SECTION 31 20 00

**EARTHMOVING**

**BASED ON DFD MASTER SPECIFICATION DATED 09/01/2015**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

***This section shall accompany all projects that include any earthwork activities. Provide additional sections to address specific earthwork topics such as trenching, rock, etc. Modify this document to account for project specific conditions. Use “Track Changes” when editing and providing review submittals.***

PART 1 - GENERAL

**SCOPE**

The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete earthwork required in these specifications and on the drawings. Included are the following topics:

PART 1 - General

Scope

Related Work

Reference Standards

Quality Assurance

Submittals

Quantities

PART 2 - Materials

Earth Fill

Granular Fill

Structural Fill

PART 3 - Execution

General

Topsoil Removal

Excavation

Placing and Compacting Material

Grading

Grading Around Trees

Soil Stabilization

Clean Up

RELATED WORK

***(Note to the designer: The designer must determine if this work will impact other related work or Contractors and should revise these specifications accordingly to only include those Sections that apply to the project.)***

Applicable provisions of Division 1 govern work under this Section.

Related work specified elsewhere:

Section 30 05 00 – Common Work Results For All Exterior Improvements

Section 31 10 00 – Site Clearing

Section 31 22 16.15 – Roadway Subgrade Preparation

Section 31 23 16.13 – Trenching

Section 31 23 16.16 – Structure Excavation for Minor Structures

Section 31 23 16.26 – Rock Removal

Section 31 25 00 – Erosion Control

Section 32 91 13 – Soil Preparation

00 00 00 – (Section Title)

REFERENCE STANDARDS

***(Note to the designer: The A/E shall discuss the quality assurance procedures with the DFD Project Manager. The A/E shall determine the frequency of the required tests based on the project specifics. Delete references from this section that are not applicable to the project.)***

American Society for Testing and Materials (ASTM):

D422-63 Standard Test Method for Particle Size Analysis of Soils

D4318 Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils

D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)

D1140 Standard Test Methods for Determining the Amount of Material Finer than 75‑μm (No. 200) Sieve in Soils by Washing

D1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)

D2922 Standard Test Methods for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)

D3017 Standard Test Method for Water Content of Soil and Rock In-Place by Nuclear Methods (Shallow Depth)

D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

# **quality assurance**

***(Note to the designer: A/E to determine the type, and frequency of quality assurance geotechnical testing required on each project. Provide listing of quality assurance geotechnical testing requirements in this item. If Contractor is not responsible for testing modify this section accordingly, or if no testing is required on the project remove this section in its entirety. If Contractor is required to complete testing, complete the table below and specify the type of tests required and the frequency of the testing.)***

The Contractor shall conduct sampling, testing, and analysis as required by this section and elsewhere in the Contract Documents either by retaining the services of an independent construction materials testing consultant or with internal certified testers. The materials testing personnel shall meet the requirements of ASTM E329.

The Contractor’s construction materials testing personnel shall complete material testing as outlined in Table 31 20 00 -1.

***Table 31 20 00 -1***

|  |  |  |
| --- | --- | --- |
| Material | Test Required | Test/Sample Frequency |
| Structural Fill | *D422 Standard Test Method for Particle Size Analysis of Soils* | *1 test/500 CY placed* |
|  |  |  |
|  |  |  |
|  |  |  |

SUBMITTALS

***(Note to the designer: A/E shall determine what submittals are required for the project. Modify the content of this section accordingly.)***

Provide samples of each type of soil or aggregate proposed for use on the project. Samples shall consist of a minimum of 50 pounds of soil.

Provide copies of all material testing reports completed for the project within 48 hours of completing the individual tests. Along with each individual test result, provide a running spreadsheet of all individual test results.

# **quantities**

Finished topsoil depth shall be as specified in Section 32 91 13 – Soil Preparation or as shown on the drawings.

Contractor shall be solely responsible for determining all earthwork quantities based on the existing and proposed elevations provided on the drawings. Any geotechnical investigations provided by the Owner apply only to those locations that the data was collected, and may not be indicative of conditions elsewhere on the site. The Contractor is responsible for collecting any additional geotechnical or survey data he deems necessary to complete an accurate estimate of earthwork quantities.

If onsite grading, excavation and borrow operations do not provide enough suitable material for fill areas, Contractor shall coordinate and pay for excavation, transport and placement of imported material meeting the specifications of the contract documents. If excavation results in excess materials, Contractor shall coordinate and pay for loading, transport and offsite disposal of excess materials.

Contractor shall notify the DFD Project Representative immediately if geotechnical information, existing grades, or proposed grades shown on the drawings appears to be inaccurate.

**PART 2 - MATERIALS**

**EARTH FILL**

Use clean material consisting of inorganic soil or a mixture of inorganic soil and rock, stone or gravel. The material shall be free of topsoil, sod, stumps, wood, asphalt, concrete, debris, and other deleterious material. The maximum dimension of any material shall not exceed 2’ in any direction.

**GRANULAR FILL**

Clean material meeting the requirements of “Grade 1” or “Grade 2” granular backfill as defined in WisDOT Section 209.2.1.

#### **structural fill**

Clean material meeting the requirements of “Structure Backfill” as defined in WisDOT Section 210.2.1.

**PART 3 - EXECUTION**

**GENERAL**

***(Note to the designer: Remove sections that are not applicable to the project.)***

Complete earthwork excavation for elevation changes, utility trenches, minor structures and building foundations in accordance with this section and the following applicable sections:

* Section 31 22 16.15 - Roadway Subgrade Preparation
* Section 31 23 16.13 - Trenching
* Section 31 23 16.16 - Structure Excavation for Minor Structures

Rock excavation shall be completed in accordance with Section 31 23 16.26 - Rock Removal

**TOPSOIL REMOVAL**

Comply with erosion control requirements of Section 31 25 00 – Erosion Control and as shown on the plan relative topsoil removal and storage.

Complete clearing and grubbing work as required by the Contract Documents and as specified in Section 31 10 00 – Site Clearing.

Coordinate topsoil stockpile locations with Owner and other contractors working onsite.

Remove all topsoil from proposed locations of buildings, structures, roads, walks and other paved areas. Also, remove topsoil from proposed lawn or turf areas where the proposed elevation exceeds the existing elevation by 1’ or greater, or where fill will be placed.

Stockpile reusable topsoil for use in restoration. Salvaged topsoil shall not be removed from the site without prior approval of the DFD Project Representative.

Do not excavate, grade or work topsoil in frozen or muddy condition.

Minimize compaction of topsoil to the extent possible.

**EXCAVATION**

Excavate to the elevations shown on the drawings. Allow for placement of fill, base course, pavements, and topsoil as required by the drawings and other Contract Documents.

Transfer lines and grades as shown on the drawings.

Excavate areas to provide positive drainage. Contractor shall notify the DFD Project Representative immediately if the final proposed elevations shown on the drawings do not provide drainage away from buildings, structures, roads, walks and other paved areas.

Remove excess and spoil material from the site in a timely fashion.

Do not excavate below design grades without prior authorization by the DFD Project Representative.

##### placing and compacting material

#### Place material in fill areas only after all topsoil has been removed.

Place fill to the elevations shown on drawings; allow for placement of base course, pavements and topsoil as required by the drawings and other Contract Documents.

Fill type shall be as indicated on Table 31 20 00 -2, or as shown on the drawings.

Do not place fill on areas consisting of organic soil, debris or soft and yielding material.

Do not place fill on frozen or muddy areas.

Moisture condition subgrade as necessary to provide a firm surface prior to placing fill.

Place fill in horizontal lifts having thickness as shown on Table 31 20 00 - 2.

Compact fill material as required by Table 31 20 00 - 2 for given use.

Moisture condition fill material as necessary to achieve density required for given use.

Place and compact backfill so as to minimize settlement and avoid damage to walls, utility lines and other work in place. Place backfill simultaneously on both sides of free-standing structures.

It is the responsibility of the Contractor to provide all necessary compaction equipment and other grading equipment that may be required to obtain the specified compaction. Compaction of controlled backfill by travel of grading equipment will not be considered adequate for uniform compaction. Hand guided vibratory or tamping compactors will be required whenever controlled backfill may be placed adjacent to walls, footings, and columns or in confined areas.

***(Note to the designer: Remove row and/or columns from table that are not applicable to the project. “Minimum Relative Density” is often times not used.)***

###### ***Table 31 20 00 -2***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Location | Required  Material | Maximum Compacted Lift Thickness | Minimum Proctor Compaction | Minimum Relative Density (a) |
| Areas Beneath Footings, Floor Slabs, or Structures | Structural Fill | 8” | 95% Modified | 70% |
| Footing, Foundation and Structure Backfill | Structural Fill | 8” | 95% Modified | 70% |
| Areas within 10’ of Existing or Proposed Building or Structure Footing or Slab | Granular  Fill | 12” | 90% Modified | 60% |
| Turf Areas | Earth Fill | 12” | 85 % Modified | 50% |

(a) Minimum relative density as determined by ASTM D-4253 for coarse-grained soils with less than 15% by mass passing the No. 200 (75‑μm)  sieve. Applicable only when minimum proctor compaction cannot be achieved.

**GRADING**

Grading shall include areas necessary to establish new grades as required, additional areas disturbed by construction activities, storage, equipment including all trenching, where excess fill is deposited and where cutting is required.

New grades are designed to produce desired configuration of site and do not represent a balance between cut and fill.

Excavated materials shall be disposed of by contractor at a suitable off-site location. Contractor shall be responsible for securing suitable disposal site(s) and for all off-site disposal costs.

Grades not indicated shall be uniform levels or slopes between point elevations as shown. Adjust all grades as necessary to provide positive drainage away from structures.

Grades for earthwork shall not deviate from established elevations, as shown in excess of 1 inch unless otherwise directed by DFD Project Representative.

Do all cutting, filling, compacting fill, rough grading required to bring entire project to within respective base course elevations or 6 inches below finished topsoil elevations.

##### GRADING AROUND TREES

Limit excavation, filling and grading near trees or other vegetation to the extent possible. When tree roots are encountered, cut roots cleanly and squarely.

For trees within the grading limits that are to remain, install tree protection fencing as noted in the drawings.

**SOIL STABILIZATION**

***(Note to the designer: If the geotechnical investigation completed during the design phase indicates that soil stabilization will be necessary, provide additional specifications in this section or elsewhere in the drawings or Contract Documents describing the method of soil stabilization. Delete this section if not applicable to the project.)***

Notify the DFD Project Representative if a solid subgrade cannot be established through drying and grading.

**CLEAN UP**

Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.

Thoroughly clean all drainage ways, roads, parking lots, sidewalks, and paved surfaces and remove and dispose of all debris and mud.

END OF SECTION