

Section 705. — ROCK

705.01 Gabion and Revet Mattress Rock. Furnish hard, durable rock that is resistant to weathering and reasonably free of organic and spoil material. Conform to the following:

- (a) Coarse durability index, AASHTO T 210 52 min.
- (b) Unit mass of a filled basket 100 pounds per cubic foot min.
- (c) Gradation:
 - (1) Baskets 1 foot or greater in the vertical dimension.
 - (a) Maximum dimension 8 inches
 - (b) Minimum dimension 4 inches
 - (2) Baskets less than 1 foot in the vertical dimension.
 - (a) Maximum dimension 6 inches
 - (b) Minimum dimension 3 inches

705.02 Riprap Rock. Furnish hard, durable, angular rock that is resistant to weathering and water action and free of organic or other unsuitable material. Do not use shale, rock with shale seams, or other fissile or fissured rock that may break into smaller pieces in the process of handling and placing. Conform to the following:

- (a) Apparent specific gravity, AASHTO T 85 2.50 min.
- (b) Absorption, AASHTO T 85 4.2% max.
- (c) Coarse durability index, AASHTO T 210 50 min.
- (d) Gradation for the class specified Table 705-1

**Table 705-1
Gradation Requirements for Riprap**

Class	Percent of Rock by Mass	Mass (pounds)	Approximate Cubic Dimension⁽²⁾⁽³⁾ (inches)
1	20	22 to 33	6 to 8
	30	11 to 22	5 to 6
	40	1 to 11	2 to 5
	10 ⁽¹⁾	0 to 1	0 to 2
2	20	55 to 110	8 to 10
	30	22 to 55	6 to 8
	40	2 to 22	3 to 6
	10 ⁽¹⁾	0 to 2	0 to 3
3	20	220 to 330	14 to 16
	30	110 to 220	10 to 14
	40	11 to 110	5 to 10
	10 ⁽¹⁾	0 to 11	0 to 5
4	20	550 to 770	18 to 20
	30	220 to 550	14 to 18
	40	22 to 220	6 to 14
	10 ⁽¹⁾	0 to 22	0 to 6
5	20	1540 to 2200	26 to 28
	30	770 to 1540	20 to 26
	40	55 to 770	8 to 20
	10 ⁽¹⁾	0 to 55	0 to 8
6	20	1870 to 3530	28 to 34
	30	1100 to 1870	22 to 28
	40	110 to 1100	10 to 22
	10 ⁽¹⁾	0 to 110	0 to 10

(1) Furnish spalls and rock fragments graded to provide a stable dense mass.

(2) The volume of a rock with these cubic dimensions has a mass approximately equal to the specified rock mass.

(3) Furnish rock with breadth and thickness at least one-third its length.

705.03 Rock for Masonry Structures. Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock and has been proven satisfactory for the intended use.

Furnish dimensioned masonry rock free of reeds, rifts, seams, laminations, and minerals that may cause discoloration or deterioration from weathering.

(a) Sizes and shapes. Do not use rock with depressions or projections that might weaken it or prevent it from being properly bedded.

When no dimensions are shown on the plans, furnish the rocks in the sizes and face areas necessary to produce the general characteristics and appearance indicated on the plans.

Unless otherwise specified, furnish rock fragments with the following dimensions:

- | | |
|---|---|
| (1) Minimum thickness | 5 inches |
| (2) Minimum width | 12 inches or 1½ times the thickness, whichever is greater |
| (3) Minimum length | 1½ times the width |
| (4) Rocks with volume \geq 1 cubic foot | 50% min. |

When headers are required, furnish headers with lengths no less than the width of bed of the widest adjacent stretcher plus 12 inches.

(b) Dressing. Remove all thin or weak portions. Dress face rock bed and joint lines to a maximum variation from true line as follows:

- | | |
|-------------------------|-----------------|
| (1) Rubble masonry | 1½ inches |
| (2) Class B masonry | ¾ inch |
| (3) Class A masonry | ¼ inch |
| (4) Dimensioned masonry | Reasonably true |

(c) Bed surfaces. Dress face rock bed surfaces normal to the face to a depth of 3 inches. Beyond that point, the departure from normal may not exceed 1 inch in 12 inches for dimensioned masonry or 2 inches in 12 inches for all other classes.

(d) Joint surfaces. For dimensioned masonry, dress face rock joint surfaces normal to the bed surface. For all other classes of masonry, dress face rock joint surfaces to form an angle with the bed surface of not less than 45 degrees.

Dress face rock joint surfaces normal to the face to a depth of 2 inches. Beyond that point, the departure from normal may not exceed 1 inch in 12 inches.

Do not round corners at the meeting of the bed and joint lines in excess of the following radii:

- | | |
|-------------------------|-------------|
| (1) Rubble masonry | 1½ inches |
| (2) Class B masonry | 1 inch |
| (3) Class A masonry | No rounding |
| (4) Dimensioned masonry | No rounding |

(e) Arch ring rock joint surfaces. Dress ring rock joint surfaces radial to the arch or normal to the front face to a depth of 3 inches. Beyond that point, the departure from the radial or normal may not exceed 3/4 inch in 12 inches.

Dress the back surface adjacent to the arch barrel concrete parallel to the front face and normal to the intrados to a depth of 6 inches. When concrete is placed after the masonry is constructed, vary adjacent ring stones at least 6 inches in depth.

(f) Finish for exposed faces. Remove all drill or quarry marks from exposed faces. Pitch face stones to the line along all beds and joints. Finish the exposed faces as specified in the contract. The following symbols are used to represent the type of surface or dressing specified:

- (1) **Fine pointed (F.P.).** Make point depressions approximately 3/8 inch apart. Limit surface variations to 1/8 inch or less from the pitch line.
- (2) **Medium pointed (M.P.).** Make point depressions approximately 5/8 inch apart. Limit surface variations to 1/4 inch or less from the pitch line.
- (3) **Coarse pointed (C.P.).** Make point depressions approximately 1¼ inches apart. Limit surface variations to 3/8 inch or less from the pitch line.
- (4) **Split or seam face (S.).** Provide a smooth appearance, free from tool marks, with no depressions below the pitch line, and no projection exceeding 3/4 inch beyond the pitch line.
- (5) **Rock faced (R.F.).** Provide an irregular projecting surface without tool marks, concave surfaces below the pitch line, and projections beyond the specified pitch line. For example, the specification "1.50 R.F." means no projections 1½ inches beyond the pitch line. Where a "variable rock face" is specified, uniformly distribute stones of the same height of projection.

705.04 Rock for Special Rock Embankment.

(a) Mechanically-placed embankments. Furnish hard, durable rock that is angular in shape, resistant to weathering, and graded in a well-balanced range conforming to Table 705-2.

**Table 705-2
Gradation for Mechanically-placed Rock**

Percent of Rock Fragments by Mass	Mass (pounds)	Equivalent Cubic Dimension (inches)
50	Greater than 2000	Larger than 28
50	90 to 2000	10 to 28

(b) Hand-placed embankments. Furnish hard, durable rock that is angular in shape, resistant to weathering, and graded in a well-balanced range conforming to Table 705-3.

**Table 705-3
Gradation for Hand-placed Rock**

Percent of Rock Fragments by Mass	Mass (pounds)	Equivalent Cubic Dimension (inches)
75	Greater than 165	Larger than 12
25	90 to 165	10 to 12

705.05 Rock for Buttresses.

(a) General. Furnish hard, durable, angular rock free of organic and spoil material, resistant to weathering and water action. Furnish rock with breadth and thickness at least one-third its length. Conform to the following:

- (1) Apparent specific gravity, AASHTO T 85 2.50 min.
- (2) Absorption, AASHTO T 85 4.2% max.
- (3) Coarse durability index, AASHTO T 210 52 min.

(b) Mechanically-placed buttresses. In addition to (a) above, furnish rock graded in a well-balanced range conforming to Table 705-2.

(c) Hand-placed buttresses. In addition to (a) above, furnish rock graded in a well-balanced range conforming to Table 705-3.

705.06 Stone Curbing.

(a) Stone curb, type I. Conform to the size and shape specified and the following:

Furnish quarried limestone, sandstone, or granite from an approved source. Use one type of stone throughout the project. Do not use stone with visible drill marks on the exposed faces.

Saw or point the top surface of all vertical stone curb to an approximate true plane with no depression or projection on that surface of over 1/4 inch. Pitch the front and back arris lines straight and true. Limit projections or depressions on the back surface to not exceed a batter of 1 inch horizontal to 3 inches vertical.

Saw, point, or smooth quarry split the front exposed face of the vertical stone curb and form to an approximately true plane. Limit projections or depressions on the remaining face distance to 1 inch or less from the plane of the exposed face.

Square the ends of vertical stone curb with the top back and face and finish so when the sections are placed end to end, no space more than 1/2 inch shall show in the joint for the full width of the top surface and for the entire exposed front face. The remainder of the end may break back no more than 4 inches from the plane of the joint. Cut the joints of circular or curved stone curb on radial lines.

The minimum length of any segment of vertical stone curb is 4 feet. However the length may vary where a depressed or modified section of curb is required for driveways, crossings, closures, etc.

(b) Stone curb, type II. Slope stone curb shall conform to the requirements for type I stone curb except as follows:

The maximum allowable projection or depression on a horizontal top surface is limited to 1/2 inch. On other exposed faces, the maximum allowable projection or depression is limited to 1 inch.

For unexposed surfaces, the maximum allowable projection or depression from a true plane on a 2-foot length shall be 3 inches.

The maximum allowable space showing on exposed faces between adjacent segments of slope stone curb is 3/4 inch. The minimum length of any segment of slope stone curb is 2 feet.