

## SECTION 204 — EMBANKMENT AND SUBGRADE

**204.01 DESCRIPTION.** This work shall consist of constructing the embankment and subgrade of suitable material obtained from roadway, structure, borrow, and other excavation included in the Contract. The material shall be placed, processed, and compacted to the lines and grades specified in the Contract Documents.

**204.02 MATERIALS.** Soils and soil aggregate mixtures used in the construction of embankments shall conform to the common borrow requirements in Section 916 unless otherwise specified in the Contract Documents.

**204.02.01 Rock.** Rock may be used in embankments, provided that individual pieces do not exceed of 24 in. in any dimension. Larger size rocks may be wasted with the approval of the Engineer.

**204.02.02 Frozen Material.** Refer to 201.03.05 with the following addition:

Any material that freezes after being placed in the embankment shall not be covered until it has thawed.

**204.02.03 Embankment Adjacent to Structures.** The Engineer may require the use of specially selected material adjacent to structures to insure good compaction or to protect the structure from damage. Rock is prohibited. Embankment material at locations of pile supported foundations shall be a type that piles may be easily driven through the embankment.

### 204.03 CONSTRUCTION.

#### 204.03.01 Embankment Foundation.

- (a) **Foundation Material.** The Engineer will inspect the foundation prior to the construction of an embankment. Topsoil, root mat, or unsuitable material shall be removed to the depth directed by the Engineer.
- (b) **Embankment Over Existing Pavement.** When embankment is placed on an existing pavement, the pavement shall be thoroughly broken up, scarified or removed as specified in the Contract Documents or as directed by the Engineer.

- (c) **Test Rolling.** When test rolling is specified in the Contract Documents or directed by the Engineer, the foundation shall be tested by rolling with a 35 ton pneumatic tired roller, or as approved by the Engineer.

**204.03.02 Placing and Spreading.** The material shall be placed in horizontal layers across the full width of the embankment. An adequate crown shall be maintained to provide drainage at all times. Side slopes shall be maintained at the specified slope throughout the progress of the work.

- (a) **Embankment on Unstable Ground.** When embankment is to be constructed on wet and unstable ground that will not support the weight of the construction equipment, the first layer of the fill may be constructed by depositing material in a layer no thicker than that required to support the equipment. Subsequent layers shall conform to (b).

- (b) **Earth Embankment.** Except as otherwise specified, no layer shall exceed 8 in. compacted depth.

- (c) **Rock Embankment.**

- (1) In rock embankment the thickness of layers shall be determined by the size of the rock or a 24 in. maximum depth, whichever is less. The portion of the embankment less than 6 ft below the subgrade at the profile grade line shall be placed in layers not more than 8 in. compacted depth, and these layers shall be filled solid and fully choked with spalls, rock dust, or earth. Each layer shall be filled and compacted before the next layer is placed.
- (2) The top of the rock material shall provide a uniform surface, determined by connecting with straight lines the points on the typical cross section which are 9 in. below any median ditch invert and 9 in. below the bottom of the pavement structure and then sloping downward and outward under the shoulders at the rate of 3/4 in. per ft to the outer slope of the embankment.
- (3) The remaining upper portion of the embankment, unless otherwise specified in the Contract Documents, shall be constructed of suitable earth, free from stones that would be retained on a 3 in. sieve.

**204.03.03 Benching.** When embankment is to be placed and compacted on hillsides or when new embankment is to be compacted against existing

embankments, the slopes on which the embankment is to be placed shall be continuously benched where they are steeper than 4:1 when measured at right angles to the roadway. The benching operation shall be done as the embankment is brought up in layers. Benching shall be a minimum width of 5 ft. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cut. Material conforming to embankment requirements cut from the benches shall be compacted along with the new embankment material at no additional cost to the Administration.

**204.03.04 Compaction.** Immediately after spreading of each layer, the material shall be compacted with compaction equipment approved by the Engineer. Rolling shall be done in a longitudinal direction along the embankment, beginning at the outer edges and progressing towards the center. The travel paths of traffic and equipment shall be dispersed over the width of the embankment to aid in obtaining uniform compaction.

Material 1 ft below the top of subgrade shall be compacted to not less than 92 percent of the maximum dry density as specified in T 180. Material in the top 1 ft shall be compacted to not less than 97 percent of the maximum dry density. In-place density shall be determined by MSMT 350 or 352. When necessary, the layer shall be wetted or dried in order to compact the layer to the required density. The resultant moisture content of embankment material, when finally compacted to required density, shall be within two percentage points of optimum.

The Contractor shall provide a portland cement concrete compaction block having dimensions 18 x 18 x 9 in. and weighing at least 200 lb. One 18 x 18 in. working face shall have a level broomed surface.

**204.03.05 Stability of Embankments.** The Contractor shall be responsible for the stability of all embankments in the Contract and shall remove and replace with acceptable material any embankment or portion thereof that has been constructed with unsuitable material. The Contractor shall remove and replace unstable material and remove and replace portions of the embankment that become unstable or displaced as the result of the Contractor's operations at no additional cost to the Administration.

**204.03.06 Protection of Structures and Utilities During Construction.** The Contractor shall be responsible for protecting all structures and utilities from any damage in the handling, processing, or compacting of embankment or backfill material. Particular care shall be exercised in the vicinity of arches, retaining walls, culverts and utility trenches to assure that no undue strain or movement is produced. In areas where rollers cannot be used, the embankment or backfill shall conform to Section 210.

**204.03.07 Subgrade.** The subgrade shall be constructed and shaped to the specified cross section after all cuts, embankment and backfilling have been substantially completed. The subgrade shall be proof rolled as specified in 204.03.01(c).

**204.03.08 Maintenance.** During construction and after completion of the embankment and subgrade, the embankment and subgrade shall be maintained by the Contractor until finally accepted. Embankment and subgrade material that may be lost or displaced as a result of natural causes such as storms and cloudbursts, or as a result of unavoidable movement or settlement of the ground or foundation upon which the embankment and subgrade is constructed shall be replaced by the Contractor with acceptable material from excavation or borrow. The Contractor shall at all times maintain ditches and drains to provide adequate drainage. The travel paths of any traffic or construction equipment on the embankment and subgrade shall be held to a minimum to avoid the displacement of material or formation of ruts. When ruts 2 in. or more in depth are formed in the subgrade they shall be removed by reshaping and recompacting.

**204.04 MEASUREMENT AND PAYMENT.** Embankment, subgrade, and all necessary work will not be measured but the cost will be incidental to the Contract unit price per cubic yard for the pertinent Class of Excavation. The payment will be full compensation for the formation, sprinkling, compacting, test rolling, shaping, scarifying, breaking or removing of the existing pavement, sloping, trimming, finishing, maintaining embankments and subgrade, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Replacement of material lost as a result of natural causes will be measured and paid for at the Contract unit price per cubic yard for the pertinent Class of Excavation item or as directed by the Engineer.

Compaction by means of mechanical tampers or vibratory compactors will not be measured but the cost will be incidental to the pertinent Class of Excavation item.

## SECTION 205 — TEST PIT EXCAVATION

**205.01 DESCRIPTION.** This work shall consist of excavation and backfilling for test pits to determine the location of underground structures and utilities as specified in the Contract Documents or as directed by the Engineer.

**205.02 MATERIALS.** Not applicable.