

# Construction Specification 461—Rock Riprap

## 1. Scope

The work shall consist of the construction of rock riprap revetments and blankets, including filter or bedding where specified.

## 2. Material

**Rock riprap** shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock shall be angular to sub-rounded in shape with the greatest dimension not greater than 2 times the least dimension. It shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits. Rock density shall be 165 pounds per cubic foot or greater. Rock hardness shall be such that it will not dent when struck with the rounded end of a one pound ball peen hammer, or hardness shall be determined by other methods approved by the NRCS. Unless otherwise specified on the plans riprap gradation shall conform to the specified mix number as follows:

Mix Number	Rock size in inches		
	Maximum	Average D50	Minimum
1	7	4	1
2	9	6	1
3	14	9	1
4	18	12	2
5	23	15	2
6	27	18	3
7	32	21	3
8	36	24	4
9	45	30	4
10	54	36	5

The mix number shall be \_\_\_\_\_.

Before rock is delivered from its source, the contractor shall designate the source from which rock material will be obtained and provide information satisfactory to the NRCS that the material meets design requirements. The contractor shall provide the NRCS technical representative free access to the source for the purpose of visually inspecting the rock and/or obtaining samples for testing. The size and grading of the rock shall be as specified in the construction drawings.

**Filter or bedding aggregates**, when required, shall be composed of clean, hard and durable mineral particles free from organic matter, clay balls or other deleterious substances. The size and grading of the filter or bedding shall be as specified in the construction drawings.

**Geotextiles**, when required, shall conform to the requirements outlined in Construction Specification 495, Geotextile.

## 3. Subgrade preparation

The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved material and shall be compacted to a density equal to the adjacent existing soil material.

Rock riprap, filter, bedding, or geotextile shall not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved by the NRCS.

#### **4. Equipment-placed rock riprap**

The rock riprap shall be placed by equipment on the surface and to the depth specified. It shall be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap shall be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks.

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

#### **5. Hand placed rock riprap**

The rock riprap shall be placed by hand on the surface and to the depth specified. It shall be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock.

#### **6. Filter or bedding**

When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material shall be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate shall be as specified on the construction drawings. The final surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

#### **7. Construction operations**

Construction operations shall be done in such a manner that erosion and air and water pollution are minimized. The owner, operator, contractor or others will conduct all work and operations in accordance with proper safety guidelines for the type of construction being performed.

The completed job shall be workmanlike and provide a good overall appearance.

#### **8. Measurement and payment**

For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap and filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

#### **9. Items of work and construction details**