

ITEM 11583.2001 M - STABILIZE ROCK SLOPE WITH SHOTCRETE

(Square Meters)

ITEM 11583.2002 M - STABILIZE ROCK SLOPE WITH SHOTCRETE (Cubic Meters)

ITEM 11583.2003 M - STABILIZE ROCK SLOPE WITH SHOTCRETE (Bags)

DESCRIPTION. Remove all loose rock, prepare the surface, apply shotcrete and dispose of all debris according to the Contract Documents or as directed by the Engineer.

MATERIALS. Blended portland cement, microsilica, fly ash and/or synthetic fiber may be used to enhance the properties of shotcrete for either the Dry Mix or Wet Mix Process, subject to approval of the mix design by the Director, Materials Bureau. Submit the proposed mix design (include fiber information and method of dispersal, if proposed) to the Engineer at least 10 working days prior to use.

Portland Cement	§701-01
Blended Portland Cement	§701-03
Concrete Sand	§703-07
Coarse Aggregate	§703-02
Wire Fabric for Concrete Reinforcement	§709-02
Admixtures	§711-08
Fly Ash	§711-10
Microsilica	§711-11
Water	§712-01

Prebagged Shotcrete Material - Commercially manufactured, microsilica enhanced, prebagged shotcrete material, with all dry ingredients in the bag.

Synthetic Fiber - Submit the Manufacturer's descriptive and test data, circumstances for use, quantity proposed for use and method of dispersal.

Wire Fabric for Concrete Reinforcement - §709-02 and certified to meet the following:

1. Galvanized according to ASTM A641, regular coatings
2. Fabricated from No. 12 wire spaced 50 mm (nominal) in each direction or No. 10 wire spaced 75 mm (nominal) in each direction
3. Minimum wire yield strength of 240 MPa.

Wire Fabric Anchor System:

Expansion Bolt Anchors - Type 2 or 3, single or double-end expansion sleeve meeting U.S. Government G.S.A. Specification No. AA 1922A

Bolts Inserted in Expansion Bolt Anchors - hook-type bolt meeting ASTM F568M, Carbon and Alloy Steel Externally Threaded Metric Fasteners, Property Class 4.6

Quality Control Sample Panels - Make to determine physical quality of the applied shotcrete:

1. Immediately before shotcreting operations begin, and
2. Whenever operators or other significant changes in the operation occur, as determined by the Engineer.

Erect a "sample panel" horizontally, vertically, or overhead, to represent the anticipated project shooting positions. Shoot the "sample" on any suitable surface, including firm ground. Break this sample open as soon as practical, in a manner approved by and in the presence of the Engineer, and inspect for deficiencies (voids, sand pockets, etc.). If

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problems exist, correct them and verify by making more sample panels. Individual, isolated voids less than 25 mm in any direction, as determined by the Engineer, are acceptable.

CONSTRUCTION DETAILS.

Rock Surface Preparation. Clean the rock surface to the satisfaction of the Engineer.

If shown on the Contract Documents, install weeps or drains as shown, or as directed by the Engineer.

Attach wire fabric by means of anchored hook type bolts spaced as per Table 1.

Drill holes in the cleaned surface to the diameter and depth recommended by the Manufacturer of the anchors. Install anchors in the holes, and attach the proper length hook-type bolts tight to the anchors.

Install wire fabric in sheets sized to the area, following the contour of the surface at the required depth. Maintain a minimum clearance of 25 mm between the wire fabric and the cleaned surface. Tie the wire fabric tight to the hook-type bolts, or as shown in the plans.

Overlap adjoining wire fabric sheets a minimum of 100 mm and tie together every 300 mm or less.

Install wire fabric every 100 mm in areas 150 mm or greater in thickness. Cover the innermost layer with shotcrete prior to installation of the next layer.

TABLE 1
SIZE AND SPACING OF HOOK TYPE BOLTS

Thickness of Placement (mm)	Underside and Vertical Surfaces		Top Surface	
	Nominal Dia. (mm)	Spacing * (mm)	Nominal Dia. (mm)	Spacing * (mm)
50	6	450	6	600
100	10	600	10	900
125	10	530	10	900
150	10	500	10	900
175	10	450	10	900
200	14	580	14	900
225	14	550	14	900
250	14	530	20	600
275	14	500	20	600
300	14	450	20	600

* Bolt diameters may be increased, but not decreased, and spacing may be decreased, but not increased, both at no additional cost.

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Preparation of Materials.

Dry and Wet Mix Process. Use 1 part cementitious material to 3 - 4½ parts sand. Measure by volume or weight (based on volume). Use batch boxes approved by the Engineer, or a proportioning plant approved according to Section 501, Portland Cement Concrete - General. Other methods of measuring will not be allowed.

Dry Mix Process - dry cementitious material and damp sand mixture carried by compressed air to the nozzle where water is injected, and the resulting mixture is jetted onto a prepared surface.

- Maintain the moisture content of the sand between 3 and 6%.
- A wetting agent may be used, as approved by the Engineer.
- Apply mixtures within 75 minutes of sand-cementitious material contact.

Wet Mix Process - low slump concrete conveyed to a nozzle and jetted onto a prepared surface.

- Slump - 25 to 75mm.
- Air Content - 6 to 10% (before shooting).
- An Approved List water reducing admixture, Type A (Normal), may be added.
- The total weight of the sand may be extended up to 30% with No 1A aggregate.
- Premix all materials, including water, according to §501-3.03, Handling, Measuring and Batching Materials, and §501-3.04, Concrete Mixing, Transporting and Discharging - General Requirements.

Prebagged Material - Follow the Manufacturer's instructions.

Shotcrete Placement.

A. Application.

Provide shotcrete placement and contouring acceptable to the Engineer.
Do not apply to a frozen surface or one containing snow or ice.

B. Weather Conditions. Shotcrete application will not be allowed when:

1. Precipitation can cause the placed shotcrete to run.
2. Wind disrupts the nozzle spray.
3. Ambient air temperature is below 7°C.

C. Finishing. No special finish is required, unless otherwise specified by the Contract Documents.

D. Curing. §555-3.09, or as approved by the Engineer.

METHOD OF MEASUREMENT.

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- Item 11583.2001M - will be for the number of square meters as shown on Contract Documents or as delineated by the Engineer prior to application.
- Item 11583.2002M - will be for the number of cubic meters as shown on Contract Documents or as agreed to by the Engineer prior to application.
- Item 11583.2003M - will be for the number of bags incorporated into the work, based on 25 kilograms per bag (for other weights, calculate into 25 kilogram bags for payment).

BASIS OF PAYMENT. Include in the item unit bid price the cost of furnishing all labor, materials, sample panels and equipment to complete the work.

This Specification is
DisApproved.