

**8-16 CONCRETE SLOPE PROTECTION**

**8-16.1 Description**

This Work consists of constructing concrete slope protection, in accordance with these Specifications and the details shown in the Plans, at the locations and in conformity with the lines, grades, and dimensions as staked.

Concrete slope protection shall consist of reinforced cement concrete poured or pneumatically placed upon the slope with a rustication joint pattern or semi-open concrete masonry units placed upon the slope closely adjoining each other.

**8-16.2 Materials**

Materials shall meet the requirements of the following sections:

<u>Commercial</u> Concrete	6-02.3(2)B	
Concrete Slope Protection	9-13.5	
Semi-Open Concrete Masonry Units Slope Protection	9-13.5(1)	
Poured Portland Cement Concrete Slope Protection	9-13.5(2)	
Pneumatically Placed Portland Cement Concrete Slope Protection	9-13.5(3)	

**8-16.3 Construction Requirements**

**8-16.3(1) Footing and Preparation of Slope**

The footing for the slope protection shall be constructed in accordance with Sections 2-09 and 6-02.

The construction of the footing will be incidental to the slope protection, and no separate measurement or payment will be made.

The surface on which application is to be made shall be thoroughly compacted and neatly trimmed to line and grade as necessary to conform to the detail in the Plans.

**8-16.3(2) Placing Semi-Open Concrete Masonry Units**

The concrete masonry units shall be placed in a uniform plane and in such a manner that they rest firmly and evenly against the slope with no rocking. The concrete masonry units shall be placed in horizontal parallel courses, and successive courses shall break joints with the preceding course to form a running bond.

**8-16.3(3) Poured in Place Cement Concrete**

The wire mesh shall lap a minimum of 1 mesh spacing, and laps shall be securely fastened at the ends. During the placement of the concrete, the reinforcement shall be held so as to provide a minimum of 1¼-inch of cover.

Where commercial concrete is to be placed upon the slope, the method of depositing and compacting shall result in a compact, dense, and impervious concrete which will show a uniform plane surface.

The newly constructed concrete shall be finished by means of a wood float and shall be striated with a rustication joint as shown in the Plans.

Curing shall be performed in accordance with Section 5-05.3(13).

**8-16.3(4) Pneumatically Placed Concrete**

**Workers.** Only workers experienced in pneumatically placed concrete shall be employed; and satisfactory evidence of such experience shall be furnished when requested by the Engineer.

**Equipment.** The Contractor shall furnish the Engineer with 2 copies of the manufacturer's Specifications and operating instructions for the equipment used. Before placement of any portion of the slope protection, the type of equipment and method of operation shall be approved by the Engineer.

**Proportions of Materials.** The sand/cement ratio shall be 4½-parts sand to 1 part cement based on loose dry volume.

Water shall be maintained at a constant pressure that shall be at least 15-PSI above atmospheric pressure at the nozzle. For lengths of hose up to 100-feet, pneumatic pressure at the gun shall be 45-PSI or greater. Pressure shall be increased 5-PSI for each additional 5-feet of hose required. A steady pressure shall be maintained.

**Method of Application.** Portland cement and sand shall be mixed dry, passed through a cement gun and conveyed by air through a flexible tube, hydrated at a nozzle at the end of the flexible tube, and deposited in place by air pressure.

All surfaces are to be wetted, but application shall not be made on any surface on which free water exists.

**Reinforcement.** The wire mesh shall lap a minimum of 1 mesh spacing, and laps shall be securely fastened at the ends. During the placement of the concrete, the reinforcement shall be held so as to provide a minimum of 1¾-inch of cover at the recess.

**Finishing.** The newly constructed concrete shall be finished by means of a wood float and shall be striated with a rustication joint as shown in the Plans.

**Curing.** Curing shall be in accordance with Section 5-05.3(13).

**Protection of Facilities.** During the construction, the Contractor shall protect all retaining walls, columns and Structures from concrete splash or overspray. Suitable covering shall be provided if such protection is deemed necessary by the Engineer.

**Test Cylinders.** Two test cylinders shall be made for each full day's operation. The Contractor shall furnish cylinders 6-inches in diameter and 12-inches high made of ¾-inch mesh hardware cloth. The test cylinder shall be filled with concrete by utilizing the same pneumatic application described above.

The cylinders shall develop a minimum compressive strength of 3,000-PSI at the age of 28-days.

**8-16.4 Measurement**

Measurement for concrete slope protection will be by the square yard and will include the actual area of the slope covered excluding the footings. The area will be computed on the basis of slope measurements.

**8-16.5 Payment**

Payment will be made in accordance with Section 1-04.1, for the following Bid item when included in the Proposal:

“Conc. Slope Protection”, per square yard.