

SPECIFICATIONS FOR
SUPPLYING AND PLACING BACKFILL

1.0 DESCRIPTION

The Work shall consist of:

- .1 Processing, loading, hauling, unloading, placing and compacting backfill material;
- .2 Protecting backfill material from freezing;
- .3 The quality control (QC) testing of all backfill material; and
- .4 Payment of royalties.

The quantity for supplying and placing backfill may be increased during construction to include the quantity of additional backfill material required because of additional excavation to remove poor soils as described in the Specifications for Structural Excavation.

2.0 REFERENCES AND RELATED SPECIFICATIONS

All reference standards and related specifications shall be current issue or latest revision at the date of tender advertisement.

2.1 Related Specifications

- Specifications for Structural Excavation

3.0 SUBMITTALS

The Contractor shall provide evidence that scales have been calibrated and certified for the current calendar year by the Weights and Measures Services of the Government of Canada before the scales will be accepted for use.

Where the scale has not been calibrated and certified for the current calendar year, the Engineer may test the scale using procedures specified by Weights and Measures Inspection Services and approve the scale for use on the project.

4.0 MATERIALS**4.1 General**

All material used for backfill, including non-granular material, shall meet the following specifications and shall be of a quality acceptable to the Engineer. All backfill material shall be in a thawed state when placing and compacting, and be free from rocks, large or frozen lumps, wood, or other unsuitable material. Backfill material shall not be placed on frozen substrate.

4.2 Types of Backfill

Backfill material shall be free from organic material and conform to one of the following types:

.1 Type 1 – Granular Backfill

Sieve Size	% Passing Standard Sieve	
	Granular	Limestone
37.5 mm	100	100
25.0mm	85 – 100	85 – 100
4.75 mm	25 – 80	25 – 80
425 µm	15 – 40	15 – 35
75 µm	8 – 18	0 - 10
Min. Crush Count	15%	-
Max. Los Angeles Abrasion Loss	40%	32%
Max. Shale Content	20%	-

.2 Type 2 – Culvert Gravel

Sieve Size	% Passing Standard Sieve
37.5 mm	100
4.75 mm	25 – 80
425 µm	15 – 40 (mechanically compacted)
425 µm	5 – 10 (water jetted)
75 µm	6 – 18 (mechanically compacted)
75 µm	0 – 8 (water jetted)

The shale content shall not exceed 25% by weight of the particles retained on a 4.75 mm sieve.

.3 Type 3 – Non-Granular Cohesive Material

Non-granular cohesive material shall be highly plastic clay (exhibiting putty-like properties with considerable strength when dry) and non-organic. Material with very high swelling potential such as bentonite clays will not be permitted. When proposed material characteristics are in question, the Engineer may require the Contractor to classify the material using Test Method ASTM D2487 – Classification of Soils for Engineering Purposes. Non-granular cohesive material shall have a minimum Plasticity Index of 40.

The non-granular cohesive material shall be free of rocks and stones.

When approved by the Engineer, non-granular cohesive material can be substituted with granular material.

.4 Type 4 – Subsurface Drainage Fill

The coarse granular subsurface drainage material shall be free draining gravel or crushed limestone aggregate conforming to the following gradation requirements.

Sieve Size	% Passing Standard Sieve
40 mm	95 – 100
20 mm	35 – 70
10 mm	10 – 30
5 mm	0 – 5

5.0 CONSTRUCTION METHODS

5.1 General

The Contractor shall backfill the excavated areas with the specified type of backfill material, unless otherwise directed by the Engineer, to the elevation of the ground surface existing immediately prior to the start of excavation or to the elevations specified on the Drawings. Backfill material shall be placed in accordance with the Drawings, this Specification, the Special Provisions and to the satisfaction of the Engineer.

Backfill material shall be stockpiled within a suitable area approved by the Engineer. Examples of unsuitable areas include, but are not limited to, the following:

- in the flood plain,
- on the edge of an embankment creating slope stability issues, or
- locations impeding sight lines of the travelling public through or around the site.

During freezing weather, the Contractor shall protect all backfill material from freezing until it is placed to the satisfaction of the Engineer.

5.2 Type 1 - Granular Backfill

The granular backfill shall be placed in layers not to exceed 150 mm in depth and each layer shall be thoroughly compacted by means of packers or mechanical tampers to a relative compaction of not less than 95% Standard Proctor Density for the backfill material at optimum moisture content.

5.3 Type 2 - Culvert Gravel

Culvert gravel for bedding shall be spread uniformly along the full length of the culvert foundation. For metal culverts, the bedding shall be constructed so that after compacting, a depth of at least 150 mm of gravel remains under the full length of the culvert. Culvert gravel shall be compacted at optimum moisture content to a minimum of 95% Standard Proctor Density.

Compaction of culvert gravel material in the haunch area for round or oval culverts may be carried out by mechanical methods or by water jetting.

5.4 Type 3 - Non-Granular Cohesive Material

Cohesive backfill shall be deposited in horizontal layers not exceeding 200 mm in thickness. Every layer shall be tamped in place and well compacted by means of mechanical tampers before the next layer is deposited.

In the event that local non-granular cohesive material is deemed unsuitable by the Engineer, the Contractor shall supply non-granular cohesive material meeting the requirements of Section 4.2.3.

5.5 Type 4 – Subsurface Drainage Fill

Placing of the granular subsurface drainage fill shall be done in accordance with the Drawings and Special Provisions or as directed by the Engineer. Compaction of the granular subsurface drainage fill will not be required.

5.6 Backfilling for Culverts, Abutments and Piers

.1 General

Special precautions shall be taken to prevent wedging action against abutments, retaining walls or culvert walls.

Backfill material placed around culverts, abutment wingwalls and piers shall be deposited on both sides to approximately the same elevation at the same time.

Unless permitted by the Engineer, backfill shall not be placed against any concrete structure within a distance of 1.0 meter until the concrete has reached 80% of the 28 day design strength.

The backfill in front of culvert headwalls and in front of abutment bearing seats and wingwalls shall be non-granular cohesive material.

.2 Culverts

Culverts shall be backfilled with granular material in the areas bounded by:

- (a) the bottom and side slopes of the excavation;
- (b) the headwall of the culvert; and
- (c) the dimensions and elevations shown on the Drawings.

.3 Abutments

Concrete abutments shall be backfilled with granular material in the areas bounded by:

- (a) the bottom and side slopes of the excavation under the approach slabs;
- (b) the wingwalls of the abutment; and
- (c) the dimensions and elevations shown on the Drawings.

.4 Piers

Concrete piers shall be backfilled with granular material in the areas bounded by:

- (a) the bottom and side slopes of the excavation; and
- (b) the dimensions and elevations shown on the Drawings.

6.0 QUALITY MANAGEMENT

6.1 General

The Contractor shall submit a sample of the backfill material and test results fourteen (14) days prior to beginning backfilling operations.

6.2 Quality Control

The Contractor shall be responsible for all quality control testing and shall complete the minimum testing requirements to the specified frequency and test procedures as described in Table 1.

6.3 Quality Assurance

The Engineer, at his/her discretion, may complete random quality assurance testing on all materials incorporated into the Work. The Contractor shall allow the Engineer unhindered access to the materials and shall assist the Engineer in carrying out any sampling or testing, including the provision for necessary traffic control, suitable access and storage. There shall be no charge to the Department for materials taken by the Engineer for testing purposes.

7.0 METHOD OF MEASUREMENT

7.1 Type 1 – Granular Backfill and Type 2 – Culvert Gravel

Supplying and placing of granular backfill and culvert gravel will be measured on a mass basis of hauled material. Weigh scale tickets for each truck shall be provided to the Engineer or his representative for verification and approval prior to unloading of backfill material.

7.2 Type 3 – Non-Granular Cohesive Material and Type 4 – Subsurface Drainage Fill

Supplying and placing non-granular cohesive material and granular subsurface drainage fill will be paid for on a lump sum basis and no measurement will be taken for this Work.

8.0 BASIS OF PAYMENT

8.1 Type 1 – Granular Backfill

Supplying and placing granular backfill will be paid for at the Contract Unit Price per tonne for “Supplying and Placing Granular Backfill”, measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the Work.

8.2 Type 2 – Culvert Gravel

Supplying and placing culvert gravel will be paid for at the Contract Unit Price per tonne for “Culvert Gravel”, measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the Work.

8.3 Type 3 – Non-Granular Cohesive Material

Supplying and placing non-granular cohesive material will be paid for at the Contract Lump Sum Price for “Lump Sum Backfill”, measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the Work.

8.4 Type 4 – Subsurface Drainage Fill

Supplying and placing granular subsurface drainage fill material will be paid for at the Contract Lump Sum Price for “Supplying and Placing Subsurface Drainage”, measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the Work.

Table 1
AGGREGATE TESTING REQUIREMENTS

TEST	STANDARD REFERENCE	MANITOBA STANDARD	MINIMUM FREQUENCY
Sampling	CSA A23.2-1A ASTM D 75		One test per hour of production or as directed by the Engineer.
Gradation Analysis	CSA A23.2-2A ASTM C 136, C 117	MRB-A202	
Soundness of Aggregate	CSA A23.2-9A ASTM C 88		
Density of Aggregate	CSA A23.2-10A ASTM C 29		
Standard Proctor	ASTM D 698	MRB-A213	
Sand Equivalent	ASTM D 2419 AASHTO T176	MRB-A215	
Coarse Aggregate Only:			
Crush Count	ASTM D 5821	MRB-A203	One test per hour of production or as directed by the Engineer.
Shale Content		MRB-A208	
Flakiness Index		MRB-A216	
Micro-Deval	CSA A23.2-29A ASTM D 6928	MRB-A214	
Dry-Rodded Unit Weight	ASTM C 29	MRB-A207	One test per material.
Los Angeles Abrasion – Large Size	CSA A23.2-17A	MRB-A205	
Los Angeles Abrasion – Small Size	CSA A23.2-16A	MRB-A206	
Relative Density and Absorption	CSA A23.2-12A ASTM C 127	MRB-A210	
Base Course Mix Design		MRB-A201	At the request of the Contractor.
Fine Aggregate Only:			
Organic Impurities	CSA A23.2-7A ASTM C 40		As directed by the Engineer.
Surface Moisture	CSA A23.2-11A ASTM C 70		
Relative Density and Absorption	CSA A23.2-6A ASTM C 128	MRB-A211	One test per material.
Material Finer than 75 µm	ASTM C 117	MRB-A204	One test per sample.