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**Part 1      General**

**1.1      DESCRIPTION OF WORK**

- .1      The work shall consist of the supply and placing of riprap bedding, supply and placing of filter cloth (if filter cloth is required) and the supply and placing of riprap.

**1.2      ASSURANCE**

- .1      The riprap and the riprap bedding shall be well graded as outlined in Part 2 below or as specified in Section 01 00 10, Special Provisions.
- .2      The method of testing riprap bedding shall be in accordance with CSA Standard A23.2.2, Test for Sieve Analysis of Fine and Coarse Aggregate. Some screens may be added and/or deleted to conform with the gradation limits given in Section 01001, Special Provisions.
- .3      The method of testing riprap shall be by either measuring the rock as it is delivered or by in-place measurement. A test shall comprise measuring several rocks. Three tip-to-tip measurements shall be taken on each rock, one through the estimated major axis and two through the estimated minor axes, and the size of the rock shall be the average of the three measurements. Rocks having an average diameter smaller than the minimum diameter given in Section 01 00 10, Special Provisions, shall be rejected.

**1.3      STANDARDS**

- .1      The following organizations publish Standards to which reference has been made in this Section:
  - .1      CSA International  
178 Rexdale Boulevard,  
Toronto, Ontario M9W 1R3
  - .2      CGSB – Canadian Government Standards Board  
National Research Council,  
Ottawa, Ontario K1A 0S5

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- .3 ASTM – American Society for Testing and Materials  
100 Barr Harbor Drive, West Conshohocken PA  
19428-2959 USA

The Standards referred to shall be the most recent edition.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 RIPRAP BEDDING - Riprap bedding shall conform with and be reasonably well graded between the gradation limits outlined below:
- |                       |                |
|-----------------------|----------------|
| 75mm (3 in.)          | 100% Passing   |
| 4.75mm (No.4 Sieve)   | 30-70% Passing |
| 0.75mm (No.200 Sieve) | 0-8% Passing   |
- .2 RIPRAP - Riprap shall be reasonably well graded 75 mm to 200 mm material with at least sixty percent 150 mm diameter size. Rock used shall be hard, dense, durable fieldstone or rock fragments having a specific gravity of at least 2.6 and a limit of 2 percent absorption, in accordance with ASTM Standard C127, "Method of Test for Specific Gravity and Absorption of Coarse Aggregate".
- .3 FILTER FABRIC - Filter fabric shall be non-woven polyester in accordance with CGSB 148.1 – 1705/m<sup>2</sup>, 1.7 mm thickness, or as approved by the Engineer.
- .4 GROUT - Concrete grout shall be 15 MPa compressive strength at 28 days, with sand aggregate of a consistency to ensure total penetration to fill voids in the riprap

## **Part 3 Execution**

### **3.1 RIPRAP BEDDING**

- .1 Riprap bedding shall be placed to the limits and dimensions as shown on the plans and as described in the Special Provisions or as directed by the Engineer. The Contractor shall place the riprap bedding in such a manner so as to prevent the intrusion of clay or silt into the bedding material. The bedding material shall be placed in a lift or lifts of uniform thickness. Rutting or displacement of the

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surface upon which the bedding is to be placed or of the surface of the bedding will not be permitted.

### **3.2 FILTER FABRIC**

- .1 Filter fabric shall be placed in a sequence approved by the Engineer. A minimum of 600 mm of overlap is required on all abutting lengths of filter fabric. The filter fabric shall be placed in accordance with the manufacturer's recommendations.

### **3.3 RIPRAP**

- .1 Riprap shall be placed in the locations and to the depth and elevations shown on the plans. The larger boulders shall be uniformly distributed and the smaller boulders and cobble shall fill the spaces in between resulting in a well-keyed, void free and stable surface. The placement operation shall be such that the riprap bedding and/or filter cloth shall not be dislodged or torn during installation.

### **3.4 GROUTED RIPRAP**

- .1 Placing of the stone riprap shall be in accordance with Section 3.3.
- .2 The concrete sand grout shall then be vibrated or rodded to ensure that the voids between the stones are filled, resulting in total penetration and worked such that the top surfaces of the exposed stones are not covered by grout. The finished surface shall present an even, closed surface, with at least fifty (50%) percent of the rocks on the surface projecting approximately 25 mm to 100 mm above the specified thickness. The grout layer shall be a minimum of 300 mm in thickness or greater as shown on the Drawings.
- .3 The outside perimeter of the riprap shall be constructed using a vertical formed edge equal to the depth of the grout layer. After initial set of the grout, the portion of the rocks projecting above the grout layer shall be thoroughly cleaned of all grout, to the satisfaction of the Engineer.
- .4 Expansion joints shall be constructed where the riprap is placed against any structure, or where directed by the Engineer. A 13 mm thick fibre joint filler shall be installed in expansion joints. The fibre joint shall extend from the base of the grout layer up to 13 mm below the grout surface. A bond breaker, as approved by the Engineer, shall be placed along the bottom of the 13 mm deep by 13 mm wide

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notch, and the top shall be filled with flexible joint sealant in accordance with the manufacturer's recommended procedures, as approved by the Engineer

### **3.5 ANCHOR TRENCH**

- .1 Anchor trenches shall be excavated in side slopes at locations where riprap is to be placed. The trenches shall be 500 mm deep by 500 mm wide. Geotextile shall be placed with the initial roll end at the top of the slope within the anchor trench.

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