

SECTION 206—EMBANKMENT

206.1 DESCRIPTION—This work is the construction of embankments and backfills.

206.2 MATERIAL—

(a) Embankment Material. Obtain material for embankment construction from the various classes of excavation on the project, including Common Borrow Excavation, Foreign Borrow Excavation, and Selected Borrow Excavation, all conforming to the following requirements:

1. General. Material of maximum size that can be readily placed in loose 200 mm (8-inch) layers, except as specified and classified as follows:

1.a Soil. Includes earth material with the following physical characteristics:

- Gradation—More than 35% passing 75 μm (No. 200) sieve.
- Minimum dry mass density—1522 kg/m^3 (95 pounds per cubic foot) determined according to [PTM No. 106](#), Method B.
- Maximum liquid limit—65, determined according to AASHTO T 89.
- Plasticity index—Not less than liquid limit minus 30, determined according to AASHTO T 90 for soils with liquid limits of 41 to 65.

1.b Granular Material. Includes natural or synthetic mineral aggregates having 35% or less passing the 75 μm (No. 200) sieve.

1.c Shale. Includes rock-like material formed by natural consolidation of mud, clay, silt, and fine sand; usually thinly laminated, comparatively soft, and easily split.

1.d Rock. Includes natural material that cannot be excavated without blasting or using rippers; also boulders and detached stones of a size that cannot be readily placed and compacted in loose 200 mm (8-inch) layers and having insufficient soil to fill the voids in each layer.

1.e Random Material. Includes any accepted combination of the above classifications and may include concrete, brick, stone, or masonry units from demolition.

2. Suitable Material. Reasonably free of organic matter, coal or coal blossom, or other objectionable matter. Wet, dry, or frozen material may be suitable when dried, wetted, or thawed, respectively.

The Contractor may waste suitable material, including wet or frozen material, after obtaining written authorization. This suitable material is subject to replacement in equivalent volume.

(b) Select Granular Material (2RC). [Section 703.3](#)

206.3 CONSTRUCTION—

(a) General. Prepare the embankment foundation area as specified in [Section 201](#).

Backfill existing depressions in embankment areas, such as gullies, old stream channels, stump holes, and areas of undercutting and topsoil or pavement removal, to the adjacent ground elevation.

Where undercutting is not directed, loosen embankment foundation areas to a depth of at least 200 mm (8 inches) and compact to the required dry mass (dry weight) density as determined in AASHTO T 99, Method C. In wet areas or unstable areas, the Representative may waive this requirement.

Break existing pavements, more than 1 m (3 feet) below the finished grade, as follows:

- break bituminous pavements to a maximum size of 0.1 m² (1 square foot) and recompact;
- break concrete pavements to a maximum size of 0.8 m² (1 square yard); and
- scarify bituminous, surface-treated roadways to a depth of 150 mm (6 inches) and recompact.

When constructing embankment on an existing slope, bench the slope to the width and depth indicated, or as directed.

Where required for installation of transverse drainage, construct embankment as shown on the [Standard Drawings](#).

(b) Placement and Compaction.

1. General. Except as specified in [Section 206.3\(b\)2](#) or except for rock, place embankment material for the full width in uniform horizontal layers of not more than a loose 200 mm (8-inch) depth, unless otherwise directed. The Contractor may end-dump material in water to the elevation necessary to establish a satisfactory working platform if rock is used, as approved by the Representative.

Other than rock, compact each embankment layer to the following requirements:

- Compact embankment for its full width to not less than 97% of the required dry mass (dry weight) density as determined according to [PTM No. 106](#), Method B.
- Compact top 1 m (3 feet) of embankment for full width to 100% of the required dry mass (dry weight) density.
- In-place density will be determined according to AASHTO T 191 or AASHTO T 310.
- Maintain material to within minus 3% of optimum and the optimum moisture content at the time of compaction.
- When material is too coarse (more than 20% retained on the 19 mm (3/4-inch) sieve and less than 35% passing the 75 µm (No. 200) sieve, or more than 30% retained on the 19 mm (3/4-inch) sieve) to satisfactorily use these methods, compaction will be determined based on nonmovement of the material under compaction equipment as specified in [Section 108.05\(c\)3.a](#), [3.b](#), [3.e](#), [3.h](#), or [4](#). Compact until embankment does not rut under a loaded triaxle (GVW 34 tonnes (75,000 pounds)).

Place rock, shale, and random material with coarser material in the outside and place finer material in the center of the embankment to produce a gradual transition in size. Using equipment, break the large pieces until most voids are filled.

Shape the top layer of the compacted embankment to drain during construction.

2. Wet and/or Unstable Foundation Areas. Where the embankment foundation is in water or swamp areas or is saturated or unstable, construct embankment with rock to the indicated elevation or as directed.

3. Existing Embankment. Existing embankment is defined as material placed and compacted during prior construction not associated with the current project, or material placed and compacted as part of the current project during a prior construction season and has wintered over. When an existing embankment requires additional material to bring it to the required elevation, proof roll the entire existing surface. Proof rolling shall be conducted with a minimum 9 tonne (10-ton) smooth drum roller (static or in static mode) in a systematic manner ensuring complete coverage of the existing embankment surface. Operate the roller at a speed between 5 km/h and 8 km/h (3 miles per hour and 5 miles per hour). Remove and recompact any unstable material before placing additional material. Material unstable due to excessive moisture should be thoroughly scarified to a minimum depth of 150 mm (6 inches), dried to the required moisture content, and recompact.

4. Inaccessible Areas. Place embankment material in uniform loose layers not exceeding 100 mm (4 inches) in depth in areas inaccessible to compaction equipment; compact to required density by means of mechanical tampers.

5. Structure Areas. Construct structure backfill behind bridge abutments and adjacent to structures under structure backfill with Selected Borrow Excavation, as shown on the [Standard Drawings](#) and as specified in [Sections 1001.3\(q\)2.b](#). Material requirements for structure backfill are indicated in the [Standard Drawings](#). Do not place rock where piles are to be driven.

6. Rock. Do not place rock in embankment without acceptance of the planned excavation and embankment operations.

When used to form the base of embankment, place rock the full cross-section width. Place rock on embankment side slopes, where indicated. With the Representative's verification, the Contractor does not need to compact excess rock disposed of on side slopes.

Before placing rock on other compacted embankment material, slope the top of the embankment from centerline to the sides, at a rate of approximately 85 mm per meter (1 inch per foot), and compact the embankment top.

Place rock in uniform loose layers not exceeding in depth the approximate average size of the larger rock, but limited to a maximum depth of 900 mm (36 inches). Remove oversize rock or reduce in size until it can be readily incorporated in a 900 mm (36-inch) layer. Do not dump rock in final position, unless specified, but distribute by blading or dozing; keep voids, pockets, and bridging to a minimum. Place rock embankment so larger pieces are evenly distributed and voids are filled as completely as possible.

When rock and other embankment material are placed at the same time, place the other material sufficiently above rock layers to allow for compaction when rock and other embankment material are placed at the same time.

When rock embankment is to be constructed to subgrade elevation, place a scratch lift of select granular material of sufficient thickness to completely fill all voids in the rock, and permit fine grading as specified by the requirements in [Section 210](#).

When transitioning from rock to other embankment materials, place a scratch lift of select granular material of sufficient thickness to completely fill all voids in the rock. Place a second lift of select granular material to a compacted thickness of 150 mm (6 inches). Only one transition from rock to other embankment material is permitted in an embankment section.

When lifts of rock and other finer embankment material are placed at the same time, place the finer material sufficiently above the rock layer to allow for proper compaction.

7. Frozen Material. Do not place frozen material on embankment. Do not place embankment material on any material frozen to a depth of 75 mm (3 inches) or more. Remove frozen material, if the embankment top freezes to a depth of 75 mm (3 inches) or more, before placing additional material.

8. Wet Material. Dry material to at least the optimum moisture content before compacting in embankment. Do not place material on embankment made unstable by excessive moisture.

9. Dry Material. Moisten material to within minus 3% of optimum and the optimum moisture content before compacting in embankment.

(c) **Stability.** Assume responsibility for the stability of embankment. Replace embankment that, in the Representative's judgment, has been damaged or displaced due to the following: carelessness or negligence, natural causes such as storms and floods, shrinkage of embankment material, and all other reasons not attributable to other than movement of the natural ground upon which embankment is placed.

Dry, reshape, and recompact material if construction equipment on embankments causes movement, rutting, or displacement of the material, and test for density and moisture requirements.

206.4 MEASUREMENT AND PAYMENT—

(a) **Embankment.** When measurement is required, embankment will be measured in its final position as specified in [Section 203.4\(a\)2](#) by the cubic meter (cubic yard).

Embankment construction is incidental to excavation or borrow excavation.

(b) **Select Granular Material (2RC).** Tonne (Ton)