
SECTION 31 20 00.01
EARTH MOVING (Roadway Excavation, Fill and Compaction)

PART 1 GENERAL**1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
1. Excavation
 2. Compaction
 3. Fill
- B. Related Work Specified Elsewhere:
1. Earth Moving (Site Excavation and Placement of Fill Material): Section 31 20 00.00
 2. Erosion and Sedimentation Controls: Section 31 25 00
 3. Asphalt Paving (Bituminous Paving and Surfacing): Section 32 12 16
- C. Definitions:
1. Roadway: Area under and within ten feet of the edge of paving.
 2. Roadway Subgrade: The prepared earth surfaces on or over which additional roadway materials will be placed or work is to be performed.
- D. Applicable Standard Details:
As shown on the Contract Drawings and in accordance with Publication 408 Specifications.

1.2 QUALITY ASSURANCE

- A. Reference Standards:
1. American Association of State Highway and Transportation Officials (AASHTO):
T99 Moisture-Density Relations of Soils, Using a 5.5-lb. Rammer and a 12-in. Drop
T191 Standard Method of Test for Density of Soil In-Place by the Sand Cone Method.
 2. American Society for Testing and Materials (ASTM):
D2167 Test Method for Density and Unit Weight of Soil in Place by the Rubber-
Balloon Method.
D2922 Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear
Methods (Shallow Depth).
 3. Pennsylvania Department of Transportation (PennDOT), latest revision:
Publication 408, Specifications
- B. Inspections:
1. Inspection by the ENGINEER will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.3 SUBMITTALS

- A. Certificates:
1. Submit certification from aggregate suppliers attesting that materials conform to PennDOT specifications herein. PennDOT certification (CS-4171) shall be provided with each load of crushed aggregate delivered to the job site.

1.4 JOB CONDITIONS

- A. As shown on the Contract Drawings, in accordance with Publication 408 Specifications.

- B. Control of traffic:
1. Reasonable access must be maintained for adjacent property OWNERS and commercial properties.
 2. All excavations in access drive, driveways, and state highway rights-of-way shall be backfilled or plated at the end of each work day.

PART 2 PRODUCTS

2.1 ACCEPTABLE MATERIALS

- A. Roadway Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 312000.00, Paragraph 2.1.
- B. Embankment Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 312000.00, Paragraph 2.1.
- C. Excavated Areas: Suitability of material for subgrade purposes shall be determined by non-movement of the material under compaction equipment.
- D. Course Aggregate: Hard, tough, durable and uncoated inert particles reasonably free from clay, silt, vegetation other deleterious substances. Course aggregate shall be obtained from an approved source.

2.2 GEOTEXTILES:

- A. For all areas of wet subgrade – Class 4 Type B as defined in PennDOT Publication 408, Section 735, and as approved by the ENGINEER.
- B. For pavement base drains – Class 1 as defined in PennDOT Publication 408, Section 735, and as approved by the ENGINEER.

PART 3 EXECUTION

3.1 SUBGRADE

- A. Perform soil erosion control work in accordance with requirements of the Contract Drawings and Section 31 25 00: Soil Erosion and Sedimentation Control.
- B. Roadway Excavation: Excavate or otherwise remove and satisfactorily dispose of materials located within the limits indicated on the Contract Drawings for roadways.
1. Excavate to roadway subgrade depths required, and cut drainage channels and waterways as detailed on the Contract Drawings. Proof roll subgrade to the satisfaction of the ENGINEER.
 2. Remove rock encountered in roadway excavation to a depth six inches below finished subgrade elevation.
 3. Excavate unsuitable subgrade material. Refill such areas to required elevation with acceptable materials.
 4. Place geotextile layer in wet areas prior to placing final base course.
- C. Roadway Grading: Shape subgrade of roadways, intersections, approaches, entrances and adjoining pedestrian walkways to no more than 0.10 foot above or below the design elevations.
- D. Roadway Fill: Construction requirements for roadway fill shall be as follows:
1. Form the roadway fill with acceptable materials.
 2. Compact material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2%, per ASTM D698 or D1557. Proof roll roadway fill to the satisfaction of the ENGINEER.

- E. Roadway Embankment: Construction requirements for roadway embankment shall be as follows:
1. Break up shale and other rock-like materials formed by natural consolidation of mud, clay, silt and fine sand into a maximum size that can be readily placed and compacted in loose eight-inch layers.
 2. Place rock to form the base of roadway embankments. Place in uniform loose layers not exceeding in depth the approximate average size of the larger rock, but not exceeding 8 inches deep.
 3. Smooth and level each layer adding soil or granular material conforming to Section 31 20 00.00, Paragraph 2.1 in sufficient quantity to supplement the smaller rock pieces, filling the voids and pockets.
 4. Form the top 18 inches of roadway embankments with soil or granular material conforming to Section 31 20 00.00, Paragraph 2.1.
 5. Compact embankment material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2%, per ASTM D698 or D1557. Proof roll embankments to the satisfaction of the ENGINEER.
 6. During foreign borrow excavation operations, keep the borrow area graded to ensure free water drainage. Following completion of work in the borrow area, grade the area to present a uniformly trim appearance merging into the surrounding terrain and to prevent erosion.

3.2 **FIELD QUALITY CONTROL**

- A. Surface Tolerance:
1. After the base course has been completed as specified, the surface smoothness shall be checked with approved templates, string lines, or straightedges.
 - a. **Templates:** The CONTRACTOR shall furnish and use approved templates of required length and cut to the required crown of the finished surface of the base course, for checking the crown and contour thereof. The templates shall be equipped with metal or other approved vertical extensions attached to each end, so that the bottom of the template will be at the elevation of the top of the aggregate. At least 3 such templates shall be furnished, and used at intervals of not more than 25 feet.
 - b. **String Lines:** String lines, for controlling the finished elevation of the proposed base course, shall be furnished with ample supports and offset along each side of the base course, and shall be maintained until all irregularities have been satisfactorily corrected.
 - c. **Straightedges:** Approved straightedges 10 feet in length shall also be furnished and used for testing longitudinal irregularities in the surface of the base course. Any surface irregularities that exceed ½ inch shall be remedied by loosening the surface and removing or adding material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.
- B. Field Moisture-Density Tests:
Conduct such tests as specified under Site Excavation and Placement of Fill Material: Section 31 20 00.00.

END OF SECTION