

**SECTION M.12
BEARING AREAS
RIPRAP
SLOPE PAVING & SLOPE PROTECTION
WATERPROOFING AND DAMPPROOFING
STONE AND GRANITE SLOPE CURBING
CALCIUM CHLORIDE FOR DUST CONTROL
WOOD**

M.12.01--Bearing Areas : Materials for this work shall conform to the following requirements:

1--Vacant

2--Prefabricated Pads : Prefabricated pads shall consist of cotton duck impregnated with rubber and shall be a single sheet of 3.2 mm minimum thickness with a tolerance of plus 15 percent or minus 5 percent, composed of 227 g duck and high quality natural rubber constructed in five or more plies. The breakdown stress for compression perpendicular to the plane of lamination shall be not less than 76 MPa.

M.12.02--Riprap: Materials for this item shall consist of sound, tough, durable and angular rock, free from decomposed stones or other defects impairing its durability. The size of a stone as hereinafter specified shall be its least dimension. Broken concrete or rounded stones are not acceptable. The type of material to be used shall be as noted on the plans, in the special provisions or as may be ordered by the Engineer.

1. Standard Riprap: This material shall conform to the following requirements:

- (A) Not more than 15 percent of the riprap shall be scattered spalls and stones less than 150 mm in size.
- (B) No stone shall be larger than 760 mm in size, and at least 75 percent of the mass shall be stones at least 380 mm in size.

2. Intermediate Riprap: This material shall conform to the following gradation:

Stone Size	% of the mass
460 mm or over	0
255 mm to 460 mm	30-50
150 mm to 255 mm	30-50
100 mm to 150 mm	20-30
50 mm to 100 mm	10-20
less than 50 mm	0-10

3. Modified Riprap: This material shall conform to the following gradation:

Stone Size	% of the mass
255 mm or over	0
150 mm to 255 mm	20-50
100 mm to 150 mm	30-60
50 mm to 100 mm	30-40
25 mm to 50 mm	10-20

less than 25 mm

0-10

4--Special Riprap: This material shall conform to the gradation of Article M.01.01 for No. 3 stone.

M.12.03--Slope Paving: The stone for this work shall consist of sound, tough, durable rock, free from decomposed stone or other defects impairing its durability. Each piece shall have an area on its exposed surface of not less than 0.2 m² and a thickness not less than 230 mm, except that stone for the two bottom rows shall be of such size that they can be embedded at least 610 mm into the ground; and they shall have a thickness of not less than 305 mm.

Concrete slabs shall conform to the dimensions given above for stone, except that the maximum surface dimensions shall not exceed 3 m in any direction.

The concrete shall conform as regards materials and proportions, to the requirements of Article M.03.01 for Slope Paving Concrete.

M.12.04--Waterproofing: The materials for this work shall conform to the following requirements:

1--Waterproofing Asphalt: For woven glass fabric, the seal coat material shall be an asphalt conforming to ASTM D 449, Type III.

Asphalt flashing cement shall be a compound of asbestos and asphalt conforming to the requirements of ASTM D 2822.

Primer for use with asphalt in waterproofing shall conform to the requirements of ASTM D 41.

2--Fabric: Woven glass fabric saturated with asphalt shall conform to the requirements of ASTM D 1668.

Resin-treated woven glass fabric shall conform to the requirements of ASTM D 1668 and shall be compatible for use with asphalt.

3--Mortar: Mortar shall conform to the requirements of Article M.11.04.

4--Reinforcement: Reinforcement shall conform to the requirements of Article M.06.01.

5--Metal Flashing: Metal flashing shall be of the type and dimensions called for on the plans, and the quality shall be acceptable to the Engineer.

6--Joint Filler: Filler for use in horizontal joints shall be a straight refined petroleum asphalt conforming to the following requirements:

	Min.	Max.
Penetration at 25 °C., 100 gms., 5 sec .	50	60
Flashpoint, open cup method, in °C	232	
Softening point, in °C	49	55
Loss on heating, at 163°C, 50 gms., 5 hrs., %		0.5
Ductility, at 25°C., 5 cm. per min.	85	
Total bitumen (Sol. in carbon disulphide) %	99.5	

Filler for use in vertical joints shall be an asphalt conforming to above specified requirements, to which has been added 20 percent, by mass of asbestos fiber. The incorporation of the asbestos fiber with the asphalt shall be done at the factory of the manufacturer to insure a uniform distribution of the fiber throughout the mix.

M.12.05--Dampproofing: The materials for this work shall conform to the following requirements:

Asphalt for Primer: Asphalt for primer shall conform to ASTM D41.

Asphalt for Seal Coat: The asphalt for seal coat shall meet one of the following:

1. Hot applied asphalt seal coat--ASTM D449, Type 1
2. Cold-applied asphalt seal coat--ASTM D4479, Type 1 (Asbestos Free)
3. Cold-applied emulsified asphalt seal coat--ASTM D1227, Type III or IV

M.12.06--Stone Curbing: The materials for this work shall conform to the following requirements:

1--Granite Curbing: Stone for this work shall be hard and durable granite, fundamentally of light color, of general uniform texture, of smooth splitting appearance, free from seams or imperfections that would impair its structural reliability and containing only such color variations as in the opinion of the Engineer would reasonably be characteristic of the material source. The Contractor shall submit for approval the name of the quarry and the type of curb which the Contractor proposes to use; samples of curbing shall be submitted for approval only when requested by the Engineer. Such submission shall be made sufficiently in advance of ordering so that the Engineer may have an opportunity to judge the stone, both as to quality and appearance. No stone from any other quarry shall be used unless it has been properly approved.

The finish and surface dimensions for the curb shall conform to the following requirements:

The curbstone shall have a top surface free from wind; it shall be pointed, peen-hammered or sawed to an approximately true plane, and shall have no projections or depressions greater than 3.2 mm. The front and back arris lines shall be pitched straight and true.

On the back surface of the curbstone there shall be no projection for 75 mm down from the top which would fall outside of a plane having a batter of 100 mm in 305 mm from the back arris line.

The front face shall be at right angles to the plane of the top and shall be smooth quarry-split, free from drill holes in the exposed face. There shall be no projections greater than 19 mm, or depressions greater than 12.5 mm, measured from the vertical plane of the face through the top arris line for a distance of 200 mm down from the top. For the remaining distance, there shall be no projections or depressions greater than 25 mm measured in the same manner. The arris lines at the ends shall be pitched with no variation from the plane of the face greater than 3.2 mm.

The ends of all stones shall be square with the planes of the top and face and so finished that, when the stones are placed end to end as closely as possible, no space more than 12.5 mm shall show in the joint for the full width of the top or down on the face for 200 mm. On curbstones having a length of 1.8 m or more, the remainder of the end may break back not over 230 mm, whereas on shorter curbstones, they shall not break back more than 150 mm.

If sawed, the curbstones shall be thoroughly cleaned of any iron rust or iron particles.

For straight curbing, 80 percent of the stones shall be furnished in lengths of not less than 1.8 m, and the remaining 20 percent in lengths of not less than 1.2 m, interspersed at random, to allow for closures.

Curbstones to be set on a radius of 30 m or less shall be cut to the curve required, and their ends shall be cut on radial lines. Requirements for length of individual stones in curved curbing vary with radii of curves.

2--Bluestone Curbing: Stone for this work shall be of a good grade, free from structural defects, and shall be approved by the Engineer.

It shall conform to the requirements contained hereinbefore for granite curbing, except that the top surface and the top 200 mm of the front face shall be "fine-pointed" in conformity with the requirements of Article M.11.01 for masonry facing stone.

M.12.07--Granite Slope Curbing: The materials for this work shall conform to the following requirements.

1--Granite Slope Curbing: Stone for this work shall be hard and durable granite, fundamentally of light color, of general uniform texture, of smooth-splitting appearance, free from seams or imperfections that would impair its structural reliability and containing only such color variations as, in the opinion of the Engineer, would reasonably be characteristic of the material source. The exposed face of all curbing shall be smooth, quarry-split to an approximate true plane, and shall have no projections or depressions which will cause over 25 mm to show between a 610 mm straightedge and the face when the straightedge is placed as closely as possible on any part of the face. If projections on the face are more than that specified, they shall be dressed off. The top arris line at the face shall be pitched to a line which shall not show over 25 mm in any direction between the stone and a straightedge the full length of the stone. The bottom arris line at the face shall be pitched so that not over 25 mm shall show between the stone and a straightedge, the full length of the stone, when viewed at right angles to the plane of the face. The ends shall be square to the plane of the face and so finished that when the stones are placed end to end as closely as possible, no space more than 38 mm shall show in the joint for the full width of the face. The arris lines at the ends shall be pitched with no variation from the plane of the face more than 6.4 mm. Drill holes not more than 90 mm in length of 12.5 mm in depth will be permitted. The sides shall not be under the square more than 100 mm, or over the square at the back more than 25 mm.

The straight slope curbing shall be in lengths of not less than 610 mm. The curved slope curbing shall be in lengths of at least 150 mm. The curbing shall have a minimum thickness of 75 mm and a maximum thickness of 150 mm.

When the slope curbing is set adjacent to concrete pavement or gutters, the width of the face of the curbing shall be 300 mm, with a tolerance of plus or minus 12.5 mm. When set adjacent to surfaces other than concrete, the curbing finished shall have a face width of not more than 330 mm and not less than 280 mm.

2--Mortar: The mortar for this work shall conform to Article M.11.04.

3--Gravel Base: The gravel base under the slope curbing shall be gravel fill conforming to Article M.02.03.

M.12.08--Granite Stone Curbing for Bridges: The materials for this work shall conform to the following requirements:

1--Granite Curbing: Stone for this work shall be hard and durable granite, fundamentally of light color, of general uniform texture, of smooth-splitting appearance, free from seams or imperfections that would impair its structural reliability, and containing only such color variations as in the opinion of the Engineer would be reasonably characteristic of the material source. When so directed by the Engineer, the Contractor shall submit samples of the type of curb he proposes to use.

The finish and surface dimensions for the curb shall conform to the requirements shown on the plans.

The ends of all stone shall be jointed square with the planes of the top and face and finished smooth except that, if so noted on plans, the extreme end face of the curbing shall be finished to a radius as shown on the plans.

The minimum length of a stone shall be 1.2 m, except that stones of lengths less than 1.2 m will be so noted on the plans.

The maximum length of stone to be used on horizontal and vertical curves shall be such as to produce the effect of a smooth, continuous curve. Curbs to be set on a radius of 50 m or less shall be cut to the curve required, and their ends shall be cut on radial lines.

Detailed cutting plans or schedule shall be submitted for approval of the Engineer prior to cutting stones.

2--Mortar: The mortar for this work shall conform to Article M.11.04.

3--Metal Anchors: Metal anchors shall be steel conforming to the requirements of Article M.06.01-1 bar reinforcement and shall be thoroughly galvanized by the hot-dip process after fabrication.

M.12.09--Vacant

M.12.10--Calcium Chloride for Dust Control: Calcium chloride shall conform to AASHTO M 144, except that the pellet form and the flake form shall be equally acceptable.

M.12.11--Granite Block for Slope Protection: The granite blocks shall be roughly rectangular in shape, with split or quarry face finish, and uniform in color. The blocks shall be from 560 mm to 660 mm in length, 430 mm to 480 mm in width, and from 127 mm to 152 mm in thickness. The toe stone shall be 380 mm to 430 mm in width and 127 mm in thickness conforming to the requirements of Article M.12.06-1. Granite blocks and toe stones shall be taken from the same approved quarry.

M.12.12--Concrete Block for Slope Protection: Concrete blocks shall be solid, precast, rectangular blocks 406 mm in length, 203 mm in width, and 100 mm in thickness. No dimensions shall differ from the theoretical block size specified by more than 12.5 mm. The blocks shall achieve 21 MPa at 28 days. The concrete mix shall use No. 8 or larger coarse aggregate.

M.12.13--Wood: The materials for this work shall conform to the following requirements and shall have a Material Certificate, Certificate of Compliance and Certified Test Report in conformance with 1.06.07.

1. Wood in contact with or immersed in water, such as piers, docks, ferry slips, boardwalks, warfs, bridges, etc. shall be one of the following: Bongossi, Ekki, or Azobe (Lophira Alata, Lophira Procera), Bonalim (Dinizia Excelsa) or Greenheart (Ocotea Podiaei).

Piles, dolphins, bulkheads or lead-in jetties shall be one of the following: Basralocus (Dicorynia guianensis, Dicorynia paraensis), Greenheart (Ocotea Podiaei) or Bongossi, Ekki or Azobe (Lophira Alata, Lophira Procera) in order of preference.

2. Wood in contact with the ground such as piles, noise-wall or safety wall poles or posts, bulkheads, etc. shall be one of the following: Bongossi, Ekki or Azobe (Lophira Alata, Lophira procera), Bonalim (Dinizia Excelsa), Greenheart (Ocotea Rodiaei), Pressure Treated Southern Yellow Pine or Pressure Treated Douglas Fir-Larch. Pressure treatment shall be CCA in accordance with AWP A P-5, 9.6 kg/m³ or Pentachlorophenol in accordance with AWP A P-9, Type B (L.P.G.), 8.0 kg/m³.
3. Wood in above ground use such as decking, railings, bridges, noise or safety walls and platforms shall be one of the following: Bongossi, Ekki or Azobe (Lophira Alata, Lophira Procera), Bonalim (Dinizia Excelsa) or Greenheart (Ocotea Rodiaei).

Pressure treated wood, where specified shall be No. 1KD or better Southern Yellow Pine or Douglas Fir-Larch. Pressure treatment shall be CCA in accordance with AWP A P-5, 6.4 kg/m³ or Pentachlorophenol in accordance with AWP A P-9, Type B (L.P.G.), 8.0 kg/m³. Pressure treated wood shall be stained or painted in conformance with the plans or special provisions.