PART 1 - GENERAL

1.1 Related Sections

.1 Environmental Procedures: Section 01 35 43

.2 Roadway Embankments: Section 31 24 13

.3 Rock Bolting: Section 31 51 17

1.2 References

.1 American Society for Testing and Materials (ASTM)
.1 ASTM C117-2013, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D698-2012, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/ft^3) (600 kN-m/m^3).
.5 ASTM D4318-2010, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA)
.1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.

1.3 Definitions

.1 Excavation classes: two (2) classes of excavation will be recognized; stripping and rock excavation.
.1 Rock: any solid material in excess of 1.0 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.
.2 Stripping: excavation of common materials up to a 400mm depth, of whatever nature, which are not included under definitions of rock excavation. This includes but is not limited to soil, rock under 1.0m^3, topsoil, rootmat and

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organic material. Measure to be after clearing and grubbing.

.2 Waste material: excavated material unsuitable for use in Work or surplus to requirements

.3 Fill material: rock fill meeting the requirements of specified in Section 31 05 17, maximum size 600mm in any dimension.

.4 Unsuitable materials:
.1 Weak and compressible materials under excavated areas.
.2 Frost susceptible materials under excavated areas.
.3 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1.
.2 Table

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.5 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

.6 Wall control blasting: a blasting method using carefully spaced and aligned drill holes intended to produce a relatively flat rock surface, generally characterized by noticeable drill hole traces, with a minimum of blast induced fractures beyond the rock excavation limits specified in the Contract Documents. Wall control blasting techniques are cushion blasting, line drilling and pre-shearing.

.7 Backslope: the slope in a cut between the invert of the roadside ditch and the point where the slope intersects original ground.

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.8 Cushion Blasting: the placing of a single row of lightly loaded closely spaced holes along the excavation limits as specified in the Contract Documents and firing them coincident with the main excavation blast as the last delay sequence to remove rock inside the cut limits.

.9 Line Drilling: the placing of a single row of very closely spaced holes without explosives along the rock excavation limits specified in the Contract Documents.

.10 Pre-Shearing: the placing of a single row of closely spaced lightly loaded holes placed along the rock excavation limits specified in the Contract Documents, which are fired prior to the main excavation blast.

.11 Rock Face: the vertical or near vertical face between the top of the existing rock surface and the designated rock or ditch grade line.

1.4 Submittals

.1 File an Emergency Response Assistance Plan with the Explosives Branch, Natural Resources Canada.

.2 Before blasting work commences provide the Departmental Representative a valid blaster's safety certificate and a valid temporary magazine license if explosives are being stored.

.3 Provide a blasting design a detailed description of the methodology proposed to accomplish blasting control. Have blast design stamped by a professional engineer licensed to practice in the Province of Newfoundland and Labrador.

1.5 Delivery, Storage and Handling

.1 Store explosives in accordance with the Canadian Explosives Act and transport, handle and use in a manner prescribed by the manufacturer.

1.6 Quality Assurance

.1 Blaster must:
.1 Along with the Contractor, be responsible for the implementation of the Explosives Management Program.
.2 Have a valid blaster's safety certificate and a valid temporary magazine license if explosives are being stored.

.3 Possess a thorough working knowledge of the Federal Explosives Act and Provincial Regulations.
.4 Posses specialized training in storage, handling and detonation of explosives.

PART 2 - PRODUCTS

2.1 Materials

.1 Rock fill: well graded with less than 8 percent smaller than 0.075 mm, blasted or crushed rock consisting of durable crushed stones, 150mm or 200mm nominal size, from source as specified in Section 31 05 17. Rock to consist of angular fragments obtained by breaking and crushing solid or natural rock, reasonably free from thin, flat elongated or other objectionable pieces and fines or as otherwise approved by the Departmental Representative.

.2 Rock bolting: to Section 31 51 17.

.3 Geotextile: woven material with minimum Tearing strength (ASTM D4533) of 625 Newtons, a Grab Tensile Strength (ASTM D4632) of 1500 Newtons and Elongation at break of 25% (maximum).

PART 3 - EXECUTION

3.1 Site Preparation

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 Excavation

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Excavation must not interfere with bearing capacity of adjacent foundations.

.3 Dispose of surplus and unsuitable excavated material in approved location off site.
.4 Do not obstruct flow of surface drainage.

.5 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.6 Notify Departmental Representative when bottom of excavation is reached.

.7 Obtain Departmental Representative's approval of completed excavation.

3.3 Blasting

.1 Conduct blasting operations in accordance with:
.1 Explosives Act of Canada.
.2 Explosives Regulations.
.3 Newfoundland Reg. 70.09, Occupational Health and Safety Regulations.

.2 Use only qualified blaster journeypersons to carry out blasting operations. Provide explosive vehicle certificate to Departmental Representative upon request.

.3 Prior to detonation, give sufficient warning in every direction and confirm all persons have reached a place of safety before detonation.

.4 Remove overbreak as directed by the Departmental Representative.

.5 Do not disturb utility lines due to blasting. Immediately inform the authority having jurisdiction if any utility is affected.

.6 Use one (1) or more wall control techniques to produce the rock space as specified. Determine the spacing and diameter of drill holes for wall control blasting.

.7 Controlled blasting is defined as the establishment of a shear plane in rock along the line of the backslope face by using controlled explosives and suitably spaced drill holes.

.8 Perform a test line blast control (pre-split or cushion blasting) outside of the final slope line.

3.4 Rock Overhang and Slide Rock Debris

.1 Excavate rock overhang and slide debris from the faces of existing rock cuts by use of explosives.

.2 Use blasted material as rock fill as long as it conforms to rock fill size requirements.

3.5 Fill Types and Compaction

.1 Use fill of types as indicated.

3.6 Backfilling

.1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0 m.

3.7 Restoration

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.3 Restore site to its state prior to excavation.

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