

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Excavating topsoil.
  2. Excavating subsoil.
  3. Cutting, grading, filling, rough contouring, and compacting site for site structures, building pads, and paving.
- B. Related Sections:
1. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  2. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  3. Section 31 10 00 - Site Clearing: Excavating topsoil.
  4. Section 31 23 16 - Excavation: Building excavation.
  5. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
  6. Section 31 23 23 - Fill: General building area backfilling.
  7. Section 32 91 19 - Landscape Grading: Finish grading with topsoil to contours.

### 1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
  4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
  8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Materials Source: Submit name of imported materials suppliers.

### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Topsoil: Type S3 and S4 as specified in Section 31 05 13.
- B. Subsoil Fill: Type S1 and S2 as specified in Section 31 05 13.
- C. Granular Fill: Type A1, A2, A3 and A4 as specified in Section 31 05 16.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

### 3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.3 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, marked areas, entire site, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material 36 mil Hypalon material and cover over with same material, until disposal.
- D. Do not remove topsoil from site.

### 3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded. marked areas. entire site.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.

### 3.5 PREPARATION OF EXISITNG SUBGRADE

- A. Scarify exposed subgrade to a depth of 6” as follows: Prior to the placing of any fill, the subgrade course shall be thoroughly loosened by scarifying or plowing in the direction parallel to the longitudinal direction of structures to be installed, to a minimum depth of 6 inches, or as directed by the Engineer. After removal of roots, rocks and other debris turned up in the scarifying process, the subgrade shall be compacted in conformity with the density and moisture requirements of these specifications. The material shall be brought to near optimum moisture conditions and compacted to at least 95% of its maximum Standard Proctor dry density (AASHTO T-99). The moisture content shall be  $\pm 2\%$  of optimum moisture, as determined by AASHTO T-99. The contractor shall keep previously compacted layers of the prepared subgrade course free of water or unacceptable material after compaction operations have started. No prepared subgrade shall be placed on frozen or muddy foundation material, nor shall snow, ice or frozen material be incorporated in the prepared subgrade course material. Irregularities and depressions that may develop shall be immediately corrected with subgrade course material. Ruts

formed by traffic moving over the prepared subgrade course shall be corrected prior to the final compaction of the prepared subgrade course material.

- B. Irregularities and depressions that may develop shall be immediately corrected with subgrade course material. Ruts formed by traffic moving over the prepared subgrade course shall be corrected prior to the final compaction of the prepared subgrade course material. No aggregate base course shall be placed until the subgrade has been inspected and accepted by the Engineer.

### 3.6 FILLING

- A. No fill or embankment material shall be placed until the foundation has been constructed in accordance with the Preparation of Existing Subgrade item and has been inspected and accepted by the Engineer. The Contractor shall keep the foundation material free of water or unacceptable material after compaction operations have started. No fill or embankment material shall be placed on frozen or muddy foundation material. Placing of fill or embankment material shall be discontinued during adverse weather conditions which create excessive moisture in, or freezing of the material.
- B. Fill areas to contours and elevations with unfrozen materials.
- C. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 6 inches depth prior to compaction.
  - 2. Structural Fill: Maximum 6 inches depth prior to compaction.
  - 3. Granular Fill: Maximum 6 inches depth prior to compaction.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. The distribution of materials throughout the prepared subgrade course shall be such that there will be no lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material. Pockets of material of uniform particle size, when encountered, shall be proportionally mixed with other material to obtain an acceptable foundation material or shall be wasted when so directed by the Engineer. The subgrade material should be observed by the Engineer or his representative to determine if the existing subgrade is capable of supporting the proposed sections
- F. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Repair or replace items indicated to remain damaged by excavation or filling.
- I. Excavations shall be constructed in accordance with these specifications and shall conform to the lines, grades and cross sections as shown on the plans or as established by the Engineer in the field. All finished surfaces shall be generally smooth and pleasing in appearance.
- J. The Contractor shall maintain and protect all excavations in a satisfactory condition at all times until final completion of the project. The Contractor shall remove, at his own expense, any material placed outside the prescribed lines when directed to do so by the Engineer.

- K. The Contractor shall construct the fills or embankments in horizontal lifts extending the entire length of the fill or embankment unless the construction of fills and embankments in sections is permitted by the Engineer. Fill and embankment material shall be placed on the compacted foundation in such quantities that it will form a layer not to exceed 6 inches in depth prior to compaction. The placement of fill and embankment material on the prepared foundation shall be done in such a manner that non uniformity in gradation from load to load will be adjusted or eliminated as far as practicable. The method in which fill and embankment material is deposited shall be subject to acceptance by the Engineer.
- L. After placement, fill and embankment material shall be spread by motor grader or other acceptable equipment to the width and thickness as required in these specifications and as indicated on the plans or as established by the Engineer in the field. No material placed by dumping in piles or windrows shall be incorporated in that position, but shall be moved and spread by blading or similar acceptable method. Fill and embankment material which does not contain sufficient moisture to avoid segregation of particle sizes during placing operations shall be wetted prior to and during placement.
- M. After each layer of fill or embankment material has been properly spread and wetted, it shall be compacted to 95% Modified Proctor Density (AASHTO T-180). Compaction requirements include both cut and fill areas. During compaction operations, the moisture content of the layer of material being compacted shall be maintained within a moisture content range of  $\pm 2\%$  of optimum moisture content. The use of water in an amount which will result in the appearance of free water on the surface under the action of compaction equipment shall be avoided. The Contractor may use any type of compaction equipment he deems necessary to obtain the specified density. The type of compaction equipment used shall be the one determined to be the best suited to compaction of the material being placed and shall be the sole responsibility of the Contractor. Pneumatic tire rollers and compaction with hauling equipment will be acceptable provided adequate compaction of the entire fill or embankment is achieved.
- N. When the top surface of a partially completed fill or embankment becomes too dry or compacted to permit suitable bond with the subsequent layer, the Contractor shall loosen the dried material by scarifying. The loosened material shall then be moistened to the required moisture content and recompact to the specified density.
- O. During construction, the top of embankments shall be kept crowned in order that the embankment will drain freely towards the side slopes.

### 3.7 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Perform laboratory material tests in accordance with ASTM D1557. ASTM D698. AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Tests.

### 3.9 SCHEDULES

- A. Structural Fill:
  - 1. Fill Type: To subgrade elevation. 6" depth prior to compaction.
  - 2. Compact uniformly to minimum 95 percent of maximum density.
- B. Previous Structural Fill:
  - 1. Fill Type: To subgrade elevation. 6" depth prior to compaction.
  - 2. Compact uniformly to minimum 95 percent of maximum density.
- C. Subsoil Fill:
  - 1. Fill Type: To subgrade elevation. 6" depth prior to compaction.
  - 2. Compact uniformly to minimum 95 percent of maximum density.
- D. Topsoil Fill:
  - 1. Fill Type: To subgrade elevation. 8" thick lifts.
  - 2. Compact uniformly to minimum 90 percent of maximum density.

END OF SECTION