

## SECTION 414

### RIPRAP

#### I. GENERAL

##### 1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, supervision, material (except as herein provided), tools, equipment, supplies, and services; and, shall perform all Work necessary for providing and placing the specified type of riprap in accordance with the requirements of these specifications and in reasonably close conformity to the dimensions, lines, and grades shown in the Contract Documents or as established by the Owner.

##### 1.2 MATERIALS

- A. Riprap shall conform to the requirements of Section 200.
- B. Sand shall conform to the requirements of Section 200. Grading A, B, or C sand may be used in mortared or grouted riprap.
- C. Mortar and grout shall conform to the requirements of Section 200.
- D. Geotextile bedding shall conform to the requirements of Section 200.
- E. Welded wire fabric shall conform to the requirements of Section 200.
- F. The classes of dry riprap shall be as follows:
  1. Class I: Stones shall weigh between 50 and 150 pounds each. At least 60 percent shall weigh more than 100 pounds, and approximately 10 percent may weigh 50 pounds or less.
  2. Class II: Stones shall weigh between 150 pounds to 500 pounds each. At least 50 percent shall weigh more than 300 pounds, and approximately 10 percent may weigh 150 pounds or less.
  3. Class III: Stones shall weigh from 500 pounds to 1,500 pounds each. At least 50 percent shall weigh more than 900 pounds, and approximately 10 percent may weigh less than 500 pounds.
  4. Class AI: Stones shall weigh between 25 and 75 pounds each, except that approximately 10 percent may weigh 25 pounds or less and 10 percent may weigh 75 to 100 pounds.
- G. Dumped riprap is classified according to the following types:
  1. Type I: Core riprap shall be composed of compact angular pieces of derrick stone weighing from 3/4 ton to 2 tons each with an average weight of approximately 1 ton. Approximately 10 percent by weight may weigh less than 3/4 ton.
  2. Type II: Heavy riprap shall be composed of compact angular pieces of derrick stone weighing from 3 to 10 tons each with an average weight of approximately 4 tons.

Approximately 10 percent by weight may weigh less than 3 tons.

- H. Mortared Riprap stone shall be the same size as specified for Dry Riprap, Class II, and shall be selected to obtain fairly large, flat-surfaced stones that will produce a true and even surface with a minimum of voids.
- I. Grouted Riprap for Slopes: Stones shall be of the same sizes and placed in the same manner as specified for Dry Riprap, Class I. Grout shall consist of 1 part hydraulic cement and 3 parts sand, thoroughly mixed with water to produce grout having a thick, creamy consistency.
- J. Erosion Control Stone for Culvert Outlet Protection shall conform to the requirements for Dry Rip Rap Class AI, I, & II respectively of (a) herein for weight.
- K. Erosion Control Riprap

Riprap shall consist of sound, nonerodible shot rock. Erosion control riprap rock shall be not more than 15 inches in its greatest dimension and shall contain a sufficient percentage of smaller rocks to provide a reasonably dense mass with a thickness of at least 8 inches.

- L. Concrete Riprap in Bags shall be either wet or dry mixtures as follows:

- 1. Wet mixture

Riprap shall consist of Class A3 concrete in suitable burlap bags. Bags shall weigh approximately 100 pounds when 2/3 filled with concrete.

- 2. Dry mixture

Riprap shall conform generally to the requirements for wet mixtures except that the mixture shall consist of the dry ingredients and the Owner will not enforce the requirements for water, consistency, and air.

Dry riprap may be in burlap or paper bags. Riprap shall be a rectangular solid enclosure approximately 3 inches in thickness and shall weigh approximately 80 pounds per bag. Paper bags shall be perforated throughout on approximate 1-inch centers and shall be of adequate seal, thickness, and strength to maintain the integrity of the riprap until the concrete mixture sets. Bags shall be biodegradable.

### 1.3 SUBMITTALS

When required by the Owner, the Contractor shall submit certifications in the form of affidavits from the material suppliers, together with supporting data, attesting that the riprap meets specification requirements.

## II. EXECUTION

The Contractor shall execute the Work in accordance with the latest edition of the VDOT *Road and Bridge Specifications*, Section 406.03, Procedures. Any references to "Engineer" or VDOT personnel shall mean the "Owner".

### **III. MEASUREMENT FOR PAYMENT**

The price for the various types of riprap shall include, as appropriate, furnishing and placing riprap, including mortar, grout, welded wire fabric or geotextile bedding material (when not included as a separate pay item) including overlaps when required, mortar or grout; excavation; and granular riprap bedding material. The price shall also include preparing the surface, repair work, and excavating and backfilling toe-ins.

- A. Riprap will be paid for at the contract unit price.
  1. Dry riprap will be measured and paid in square yards of surface area or tons as specified in the Bid form.
  2. Mortared riprap will be measured and paid in square yards of surface area for the type specified.
  3. Grouted riprap will be measured and paid in square yards of surface area or tons as specified in the Bid form.
  4. Dumped riprap will be measured and paid in square yards of surface area or tons as specified in the Bid form.
  5. Concrete riprap in bags will be measured and paid in cubic yards as specified in the Bid form.
- B. Erosion control riprap will be measured and paid at the contract unit price in square yards of surface area or tons for the Class specified on the Bid form.
- C. Erosion Control Stone used for Culvert Outlet Protection will be measured in square yards of surface area or tons for the Class and Standard specified and will be paid for at the contract unit price per square yard or ton.
- D. Incidental items are identified in Section 109.1.2 and, unless otherwise indicated in the Bid form, also include the following:
  1. Erosion and sediment control materials and effort necessary to perform the Work.

End of Section