

CONSTRUCTION SPECIFICATION

61. ROCK RIPRAP

1. SCOPE

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

2. MATERIALS

Rock riprap shall conform to the requirements of Material Specification 523 or, if so specified shall be obtained from designated sources. It shall be free from dirt, clay, sand, rock fines and other materials not meeting the required gradation limits.

At least thirty (30) days prior to delivery of rock from other than designated sources, the Contractor shall designate in writing the source from which rock materials will be obtained and provide information satisfactory to the Engineer that the material meets contract requirements. The Contractor shall provide the Engineer free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in Section 8.

Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

When specified in Section 8 or, when requested by the Contracting Officer, a gradation quality control check shall be made by the Contractor and subject to inspection by the Engineer. The test shall be performed at the work site, in accordance to ASTM D 5519 Test Method B Size, *Size-Range Grading*, on a test pile of representative rock. The weight or size of the test pile shall be large enough to ensure a representative gradation of rock from the source and to provide test results within a five (5) percent accuracy.

Based on a specific gravity of 2.65 (typical of limestone and dolomite), and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are:

Sieve Size of Rock	Approximate Weight of Rock	Weight of Test Pile
16 inches	300 pounds	6000 pounds
11 inches	100 pounds	2000 pounds
6 inches	15 pounds	300 pounds

The results of the test shall be compared to the gradation required for the project. Test pile results that do not meet the construction specifications shall be cause for the rock to be rejected. The test pile that meets contract requirements shall be left on the job site as a sample for visual comparison. The test pile shall be used as part of the last rock riprap to be placed.

Filter or bedding aggregates when required, shall conform to Material Specification 521, unless otherwise specified. Geotextiles shall conform to Material Specification 592.

3. SUBGRADE PREPARATION

The subgrade surfaces 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 materials and shall conform to the requirements of the specified class of earthfill.

Rock riprap, filter, bedding or geotextile shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved.

4. EQUIPMENT-PLACED ROCK RIPRAP

The rock riprap shall be placed by equipment on the surfaces and to the depths specified. The rock riprap shall be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock for riprap shall be delivered and placed in a manner that will ensure that the riprap in-place shall be 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. Some hand placing may be required to provide a neat and uniform surface.

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing will be 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 surfaces and to the depths 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.

Flat slab rock shall be laid on its vertical edge; except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

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 will not be required, but the surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

7. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits will be computed to the nearest ton by actual weight. The volume of each type of filter or bedding aggregate will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. For each load of rock riprap placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to nearest 0.1 ton.

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

Method 2 For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits will be computed to the nearest 0.1 ton by actual weight. The quantity of each type of filter or bedding aggregate delivered and placed within the specified limits will be computed to the nearest 0.1 ton. For each load of rock riprap placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton. For each load of filter or bedding aggregate, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

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

Method 3 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 will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

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

Method 4 For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap, including filter and bedding aggregate, will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

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

Method 5 For items of work for which specific unit prices are established by the contract, the quantity of each type of rock riprap placed within the specified limits will

be computed to the nearest ton by actual weight. For each load of rock for riprap placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

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

Method 6 For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

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

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 8.

No separate payment will be made for testing the gradation of the test pile. Compensation for testing will be included in the appropriate bid item for riprap.