DIVISION 31 – EARTHWORK

SECTION 31 00 00
EARTHWORK

CONSULTANT DESIGN GUIDELINE

The intent of the University is to employ a third party geotechnical engineer to provide testing services for earthwork and soils analysis. The contractor should work with the assigned soils engineer for testing as the project progresses.

EXECUTION

Notification. The Contractor, upon encountering any underground water, springs, wells, etc., in the course of excavation, shall immediately notify the Facilities Management Construction Coordinator and shall not proceed further until instructions are given.

END SECTION

31 01 00 Maintenance of Earthwork
31 01 10 Maintenance of Clearing
31 01 20 Maintenance of Earth Moving
31 01 40 Maintenance of Shoring and Underpinning
31 01 50 Maintenance of Excavation Support and Protection
31 01 60 Maintenance of Special Foundations and Load Bearing Elements
31 01 62 Maintenance of Driven Piles
31 01 62.61 Driven Pile Repairs
31 01 63 Maintenance of Bored and Augered Piles
31 01 63.61 Bored and Augered Pile Repairs
31 01 70 Maintenance of Tunneling and Mining
31 01 70.61 Tunnel Leak Repairs

31 05 00 Common Work Results Earthwork
31 05 13 Soils for Earthwork
31 05 16 Aggregates for Earthwork
31 05 19 Geosynthetics for Earthwork
31 05 19.13 Geotextiles for Earthwork
31 05 19.16 Backfill Material Schedule
31 05 23 Cement and Concrete for Earthwork

31 06 00 Schedules for Earthwork
31 06 10 Schedules for Clearing
31 06 20 Schedules for Earth Moving
31 06 20.13 Trench Dimension Schedule
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31 09 00 Geotechnical Instrumentation and Monitoring of Earthwork
- 31 09 13 Geotechnical Instrumentation and Monitoring
  - 31 09 13.13 Groundwater Monitoring During Construction
- 31 09 16 Special Foundation and Load Bearing Elements Instrumentation and Monitoring
  - 31 09 16.13 Foundation Performance Instrumentation
  - 31 09 16.23 Driven Pile Load Tests
  - 31 09 16.26 Bored and Augered Pile Load Tests

31 10 00 SITE CLEARING

31 11 00 Clearing and Grubbing

31 12 00 Selective Clearing

31 13 00 Selective Tree and Shrub Removal and Trimming
- 31 13 13 Selective Tree and Shrub Removal
- 31 13 16 Selective Tree and Shrub Trimming

31 14 00 Earth Stripping and Stockpiling
- 31 14 13 Soil Stripping and Stockpiling
  - 31 14 13.13 Soil Stripping
  - 31 14 13.16 Soil Stockpiling
  - 31 14 13.23 Topsoil Stripping and Stockpiling
- 31 14 16 Sod Stripping and Stockpiling
  - 31 14 16.13 Sod Stripping
  - 31 14 16.16 Sod Stockpiling

31 20 00 EARTH MOVING

31 21 00 Off-Gassing Mitigation
- 31 21 13 Radon Mitigation
  - 31 21 13.13 Radon Venting
- 31 21 16 Methane Mitigation
  - 31 21 16.13 Methane Venting

31 22 00 Grading
- 31 22 13 Rough Grading
- 31 22 16 Fine Grading
  - 31 22 16.13 Roadway Subgrade Reshaping
SECTION 31 22 19
FINISH GRADING

CONSULTANT DESIGN GUIDELINE

Coordinate earthwork design with Facilities Management.

INCLUDE IN THE CONSTRUCTION DOCUMENTS

CONSTRUCTION DEBRIS. Before start of final grading, remove all construction debris and construction materials from the site.

APPROVAL. The contractor shall supply samples of soils that are intended to be used for imported fill or for other purposes. Topsoil must be approved by Facilities Management and consulting landscape architect.

TOPSOIL QUALITY. Topsoil shall be fertile, well drained of uniform quality, free of foreign materials, oil or chemicals, rocks, sticks, noxious weeds or grasses (Bermuda grass, Nut grass, Bind weed, Johnson grass, and Kudzu), and must be approved by Facilities Management and consulting landscape architect before being placed.

SOIL TESTING. Submit soil test of proposed topsoil verifying amounts of nitrogen, potassium, and phosphorus to Facilities Management Construction Coordinator. Before placing soil, sample sections of the ground. Landscape architect will determine location of sampling. Dig a ditch of 1'-0" wide x 1'-6" deep by 20'-0" long to determine the condition of the soil.

EXECUTION

FINISH GRADE. Bring all areas to a finished grade (hand-raked surface) not to exceed 1" below all walks and/or doorways of buildings. The finished grade shall be in physical condition for landscape planting as approved by Facilities Management Construction Coordinator.

SLOPE. Design slopes with a minimum slope of 2% to all drain inlets to assure positive surface water drainage. Design sloped sites, not to exceed a slope ratio of 4:1. In areas where a more abrupt change of slope is necessary, design a series of "OGEE" terraces with grade surfaces not to exceed a ratio of 3:1.

Verify slope design with Facilities Management Landscape Architect.

END SECTION

31 22 19 13 Spreading and Grading Topsoil
31 23 00 Excavation and Fill
Notify the University Construction Coordinator for soil bearing/soils analysis testing as required for project. Provide Facilities Management with drawing of locations for soil borings as specified by structural engineer.

It shall be the responsibility of the contractor to calculate soil and rock excavation volumes to be a part of the project. Reasonable allowances will likely be allowed in the formulation of project costs, however, the consultant should work with Facilities Management to closely control and manage excavation costs by limiting allowance overruns, or other methods.

END SECTION
SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

CONSULTANT DESIGN GUIDELINE

SLOPE. Design slopes with a minimum slope of 2% to all drain inlets to assure positive surface water drainage. Design sloped sites, not to exceed a slope ratio of 4:1. In areas where a more abrupt change of slope is necessary, design a series of "OGEE" terraces with grade surfaces not to exceed a ratio of 3:1.

Verify slope design with Facilities Management Planning Group.

END SECTION

31 25 13 Erosion Controls
31 25 23 Rock Barriers
31 25 53 Sedimentation Controls
31 25 63 Rock Basins

31 30 00 EARTHWORK METHODS

31 31 00 Soil Treatment
31 31 13 Rodent Control
   31 31 13.16 Rodent Control Bait Systems
   31 31 13.19 Rodent Control Traps
   31 31 13.23 Rodent Control Electronic Systems
   31 31 13.26 Rodent Control Repellants
31 31 16 Termite Control

SECTION 31 31 16
TERMITE CONTROL

CONSULTANT DESIGN GUIDELINE

Treat all the soil under new buildings and around the buildings with chemicals as appropriate and meet current standards and guidelines for termite protection.

Closely follow instructions on the manufacturers label and obey all state and federal laws.

INCLUDE IN THE CONSTRUCTION DOCUMENTS
WARRANTY. Provide a five-year certificate of guarantee to the University.

END SECTION
31 33 23 Rock Slope Netting
31 33 26 Rock Slope Wire Mesh
31 33 33 Shotcrete Rock Slope Stabilization
31 33 43 Vegetated Rock Slope Stabilization

31 34 00 Soil Reinforcement
31 34 19 Geosynthetic Soil Reinforcement
   31 34 19.13 Geogrid Soil Reinforcement
   31 34 19.16 Geotextile Soil reinforcemements
31 34 23 Fiber Soil Reinforcement
   31 34 23.13 Geosynthetic Fiber Soil Reinforcement

31 35 00 Slope Protection
31 35 19 Geosynthetic Slope Protection
   31 35 19.13 Geogrid Slope Protection
   31 35 19.16 Geotextile Slope Protection
   31 35 19.19 Slope Protection with Mulch Control Netting
31 35 23 Slope Protection with Slope Paving
   31 35 23.13 Cast-In-Place Slope Paving
   31 35 23.16 Precast Concrete Slope Paving
   31 35 23.19 Concrete Unit Masonry Slope Paving
31 35 26 Containment Barriers
   31 35 26.13 Clay Containment Barriers
   31 35 26.16 Geomembrane Containment Barriers
   31 35 26.23 Bentonite Slurry Trench

31 36 00 Gabions
31 36 13 Gabion Boxes
31 36 19 Gabion Mattresses
   31 36 19.13 Vegetated Gabion Mattresses

31 37 00 Riprap
31 37 13 Machined Riprap
31 37 16 Non-machined Riprap
   31 37 16.13 Rubble-Stone Riprap
   31 37 16.16 Concrete Unit Masonry Riprap
   31 37 16.19 Sacked Sand-Cement Riprap

31 40 00 SHORING AND UNDERPINNING

31 41 00 Shoring
31 41 13 Timber Shoring
31 41 16 Sheet Piling
   31 41 16.13 Steel Sheet Piling
   31 41 16.16 Plastic Sheet Piling
31 41 19 Metal Hydraulic Shoring
   31 41 19.13 Aluminum Hydraulic Shoring
31 41 23 Pneumatic Shoring
31 43 00 Concrete Raising
31 43 13 Pressure Grouting
   31 43 13.13 Concrete Pressure Grouting
   31 43 13.16 Polyurethane Pressure Grouting
31 43 16 Compaction Grouting
31 43 19 Mechanical Jacking

31 45 00 Vibroflotation and Densification
31 45 13 Vibroflotation
31 45 16 Densification

31 46 00 Needle Beams
31 46 13 Cantilever Needle Beams

31 48 00 Underpinning
31 48 13 Underpinning Piers
31 48 19 Bracket Piers
31 48 23 Jacked Piers
31 48 33 Micropile Underpinning

31 50 00 EXCAVATION SUPPORT AND PROTECTION

31 51 00 Anchor Tiebacks
31 51 13 Excavation Soil Anchors
31 51 16 Excavation Rock Anchors

31 52 00 Cofferdams
31 52 13 Sheet Piling Cofferdams
31 52 16 Timber Cofferdams
31 52 19 Precast Concrete Cofferdams

31 53 00 Cribbing and Walers
31 53 13 Timber Cribwork

31 54 00 Ground Freezing

31 56 00 Slurry Walls
31 56 13 Bentonite Slurry Walls
   31 56 13.13 Soil-Bentonite Slurry Walls
   31 56 13.16 Cement-Bentonite Slurry Walls
   31 56 13.19 Slag-Cement-Bentonite Slurry Walls
   31 56 13.23 Soil-Cement-Bentonite Slurry Walls
   31 56 13.26 Pozzolan-Bentonite Slurry Walls
   31 56 13.29 Organically-Modified Bentonite Slurry Walls
31 56 16 Attipulgite Slurry Walls
   31 56 16.13 Soil-Attipulgite Slurry Walls
31 56 19 Slurry-Geomembrane Composite Slurry Walls
31 56 23 Lean Concrete Slurry Walls
31 56 26 Bio-Polymer Trench Drain

31 60 00 SPECIAL FOUNDATIONS AND LOAD-BEARING ELEMENTS
31 62 00 Driven Piles
  31 62 13 Concrete Piles
    31 62 13.13 Cast-in-Place Concrete Piles
    31 62 13.16 Concrete Displacement Piles
    31 62 13.19 Precast Concrete Piles
    31 62 13.23 Prestressed Concrete Piles
    31 62 13.26 Pressure-Injected Footings
  31 62 16 Steel Piles
    31 62 16.13 Sheet Steel Piles
    31 62 16.16 Steel H Piles
    31 62 16.19 Unfilled Tubular Steel Piles
  31 62 19 Timber Piles
  31 62 23 Composite Piles
    31 62 23.13 Concrete-Filled Steel Piles
    31 62 23.16 Wood and Cast-In-Place Concrete Piles

31 63 00 Bored Piles
  31 63 13 Bored and Augered Test Piles
  31 63 16 Auger Cast Grout Piles
  31 63 19 Bored and Socketed Piles
    31 63 19.13 Rock Sockets for Piles
  31 63 23 Bored Concrete Piles
    31 63 23.13 Bored and Bellied Concrete Piles
    31 63 23.16 Bored Friction Concrete Piles
  31 63 26 Drilled Caisson
    31 63 26.13 Fixed End Caisson Piles
    31 63 26.16 Concrete Caissons for Marine Construction
  31 63 29 Drilled Concrete Piers and Shafts
    31 63 29.13 Uncased Drilled Concrete Piers
    31 63 29.16 Cased Drilled Concrete Piers
  31 63 33 Drilled Micropiles

31 64 00 Caissons
  31 64 13 Box Caissons
  31 64 16 Excavated Caissons
  31 64 19 Floating Caissons
  31 64 23 Open Caissons
  31 64 26 Pneumatic Caissons
  31 64 29 Sheeted Caissons

31 66 00 Special Foundations
  31 66 13 Special Piles
  31 66 16 Special Foundation Walls
31 66 16.13 Anchored Foundation Walls
31 66 16.23 Concrete Cribbing Foundation Walls
31 66 16.26 Metal Cribbing Foundation Walls
31 66 16.33 Manufactured Modular Foundation Walls
31 66 16.43 Mechanically Stabilized
31 66 16.46 Slurry Diaphragm Foundation Walls
31 66 16.53 Soldier-Beam Foundation Walls
31 66 16.56 Permanently-Anchored Soldier-Beam Foundation Walls
31 66 19 Refrigerated Foundations

31 68 00 Foundation Anchors
31 68 13 Rock Foundation Anchors

31 70 00 TUNNELING AND MINING
31 71 00 Tunnel Excavation
31 71 13 Shield Driving Tunnel Excavation
31 71 16 Tunnel Excavation by Drilling and Blasting
31 71 19 Tunnel Excavation by Tunnel Boring Machine

31 72 00 Tunnel Support Systems
31 72 13 Rock Reinforcement and Initial Support
31 72 16 Steel Ribs and Lagging

31 73 00 Tunnel Grouting
31 73 13 Cement Tunnel Grouting
31 73 16 Chemical Tunnel Grouting

31 74 00 Tunnel Construction
31 74 13 Cast-in-Place Tunnel Lining
31 74 16 Precast Concrete Tunnel Lining
31 74 19 Shotcrete Tunnel Lining

31 75 00 Shaft Construction
31 75 13 Cast-in-Place Concrete Shaft Lining
31 75 16 Precast Concrete Tunnel Lining

31 77 00 Submersible Tube Tunnels
31 77 13 Trench Excavation for Submerged Tunnels
31 77 16 Tube Construction (Outfitting Tunnel Tubes)
31 77 19 Floating and Laying Submerged Tunnels