

## SECTION 205 - ROCK FILL

### 205.01 DESCRIPTION

This section covers the requirements for the use of rock fill in embankment construction. This section should be used taking into account the requirements of Section 204 of the Specification.

### 205.02 DEFINITIONS

#### Fill:

The compacted embankment placed above natural surface level after removal of topsoil.

#### Rock Fill:

A material comprised of larger fragments of hard, sound durable rock containing only a small amount of fine particles, which when placed and compacted produces an embankment deriving its stability from the mechanical interlock of the coarser particles and not from the compaction of finer material.

### 205.03 MATERIALS

Unless otherwise specified, material for rock fill embankment construction shall be obtained from excavations within the works.

Rock fill shall be comprised of sound rock fragments. Not less than 90% of rock fragments with dimensions greater than 100 mm shall have a Point Load Strength ( $I_{s(50)}$ ) of 2.0 MPa or greater. Material which breaks down under compaction is not acceptable as rock fill. Rock fill shall be constructed to ensure rock particle to particle contact is maintained and further movement or consolidation is prevented.

Prior to placement, rock fill material must be well graded in accordance with Table 205.031 and with no particle dimension exceeding 400 mm.

**Table 205.031 - Grading of Rock Fill Material Prior to Placement**

AS Sieve Size (mm)	Limits of Grading (% passing by mass)
26.5	0 – 40
1.18	0 - 10

Material that does not meet the requirements for rock fill specified in this clause must be subjected to additional breakdown, or have additional fines incorporated and used in earth fill embankments in accordance with Section 204 of the Specification.

### 205.04 SITE EXCAVATION

#### (a) General

Site excavation of rock fill material shall be within the limits of batters, open and underground drainage and approved borrow areas from within the Site, and shall include the handling of excavated material to the point of disposal.

(b) Material Category

**HP Prior to the use of excavated rock material as rock fill, the Superintendent and the Contractor shall inspect the material encountered and subject to verification by appropriate testing, agree on the suitability of the material for rock fill as described in Clause 205.03.**

(c) Excavation Operations

If excavated rock is to be used in the construction of rock fill embankment, the working methods employed in the excavation of cuttings must be adjusted so as to produce rock fill material of the grading and rock strength specified in Clause 205.03. Such working methods must include screening and, if necessary, secondary processing.

(d) Oversize Rock

Oversize rock produced as a consequence of rock fill production shall be used or disposed of only in areas specified or shown in the drawings or otherwise in areas approved by the Superintendent.

**HP The Superintendent's approval shall be obtained to the use or disposal of oversize rock with a maximum particle dimension greater than the requirements for Type B fill in Type B fill areas in accordance with Section 204 of the Specification.**

#### **205.05 ROCK FILL EMBANKMENT CONSTRUCTION**

(a) General

Except where specified or shown on the Drawings, rock fill must not be placed in areas where earth fill has previously been constructed.

(b) Areas upon which Fills are to be Constructed

Areas upon which fills are to be constructed shall be prepared in accordance with the requirements of Section 204 of the Specification. Topsoil and material classified as silt shall be removed prior to construction of any rock fills.

Further to the requirements of Section 204, foundations under rock fills must be shaped to ensure that drainage is maintained and treated to ensure that erosion of the foundation will not occur.

(c) Geotextiles

Prior to placement of the first layer of rock fill, a geotextile fabric with a G robustness rating of greater than 3000 shall be placed as a separation layer.

Prior to placement of any type of fill material over or adjacent to rock fill, a geotextile fabric with a G robustness rating of greater than 3000 shall be placed as a separation over the top of the rock fill, and covered with a minimum layer of 200 mm of Type B fill material which has a maximum particle dimension of 75 mm.

Further to the above requirements, where rock fill is specified or shown on the drawings to be placed in areas where earth fill has previously been constructed, a geotextile fabric with a G robustness rating of greater than 3000 shall be first placed over the top of the earth fill as a separator layer.

## (d) Placement of Rock Fill in Embankments

The rock fill material must be placed and spread in such a way as to avoid contamination with foreign material.

Rock fill shall only be placed in accordance with Table 205.051.

**Table 205.051 - Placement of Rock Fill in Embankments**

Distance Below Surface Level of Type B Fill	Maximum Particle Size (mm)	Maximum Layer Depth (mm)
0.4 to 1.0 m	75	200
1.0 to 2.0 m	150	300
> 2.0 m	400	600

## (e) Compaction

Rock fill must be placed and compacted to achieve stability of the layer.

The minimum compactive effort shall be equivalent to 6 passes of a vibrating pad foot roller which can transmit a minimum force to the ground through the surface of the drum of 50 kN per meter of drum length, when operated at the maximum frequency of vibration. The frequency of vibration of the roller shall be between 16 and 25 Hz, and the travel speed shall not exceed 1 m for every three seconds.

The Superintendent may require that trial sections be constructed to verify that the proposed compaction routine is acceptable. No additional payment is to be made for any requirement to construct trial sections.

## (f) Cover over Rock Fill

Where Type A or B fill is to be placed over or adjacent to rock fill, the rock fill shall first be covered with smaller particle rock fill in accordance with Table 205.052.

**Table 205.052 - Minimum Cover Requirements for Rock Fill**

Maximum Particle Size of Rock Fill to be Covered (mm)	Maximum Thickness of Cover Layer (mm)		
	Layer 1 Maximum Particle Dimension 150 mm	Layer 2 Maximum Particle Dimension 75 mm	Total
400	200	100	300
150	Not Required	100	100
75	Not Required	Not Required	Nil

## (g) Rock Fill around Structures

Notwithstanding requirements elsewhere in Section 204 of the Specification, the thickness of backfill around structures specified in Clause 204.11 within rock fill embankments must be at least:

- Minimum Distance from Side of Structure, Abutments, Retaining Walls and Wing Walls: 2.0 m
- Minimum Cover over Top of Large Culverts: 1.0 m

## (h) Level Control

The surface level tolerance of the top of rock fill layer or zone must be finished to the following tolerance:

+0 mm / -100 mm.

**205.06 TEST ROLLING**

All layers of rock fill shall be test rolled in accordance with Section 173 of the Specification.

**205.07 TESTING AND ACCEPTANCE OF COMPACTION**

Unless otherwise specified, the first lot shall be placed as a trial section. The Contractor shall then develop a material grading, mixing, watering and rolling routine based on construction and testing of trial sections for review by the Superintendent. If the routine includes in situ modification of the material, then the after-compaction grading of the material must be verified.

The Superintendent may require that further trial sections be constructed to verify that the proposed compaction routine is acceptable. No additional payment will be made for any such request.

Acceptance of work for compaction will be based on compliance with the accepted compaction procedure and test rolling carried out in accordance with Section 173 of the Specification.

Any unstable areas detected by test rolling shall be rectified by the Contractor.

Prior to any layer being covered by a successive layer, the Superintendent may require further test rolling to confirm that the layer is sound. No additional payment will be made for any requirement to carry out such further test rolling.

**205.08 MINIMUM FREQUENCY OF TESTING**

The Contractor shall carry out testing at a frequency sufficient to ensure that work performed under the Contract complies with the specified requirements but which is at a frequency not less than that specified below.

The minimum test frequency specified in Table 205.082 shall not apply to small areas as defined in Section 173 of the Specification. In this case, every lot shall be tested separately for compliance with the specified requirements.

**(a) Material Properties**

Materials shall be tested to demonstrate compliance with the material property requirements specified in Clause 205.03.

Testing shall be undertaken at the frequency specified in Table 204.081 until three consecutive lots of like material have achieved the specified requirements in the first test.

**Table 205.081 - Minimum Frequency of Testing for Material Properties**

<b>Material Properties</b>	<b>Minimum Frequency of Testing</b>
Rock Strength – Point Load Index - $I_{S(50)}$	Each source prior to the commencement of work and every 500 m <sup>3</sup> of production.
Grading	Prior to the commencement of work and at other times when in the opinion of the Superintendent, the nature and/or physical properties of the material have changed.

## (b) Compaction

The Contractor shall initially test each trial section thence each lot for compaction acceptance in accordance with the requirements of the Specification. Testing of every lot shall continue until three consecutive lots of like material and/or work satisfy the requirements specified in Clause 205.07 when tested for the first time. The Contractor may reduce the frequency of testing to the minimum test frequency as specified in Table 205.082 after satisfying the above requirement.

The Contractor may continue to test at the minimum frequency until such time as a lot fails to achieve the specified requirements. All subsequent lots shall be tested until three consecutive lots of like material and work have achieved the specified standard, at which time the frequency of testing may revert to the minimum test frequency.

**Table 205.082 - Maximum Lot Size and Minimum Frequency of Testing for Compaction  
(after passing the minimum number of qualifying lots)**

<b>Maximum Allowable Lot Size for a Single Layer of Work</b>	<b>Minimum Frequency of Testing for Compaction</b>
The lesser of 1000 m <sup>2</sup> or one day's production	One per 2 lots