

## **PART 1 - GENERAL**

### **1.1 DESCRIPTION**

- .1 This section specifies requirements for supply and placing armour stone, filter stone, stone barricades, and rock scour protection for erosion protection at locations and to dimensions indicated on drawings or designated by Departmental Representative.

### **1.2 RELATED SECTIONS**

- .1 Section 31 23 25 - Rock and Gravel Fill.
- .2 Section 31 32 21 - Geotextiles.

### **1.3 MEASUREMENT FOR PAYMENT**

- .1 Rock Scour Protection: Supply and placement of rock scour protection, including the cost of all plant, labour, equipment, divers and materials required to complete the work as specified, will be measured by the cubic meter (CMPM). The volume of material will be determined in place from measurements taken prior to and at completion of the work.
- .2 Filter Stone Protection: Supply and placement of filter stone, including the cost of all plant, labour, equipment, and materials required to complete the work as specified, will be measured by the cubic meter (CMPM). The volume of material will be determined in place from measurements taken prior to and at completion of the work. Include incidental to this unit price all costs associated with the supply and installation of geotextile, as detailed on the drawings.
- .3 Armour Stone Protection: Supply and placement of armour stone, including the cost of all plant, labour, equipment, and materials required to complete the work as specified, will be measured by the cubic meter (CMPM). The volume of material will be determined in place from measurements taken prior to and at completion of the work.
- .4 Stone Barricades: No measurement for payment to be made under this Section for the re-use of existing and installation of new stone barricades, to the limits shown on the drawings. Include all costs, including all plant, labour, equipment and materials required to complete the work as specified in the lump sum price arrangement.

## **PART 2 - PRODUCTS**

### **2.1 ROCK MATERIAL**

- .1 Hard, dense with relative density (specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects.
- .2 Absorption, 1.5 to 2.0% maximum as determined by ASTM C127 test procedure.
- .3 Durability, less than 35% abrasion Wear, ASTM C535 test procedure.
- .4 Sulphate Soundness Determination maximum 12% by ASTM C88.

### **2.2 ROCK SCOUR PROTECTION**

- .1 Stones to be used as rock scour protection will weigh 200kg (450mm ø) as shown on the drawings. Additional, appropriately sized rocks to fill all gaps/voids as required and to approval of Departmental Representative.
- .2 Field stones of appropriate sizes are acceptable for hand-placed stone.

### **2.3 FILTER STONE**

- .1 Stones to be used as filter stone will weigh not less than 200 kg or more than 400 kg.
- .2 Supply rock spalls to fill open joints.
- .3 Field stones of appropriate sizes are acceptable for hand-placed filter stone.
- .4 Greatest dimension of each stone not to exceed two (2) times the least dimension.

### **2.4 ARMOUR STONE**

- .1 Stones to be used as armour stone will weigh not less than 2 tonne or more than 3 tonne.
- .2 Supply rock spalls to fill open joints.
- .2 Field stones of appropriate sizes are acceptable.
- .3 Greatest dimension of each stone not to exceed one and half (1.5) times the least dimension.

**PART 2 - PRODUCTS  
(CONT'D)**

**2.5 STONE BARRICADE**

- .1 Stones to be used as barricades will weigh 2.0 tonnes, as shown on the drawings.
- .2 Field stones of appropriate sizes are acceptable.
- .3 Greatest dimension of each stone not to exceed one and half (1.5) times the least dimension.

**PART 3 - EXECUTION**

**3.1 PLACING**

- .1 Place rock stones as directed to thickness and details indicated on drawings or as designated by Departmental Representative.
- .2 Where stones are to be placed on slopes, ensure that fill is placed to the slopes as indicated on the drawings.
- .3 Fine grade area to be protected to uniform even surface. Fill depressions with suitable material and compact to provide firm bed.
- .4 Place stones in manner approved by Departmental Representative to secure surface and a stable mass. Place larger stones at bottom of slopes.
- .5 Hand Placing:
  - .1 Use larger stones for lower courses and as headers for subsequent courses.
  - .2 Stagger vertical joints and fill voids with rock spalls or cobbles.
  - .3 Finish surface evenly, free of large openings and neat in appearance.
- .6 Stones shall be carefully placed to give a thickness perpendicular to slope as indicated on drawings. Side slopes to be 1.5 horizontal to 1.0 vertical, as indicated on the drawings.
- .7 Machine place stone barricades in locations as shown on the drawings, and in a manner approved by the Departmental Representative.

**PART 3 – EXECUTION  
(CONT'D)**

**3.1 PLACING  
(CONT'D)**

- .8 Scour protection: There will be no tolerance for scour protection above the elevation indicated on the drawings (i.e. if -4.5 m is shown for top of scour protection, -4.4 m or anything above, will not be accepted). Tolerance below the elevation indicated on the drawings will be 100 mm (i.e. if -4.5 is shown for top of scour protection, -4.6 m will be accepted).
- .9 Scour protection to be installed such that there are no gaps/voids between rocks and along face of cribwork. If necessary, with the use of divers, fill all gaps/voids with appropriately sized rocks to approval of Departmental Representative. Ensure rocks do not extend up pass top of scour protection elevation indicated.

**3.2 TESTING**

- .1 Submit rock materials samples for testing to testing laboratory appointed by the Departmental Representative prior to commencement of quarry production. Allow sufficient lead time to perform and report tests before start of production.
- .2 Contractor will be responsible to arrange and pay for shipment of samples to testing laboratory.
- .3 Departmental Representative will pay for all costs associated with laboratory testing of proposed rock materials. The cost of re-testing due to samples failing to meet the requirements of the contract will be borne by the Contractor.
- .4 Only materials satisfactorily tested and approved by the Departmental Representative will be quarried and placed in the work.