provide a flush concrete curb to define the limit of the vehicular dimensional mesh soil stabilization for the full length. This shall be delineated on the civil plans. Curb shall match VDOT detail CG-2.