

SECTION 02291
RIPRAP DITCHES

02291.01 GENERAL

A. Description

Riprap ditches shall include, but not necessarily be limited to, the construction of riprap ditches to the lines and grades shown on the Plans in accordance with the Contract Documents or as directed by the Engineer.

B. Related Work Included Elsewhere

Excavation; Sections 02210, 02220, and 02230.

C. Quality Assurance

1. The Engineer will inspect all materials and work to ensure compliance with the Contract Documents.
2. For the purpose of visually inspecting stone for riprap, the terms "flat" and "elongated" shall be defined as follows:
 - a. A flat piece of stone is one for which the ratio of the width to thickness is greater than four to one.
 - b. An elongated piece of stone is one for which the ratio of the length to width is greater than four to one.

D. Submittals

Certificates of compliance and shop drawings shall be submitted in accordance with the "General Provisions" for all riprap material furnished. The certificate shall state that the stated materials meets the requirements specified herein and list the stone source. Shop drawing submittal shall include product information, handling, installation recommendations and a tabulation of the physical properties for the filter fabric.

02291.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for riprap ditches.

B. Contractor's Options

Not Applicable

C. Detailed Material Requirements

1. General Requirements for Stone

The stone shall be hard, durable, angular in shape, resistant to weathering and to water action; free from overburden, spoil, shale, slate, organic material, and flat and elongated pieces; and shall meet the specified weight requirements.

2. Stone for riprap shall meet the following requirements as specified:

a. Grading by Class:

Class I Riprap: contain individual pieces weighing between 2 pounds and 150 pounds. The total weight of riprap shall contain not more than 10% of pieces smaller than 2 pounds.

Class II Riprap: contain individual pieces weighing between 20 pounds and 700 pounds. The total weight of riprap shall contain not more than 10% of pieces smaller than 20 pounds.

Class III Riprap: contain individual pieces weighing between 40 pounds and 2,000 pounds. The total weight of riprap shall contain not more than 10% of pieces smaller than 40 pounds.

b. Grading by d_{50} Size

Riprap shall be composed of a well graded mixture of stone size so that 50% of the pieces, by weight, shall be larger than the d_{50} size determined by using charts prepared by the US Department of Agriculture, Soil Conservation Service. A well-graded mixture as used herein is defined as a mixture composed primarily of larger stone sizes but with a sufficient mixture of other sizes to fill the small voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d_{50} size.

3. Riprap shall be graded from the smallest to the largest pieces as specified above and will be controlled by visual inspection.

4. Filter Fabric

Fabric shall be furnished in accordance with Section 02295.02, Paragraph 4.

02291.03 EXECUTION**A. Excavation**

Excavation for the riprap ditches and cutoff walls shall be made to the required depth and width in reasonable close conformity to the lines, grades, and typical sections shown on the Plans. The foundation upon which the stone is to be placed shall be even and reasonably smooth.

B. Foundation

1. After the Engineer has approved the excavation, the Contractor shall install the filter fabric over the prepared surface. Securing pins shall be used to anchor the fabric in place. Where fabric overlaps are necessary, the minimum overlap shall be 12 inches.
2. A filter blanket between the filter fabric and the riprap will not be required; however, the Contractor shall exercise care in the placement of riprap stone to prevent puncture of the filter fabric. If the filter fabric is punctured, the riprap stone shall be fully removed for at least three feet outside the limits of the fabric puncture and a new filter fabric patch with minimum overlap, shall be securely fastened over the puncture with securing pins and the riprap stone carefully replaced. No payment will be made for work involved in the repair of Contractor damaged filter fabric.

C. Stone Placement

Stones shall be placed by mechanical or other acceptable methods with a minimum of voids. The stones shall be placed to form a neat and uniform surface area. No mortar will be required.

D. Backfill

All remaining excavated areas along the edges and ends of the placed riprap shall be backfilled with suitable material to blend in with contiguous slopes, ditch lines, or existing ground.

02291.04 METHOD OF MEASUREMENT**A. Riprap Ditches**

Measurement for riprap ditches will be made of the area of the finished surface satisfactorily installed. Area measurements will be made parallel to the foundation on which the riprap is placed.

B. Foundation

Measurement for constructing riprap ditch cutoff walls will be made of the length of cutoff wall satisfactorily constructed, measured along the surface of the ditch.

C. Filter Fabric

No separate measurement will be made for filter fabric.

02291.05 BASIS OF PAYMENT**A. Riprap Ditches**

Payment for riprap ditches will be made at the price bid per square yard. The price bid shall include all excavation, backfill, disposal of surplus materials and furnishing and installing the filter fabric and stone, as well as furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

B. Cutoff Walls

Payment for constructing riprap ditch cutoff walls will be made at the price bid per linear foot. The price bid shall include excavation; backfill; disposal of surplus materials; furnishing and installing all filter fabric and stone; and furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work.

C. Filter Fabric

No separate payment will be made for filter fabric.