

occasioned by additional depth to be paid for at schedule rates. All piles shall be of totara, or matai, and are to be hooped before driving with a 3-inch by $\frac{3}{4}$ -inch wrought-iron hoop. The piles are to be shod with substantial iron shoes, weighing not less than 30 lb. each, securely fixed; the points of the piles to be cut true, and to be squared off at the ends to three inches square, and to have true bearing against the shoes. The timber piers and superstructures of bridges shall be secured with iron bolts and straps as shown. All joints, abutments, shoulders, and sides of tenons and scarfs are to be worked perfectly true, and to fit accurately, and shall be covered with thick red-lead paint before being put together. The lengths of the piles, where shown on the sections of bridge sites, are so figured to show the minimum depth below formation level to which the piles in those cases must be driven; but it is nevertheless hereby provided that in all cases the piles must be long enough to reach what, in the opinion of the Resident Engineer, is a good foundation; and if the length shown on the section is not sufficient to secure this, the Contractor must provide piles of longer length, and he will be paid therefor at Schedule rates. No foundation will be approved of where the piles for the last foot drive more than one foot to each twenty-four blows of a twenty-cwt. ram, with ten-foot fall. All timber in the bridges is to be rough off the saw. The ironwork throughout shall be painted black. Tenons generally to be 6 inches long, and to be drawbored to receive trenails of hardwood made with hollow auger or trenailing machine; trenails to be well seasoned and kept dry, to be $\frac{1}{8}$ inch larger in diameter than the hole bored for them, and to be covered with red-lead before being driven. The trusses shall be erected and maintained with such camber as the Resident Engineer may direct. The Contractor shall provide all proper rods and gauges which the Engineer may require for setting out and testing the dimensions of bridges and timber openings.

CULVERTS AND DRAINS.

17. The culverts shall be of the sizes specified in the longitudinal sections, and of the forms and dimensions shown on the drawings for each kind of culvert; the foundations shall in all cases be carried down to solid ground, and prepared for the upper work to the satisfaction of the Engineer. The walls of the culverts shall be of rubble masonry, or concrete, with coping of brick on edge or concrete covered with cement plaster. The arches and inverters are to be of brickwork turned in rings, but the Contractor will have the option of substituting rubble or concrete, provided the thickness is increased by a fourth. When rubble arches are built of stones more than 6 inches thick, the stones shall be roughly dressed to the radius of the arch, and in all cases the arch stones are to break joint, and be carefully bedded, packed, and grouted. Arches shall be built on centres and in frames approved by the Engineer, and in accordance with such special instructions as may from time to time be given. The two-foot culverts shall be arched or flat-topped at the option of the Contractor; if stone covers are used they must be of a tough and durable kind, and specially approved by the Engineer. Stone covers shall be at least 6 inches thick. The dry stone culverts shall be bonded with headers and stretchers in the same manner as coursed rubble masonry in mortar. The frames of timber culverts shall be accurately mortised and tenoned and pinned; the planking to be securely spiked on the frames: the whole of the timber to be heart of totara or matai. The edging of the planking must fit truly for the whole thickness, and the planks must extend over at least two panels, and break joint as much as possible. All culverts are to be covered with a 9-inch layer of well wrought clay puddle. In addition to those shown on the section, 50 lineal yards each of 12-inch, 9-inch, and 6-inch glazed stoneware pipes, and 50 lineal yards of 12-inch box drains, shall be provided and laid where directed. The pipes are to be of the best manufacture, glazed both sides, well burned, and sound throughout. They shall have socket joints threaded to receive the packing. The box drains shall be made from $1\frac{1}{2}$ inch totara, firmly spiked together. The trenches are in all cases to be cut in the solid, and the pipe or box shall be bedded and encased in well-wrought clay puddle. The joints or pipes are to be set with clay, and their ends protected with stonework or brickwork as shown. Sufficient inlet and outfall drains are to be dug at culverts, and all rocks and stumps occurring in the line of ditch are to be taken out. Such drains to be cut at least half a chain from each end of all culverts.

BALLASTING AND PERMANENT WAY.

18. *Ballast.*—The ballast is to consist of broken stone, shingle, or gravel previously approved, free from all clay and earth. No stones to be larger than $2\frac{1}{2}$ inches in any dimension. It is to be disposed as shown. In all cases the embankments and cuttings are to be cleared from mud or vegetation, and brought to a uniform formation level before the ballast is laid on.

Permanent Way.—The materials for the permanent way, as per special specification attached, are to be provided by the Contractor. They are to be obtained from such makers as the Agent-General for New Zealand may approve, and shall be manufactured under the direct supervision and to the entire satisfaction of the Consulting Engineers of the Government in England; and no permanent way materials shall be shipped without the approval of the Agent-General. The permanent way is to consist of a single line of railway laid to a gauge of 3 feet 6 inches. Throughout the curves the rails are to be laid slack for gauge, the amount of slack being in each case as directed by the Engineer.

Rails.—The rails will weigh 40 lb. to the yard; they will be jointed with fish-plates, weighing about $11\frac{1}{2}$ lb. per pair, and fastened to the sleepers as shown on the drawings. About three thirty-seconds of an inch of space is to be left between the ends of the rails when fixed in place,