

SECTION 02373

RIPRAP

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Materials and procedures for placing loose riprap, hand-placed riprap, compacted riprap, and plated riprap.

1.2 RELATED SECTIONS

- A. Section 02075: Geotextiles

1.3 REFERENCES

- A. AASHTO M 288: Geotextile Specification for Highway Applications
- B. AASHTO T 96: Resistance to Degradation of Small Size Coarse Aggregate by Abrasion by Impact in the Los Angeles Machine
- C. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

1.4 SUBMITTALS

- A. Submit data showing riprap source gradation, wear and soundness, and placement technique 10 working days before use.
- B. Submit samples for Quality Assurance testing before use.

PART 2 PRODUCTS

2.1 AGGREGATE

- A. Durable, angular, hard, stone that is free from seams, cracks, or other structural defects.
- B. Maximum wear not greater than 40 percent when tested. AASHTO T 96.
- C. Maximum 16 percent weighted loss. AASHTO T 104.
- D. Loose Riprap: Stones graded in size so as to produce a dense mass. The greatest dimension of fifty percent of the stone to be at least two-thirds times, but not more than one and one-half times, the specified thickness of the riprap layer. Not more than ten percent of the rock will have a dimension of less than one-tenth the indicated thickness of the riprap.
- E. Hand-placed riprap: Stones of not less than 3 inches in thickness, with seventy-five percent of stones being at least one-third of a cubic foot in volume.

2.2 ACCESSORIES

- A. When required in the plans, furnish stabilization/separation Geotextile specified in AASHTO M 288 and as approved by the Region Materials Engineer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove all brush, trees, stumps, and other objectionable materials.
- B. Provide a firm foundation by excavating to a dressed uniform surface conforming to the lines and grades shown in the plans.
- C. Do not over-excavate and disturb compacted foundations or undisturbed soils outside of the required lines and grades shown on the plans. Secure approval from Engineer before backfilling or installing geotextiles.
- D. Install required geotextile following Section 02075 and plans.

3.2 LOOSE RIPRAP

- A. Place stones to secure a rock mass, conforming to the grades and dimensions shown on the plans. Distribute and manipulate the stones in a manner that the larger rock fragments are uniformly distributed and the smaller rock fragments serve to fill the spaces between the larger fragments. Place in a manner that results in unsegregated, densely placed, uniform layers of riprap of the thickness indicated on the plans.
- B. Excavate at the toe of the slope and embed riprap as shown in the plans to protect against undercutting.

3.3 HAND-PLACED RIPRAP

- A. Place and bed the stones, one against the other, and key together. Fill irregularities between stones with suitable size stones rammed tightly into place.
- B. Provide an even, tight finished surface, true to the dimensions shown in the plans.
- C. Embed riprap below the ground surface as shown on plans.

3.4 COMPACTED RIPRAP

- A. Place loose riprap conforming to this Section, article 3.2, Loose Riprap where indicated on the plans.
- B. Compact properly placed loose riprap in a manner that results in the development of an unsegregated dense regular tight surface of graded interlocking sizes, true to the dimensions shown in the plans and free from any irregular surface protrusions over 3 inches in height.

3.5 PLATED RIPRAP

- A. Place loose riprap conforming to Section, article 3.2, Loose Riprap where indicated on the plans.
- B. Compact properly placed loose riprap by repeatedly striking the riprap surface with a steel (armor) plate, approximately 5 ft by 5 ft and weighing 6,000 lbs, dropped from a height of 3 to 5 ft.

- C. Compaction is complete when plating action has resulted in a reasonably uniform surface, true to the dimensions shown in the plans and free from any irregular surface protrusions over 4 inches in height.

END OF SECTION