

**SECTION 31 22 00**  
**GRADING, FILLING AND COMPACTION**

**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

A. All of the Contract Documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

**1.02 DESCRIPTION**

A. Grading, filling, proofrolling, compaction testing, and placement and compaction of stone subbase. Removal of all obstructions, piles, foundations, structures and other materials etc. encountered during the course of construction shall be in accordance with Section 312300 of these Specifications.

B. Draining and/or pumping, if required, to keep excavation free from water.

C. Stockpiling on site fill material.

D. Laying out lines and grades by a surveyor for final grading.

E. Obtaining the services of an approved testing laboratory for compaction testing of fill material.

F. Cleaning up the site upon completion of Contract work.

**1.03 RELATED SECTIONS**

Section 02 41 00 – Demolition and Removals  
Section 32 13 13 – Concrete Pavement

**1.04 REFERENCES**

A. American Society for Testing and Materials (ASTM).

ASTM C 117 - Test Method for Material Finer than No. 200 Sieve in Mineral Aggregates by Washing.

ASTM C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

ASTM D 422 - Test Method for Particle - Size Analysis of Soils.

ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb Hammer and 12 inches Drop.

ASTM D 1556 -Test Method for Density of Soil in Place by the Sand-Cone Method.

ASTM D 2922 -Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D 3017 -Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D 4318 -Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

## 1.05 SUBMITTALS

Submit 14 days prior to fill placement:

- A. Equipment: Proposed equipment to be used in compacting fill or backfill material.
- B. Report: If imported fill is used, provide gradation curves. When imported material is used, the contractor shall submit a ticket with each load of material delivered to the site indicating date and time loaded and delivered, source of material, amount in the load and class of material.

## 1.06 QUALITY ASSURANCE

- A. The Contractor shall not perform proofrolling or final grading operations on soil which is too wet to be properly rolled or compacted as determined by the Engineer.
- B. Fill material for grading will be subject to the approval of the Engineer.

# PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Fill shall be clean, free from deleterious debris or organic matter, with no more than 15 percent fines passing the No. 200 sieve, and the maximum dimension of the largest stone not exceeding 4 inches.
- B. Select material shall be clean, free from debris and organic matter, with a maximum particle size of 3 in. and not more than 10% by weight passing the ASTM D1140 No. 200 sieve size.

# PART 3 - EXECUTION

## 3.01 PREPARATION AND LAYOUT

- A. Establish extent of excavation by area and elevation; designate and identify datum elevation.
- B. Set required lines and levels.
- C. Maintain benchmarks, monuments and other reference points.

## 3.02 UTILITIES

- A. Existing utility systems and service lines to remain and those encountered during excavation, if damaged, shall be repaired at the Contractor's expense. Relocation of existing utility systems and service lines, to accommodate the completion of the project, whether on or off the site, shall be the responsibility of the Contractor.
- B. The Contractor shall contact utility companies for information pertaining to locations and construction of existing systems before starting excavation.

## 3.03 COMPACTION

- A. Prior to placement of fill, the subgrade shall be proofrolled with minimum of two passes by the approved roller that is to be used for backfill placement.
- B. Fill shall be compacted to achieve a density of at least 95 percent of the maximum density as determined by Method D of ASTM D 698.
- C. Fill shall be placed in maximum eight-inch loose lifts and compacted with a minimum of six passes with an approved vibratory roller.
- D. Do not place and compact fill on frozen subgrade.

### **3.04 DEWATERING**

- A. Prevent surface water and subsurface water or groundwater from flowing into excavations and from flooding project site and surrounding area.
- B. Do not allow water to accumulate in excavations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.

### **3.05 MATERIAL STORAGE**

- A. Stockpile satisfactory excavated materials where directed. Place, grade and shape stockpiles for proper drainage.
- B. Locate and retain soil materials away from edge of excavations.
- C. Storage areas shall be subject to the approval of the Construction Manager and/or the Owner's Representative.
- D. All excess material not incorporated in the work shall become the property of the contractor and shall be disposed of off site.
- E. No materials shall be stored or stockpiled within the limits of the dripline of any existing tree to remain.

### **3.06 FIELD TESTS**

- A. The Contractor shall engage the services of an approved testing laboratory to determine the in-place density of the soil after compaction is completed.
- B. Compaction tests shall be performed at a frequency of one for every 250 square feet of excavated/backfilled area and street area shown on the Contract Drawings. Test methods may be either Sand-Cone (ASTM D 1556), or nuclear method determined by ASTM D 3017.
- C. If fill has not been sufficiently compacted as determined by in-place density tests, the compaction effort shall be continued and moisture content shall be adjusted as necessary until the specified compaction is obtained.

**3.07 CLEAN UP**

- A. All surplus materials furnished by the Contractor and all equipment and temporary structures shall be removed from the site by the Contractor. All dirt and rubbish shall be hauled off site and the construction site left clean to the satisfaction of the Engineer.

**END OF SECTION**