

Concrete shall be composed of three parts, by measure, of broken stone, two parts of sharp sand, and one part of fresh Portland cement; or four parts of assorted shingle and gravel, one part of sand, and one part of cement. The stone shall consist of approved hard stone, broken to a  $2\frac{1}{2}$ -inch gauge. The cement shall be of approved brands, and subject to such tests as the Engineer may from time to time direct. The concrete shall be laid in layers not more than 12 inches thick, and well rammed as the work progresses.

Ashlar masonry shall be chisel-dressed on beds and joints and rock-faced in front. The courses are to be at least 12 inches thick, and each superficial yard of face shall be bonded with stones 3 feet 6 inches long. In addition to the above, string courses, coping, and the face of arch stones shall have a chisel draft round the margin. Arch stones are to be dressed to a template and made perfectly true in bed and joint; they shall be the full depth of the arch, and must break bond lengthwise. Dry stone walls shall be built of large flat-bedded stones, and finished on the top with a rough coping of thin stones on edge, bedded in mortar. Where the embankments are more than 6 feet high, the stones used shall have a minimum area of 4 superficial feet on their beds.

Rubble masonry shall be coursed and set in cement mortar. It shall be done bonded together, levelled every 12 or 18 inches in height, and with one good through bonder, formed of stones not less than 3 feet long, to every superficial yard of face. The stones shall in all cases be laid on their natural bed, which must be at least  $1\frac{1}{2}$  times greater than the side, and face-work must have no stone containing less than  $\frac{1}{2}$  of a cubic foot. All spalls are to be set in mortar, and not laid dry under the plea of afterwards grouting; and the work shall be grouted every foot in height. All exposed joints of masonry shall be neatly pointed and keyed with cement mortar, and the tops of walls and arches are to be covered with a coat of cement plaster  $\frac{1}{2}$ -inch thick. The stone used in rubble masonry shall be sound bluestone, breccia, or other building stone of equal quality.

Mortar shall consist of three parts, by measurement, of sharp clean sand, to one part of fresh Portland cement of approved brands; the ingredients of concrete and mortar must all be accurately gauged, and mixed in the presence of the Overseer.

Bricks shall be of the best quality of hard-burned kiln bricks, and specially approved by the Engineer.

Timber shall be straight and sound, and free from shakes, large knots, or other imperfections, and each side of any scantling shall nowhere show less than  $\frac{3}{4}$  heart. Timber in the main and rail beams of bridges is to be ironbark of the best quality. All other shall be totara [*Podocarpus totara*], matai [*Podocarpus spicata*], or other approved timber.

Ironwork shall be made of B.B. Crown iron, or other iron of equal quality, of the dimensions shown; the whole to be finished and fixed in a workmanlike manner. Bolts shown or specified shall have a square head, of which the thickness shall be equal to the diameter of the bolt, and the width twice the diameter of the bolt. They are to be tapped with a good clean thread, and shall have a nut equal in size to the head of the bolt, and shall each be provided with two stout washers at least three times the diameter of the bolt and one quarter the diameter in thickness.

#### RETAINING WALLS.

14. Where shown on longitudinal section and where the ground is steeper than  $1\frac{1}{4}$  to 1 retaining walls of the form and dimensions shown on Drawing No. 5 are to be erected on the outer side of the embankments. The foundations are in all cases to be laid on the solid rock, which is to be benched out at right angles to the face of the wall. Where the embankments are more than six feet high the stones used in the wall shall have a minimum area of six superficial feet.

#### LEVEL CROSSINGS.

15. Nine second and one third-class crossing, with two cattle-stops at each, shall be constructed at public roads where directed. They shall be carefully placed as to line and levels, and finished in strict conformity with the drawing and notes thereon. Each level crossing shall be metalled or gravelled for a length of 66 feet on each side of the centre line as above specified for the roads, and tile or timber box drains shall be put in the formation ditches if necessary for the drainage of the line or road. Twenty pairs of timber gates, as per drawing, shall be provided and hung at private crossings where directed. They are to be furnished with bolts and padlocks. All the timber work above ground shall be cleaned and dressed, and all gates and posts are to receive three coats of paint of approved colours. Four cattle-stops are to be put in where directed, besides those at level crossings. Twenty private crossings, the same as third-class crossings, with guard baulks, but without cattle-stops, and metalled for a distance of 33 feet on each side of the centre line, shall be placed where directed. The metalling is to be the same as specified for district or private roads. Box drains or pipes, as shown in drawing, shall be placed where directed.

#### BRIDGES AND TIMBER OPENINGS.

16. Bridges as per detail drawings shall be erected where shown on longitudinal section. The excavations for the foundations of piers shall be carried down to the depth shown on drawings, or such additional depth as may be necessary to get a sound foundation. Any extra work