

SPECIFICATIONS - DETAILED PROVISIONS
Section 02271 - Grouted Rip-Rap

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**SECTION 02271
GROUTED RIP-RAP**

PART 1 - GENERAL

1.01 DESCRIPTION

Requirements specified in Conditions of Contract form a part of this Section. The work of this Section includes all labor, machinery, construction equipment and materials to install grouted rock rip-rap as shown on the Drawings and as herein specified.

- A. Work Included in This Section. Principal items are:
 - 1. Rock rip-rap
- B. Related Work Not in This Section.
 - 1. Clearing
 - 2. Earthwork
 - 3. Trenching, backfilling and compaction
 - 4. Concrete

1.02 SUBMITTALS

Before delivery of materials, certified copies in duplicate of the reports of all material tests shall be submitted to the District. All sampling and testing shall be performed by an approved independent commercial testing laboratory.

PART 2 - PRODUCTS

2.01 MATERIALS

Provide materials conforming to the following requirements.

- A. General. All rock products shall be clean, hard, sound, durable, uniform in quality and free from any detrimental quantity of soft, friable, thin elongated or laminated pieces, disintegrated material, organic matter, oil alkali, or other deleterious substance.
- B. Rock Rip-Rap Material. The requirements for rock rip-rap shall be as follows.
 - 1. General. Rock rip-rap shall be angular quarrystone. Rock shall be dense, sound, resistant to abrasion and free from cracks or weak cleavage planes. Rock shall be

of such character that it shall not disintegrate from the action of air, water or from conditions to be met during handling and placing.

2. Gradation. The individual classes of rock used in grouted rock slope protection shall be as called out on the Drawings. Individual fragments of rock shall have a thickness which is not less than one-third of the length of the rock. The classes of rock shall comply with the following gradation:

GRADING OF CONCRETED-ROCK SLOPE PROTECTION
Percentage Larger Than* Classes

<u>Rock Sizes</u>	<u>Light</u>
1/4-Ton	0-5
200-LB	50-100
75-LB	90-100

Minimum Penetration of Concrete is ten (10) inches.

* The amount of material smaller than the smallest size listed in the table for any class of concreted-rock slope protection shall not exceed the percentage limit listed in the table determined on a weight basis.

Compliance with the percentage limit shown in the table for all other sizes of the individual pieces of any class of concreted-rock slope protection shall be determined by the ratio of the number of individual pieces larger than the specified size compared to the total number of individual pieces larger than the smallest size listed in the table for that class.

3. Tests. The rock shall also conform to the following quality requirements:

<u>Tests</u>	California <u>Test</u>	<u>Requirement</u>
Apparent Specific Gravity 206	2.5 Min.	
Absorption	206	4.2 Max.*
Durability Index	229	52 Min.*

$$\frac{\text{Course Durability Index}}{\% \text{ Absorption} + 1} = \text{Durability Absorption Ratio (DAR)}$$

* Based on the formula contained herein, absorption may exceed 4.2 percent if DAR is greater than 10. Durability Index may be less than 52 if DAR is greater than 24.

- C. Grout. Grout for grouted rip-rap shall comply with Class B concrete as defined in Section 03300. The water content of the concrete shall be such as to permit gravity flow into the interstices with limited spading and brooming.

PART 3 - EXECUTION

3.01 GENERAL

Place grouted rip-rap to the lines and grades as shown on the Drawings.

3.02 ROCK PLACEMENT

A footing trench shall be excavated along the toe of the slope as shown on the plans. Rocks shall be so placed as to provide a minimum of voids and the larger rocks shall be placed in the toe course and on the outside surface of the slope protection. The rock may be placed by dumping and may be spread in layers by bulldozers or other suitable equipment.

Local surface irregularities of the slope protection shall not vary from the planned slopes by more than one foot measured at right angles to the slope.

At the completion of slope protection work, the footing trench shall be filled with excavated material and compaction will not be required.

3.03 PLACING CONCRETE

The surfaces of the rock to be concreted shall be cleaned of adhering dirt and clay and then moistened. The concrete shall be placed in a continuous operation for any day's run at any one location. Concrete shall be brought to the place of final deposit by use of chutes, tubes, or buckets, or may be placed by means of pneumatic equipment or other mechanical methods. In no case shall concrete be permitted to flow on the slope protection a distance in excess of ten (10) feet.

Immediately after depositing, the concrete shall be spaded and rodded into place with suitable spades, trowels or other approved means until the minimum penetration is that shown in the rock gradation table.

After the concrete has been placed, the rocks shall be thoroughly brushed so that their top surfaces are exposed. The outer rocks shall project 1/3 to 1/4 their diameter above the concrete surface. After completion of any 10 foot strip, no workman or load shall be permitted on the surface for a period of at least 24 hours and longer if so ordered by the District.

Concrete shall be cured as provided in Section 03300.

END OF SECTION 02271

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