

SECTION 02273

RIPRAP

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Furnish and install riprap for slope protection and erosion control where indicated on the Drawings or specified

B. Additional Requirements Specified Elsewhere

1. Section 01340: Shop Drawings, Product Data, and Samples
2. Section 01400: Quality Control

C. Related Requirements Specified Elsewhere

1. Section 02200: Earthwork
2. Section 02270: Sediment and Erosion Control
3. Section 02271: Soil Stabilization and Filter Fabrics
4. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition

1.2 QUALITY ASSURANCE

A. Riprap shall be of consistent quality

B. Engineer shall have access to quarry sites and quarries at all times

C. Changes in riprap source, including location and/or quality, will require the performance and submittal of new, certified test reports at Contractor's expense

D. Test samples representative of material delivered to project site

E. Riprap not conforming to requirements of Specifications, as determined by tests and/or observation at the quarry or project site, will be rejected

F. Deliver and stockpile as necessary to eliminate unnecessary fracturing of material and to prevent segregation or contamination with other materials

1.3 SUBMITTALS

A. Perform and submit certified test reports in accordance with specific standards set forth hereafter

- B. Test reports shall include as a minimum
 - 1. Source of riprap materials
 - 2. Type of material (igneous, limestone, etc.)
 - 3. Gradation
 - 4. Specific gravity, ASTM C127
 - 5. Sodium sulfate soundness, ASTM C88
 - 6. Los Angeles abrasion value, ASTM C131
- C. Costs for testing of materials proposed for use to be borne by Contractor
- D. Refer to Section 01340 - Shop Drawings, Product Data, and Samples for additional requirements

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Riprap
 - 1. Hard, durable, angular stone of approximate cubical shape
 - 2. Free from overburden, shale and organic matter
 - 3. Free from cracks, seams and other defects which would unduly increase destruction by water and frost actions
 - 4. Neither breadth nor thickness of a single stone should be less than one-third its length
 - 5. Conform to the following properties
 - a. Size of riprap as referenced on Drawings
 - b. Specific gravity (minimum): 2.5
 - c. Sodium sulfate soundness value, less than: 10%
 - d. Los Angeles abrasion value, less than: 35%
- B. Riprap Bedding
 - 1. Crushed rock with gradation conforming to ASTM C33, gradation No. 67
- C. Geotextile Fabric
 - 1. Refer to Section 02271

2.2 MANUFACTURE

- A. Riprap shall conform to the following gradations:

<u>Stone Size d₅₀</u> ¹	<u>% of Material Smaller Than Typical Stone</u> ²	<u>Typical Stone Dimensions</u> ³
Type L	70-100	15"
9"	50-70	12"
	35-50	9"
	2-10	3"

<u>Stone Size d₅₀</u> ¹	<u>% of Material Smaller Than Typical Stone</u> ²	<u>Typical Stone Dimensions</u> ³
Type M 12"	70-100	21"
	50-70	18"
	35-50	12"
	2-10	4"
Type H 18"	70-100	30"
	50-70	24"
	35-50	18"
	2-10	6"
Type VH 24"	70-100	42"
	50-70	33"
	35-50	24"
	2-10	9"

- ¹ d₅₀ = nominal stone size
² Based on typical rock mass
³ Equivalent spherical diameter

B. Not more than 3% of total material by weight being sand and rock dust

PART 3 - EXECUTION

3.1 GENERAL

A. Furnish all labor, equipment and material necessary to install riprap to the lines, grades and thicknesses indicated on the Drawings

3.2 INSTALLATION

A. Excavate and grade subgrade to a tolerance of ± 0.1 foot of required lines and grades indicated on the Drawings and in accordance with Section 02200 - Earthwork

1. Install geotextile in accordance with Section 02271
2. Install granular bedding material in accordance with Section 02200

B. Installation of Riprap

1. Complete installation of filter fabric and granular bedding material where required prior to installation of riprap
2. Compaction of riprap is not required but place to ensure
 - a. Uniform distribution of larger rock fragments
 - b. Smaller fragments to fill voids between larger fragments
 - c. Well-keyed, densely placed, uniform layer of riprap of specified thickness
3. Do not displace or damage underlying filter fabric or granular bedding material
4. Placement of riprap by mechanical means is acceptable, but
 - a. End-dumping from trucks is not acceptable
5. Tolerances
 - a. ± 0.2 feet of lines and grades indicated on Drawings

6. Hand placement of riprap required only to the extent necessary to obtain the specified results

END OF SECTION