

whole of the timber to be heart of totara; the outer side of the planking need not be reduced to the dimensions given, but there must in every case be the full thickness specified of heart timber; the edges of the planking must fit truly for the whole thickness, and the planks must extend over at least two panels, and break joints as much as possible.

Three hundred lineal yards, each of 12, 9, and 6-inch glazed earthenware pipes, and 300 lineal yards of 12-inch box drains, shall be provided, and laid where directed. The pipes are to be of the best manufacture, well burned, and sound throughout, and shall have socket joints threaded to receive the packing. The box drains shall be made from 1½-inch totara, firmly spiked together, and strengthened by 4-inch cross-pieces every 3 feet. The trenches are in all cases to be cast in the solid; and the drain shall be bedded and encased in well-wrought clay puddle, the joints of pipes being laid with clay. Covered drains.

Sufficient catchwater and out-fall drains are to be dug at culverts, and all stumps and roots occurring in the line of ditch to be taken out. Drains at culverts.

BALLASTING AND PERMANENT WAY.

17. The ballasting is to consist of shingle, broken stone, or sand, previously approved, and is to be disposed as shown on Drawing No. 1. In all cases the embankments and cuttings are to be cleared from mud, and brought to a uniform formation level before the ballast is laid on. Ballasting.

The permanent way is to consist of a single line of rails laid to a gauge of 3 feet 6 inches, and sidings provided and laid where directed, amounting in all to two miles of sidings. Permanent way.

The Contractor is to provide and have upon the ground at all points where the work is proceeding a sufficient supply of all such templates, tools, gauges, and other implements as are necessary and are usually required in the laying of permanent way, or as may be required by the Engineer. Gauges.

About three thirty-seconds of an inch of space is to be left between the ends of the rails when fixed in place, or such other space as the Engineer may direct, according to the season. Permanent way.

For the curves, the rails will require bending. This, as well as the straightening of all bent rails, must be effected by a press, and on no account by striking unless by wooden hand-beetles on wooden blocks. In all cases, whether of straightening of bent rails or of bending rails to the necessary curves, the rails must be set permanently to the form required before being laid, and no temporary bending, springing, or straightening, either by dragging with a lever and hook, or by any other means of a like character, will on any account be permitted. Bending rails.

Great care must be taken to lay all the sleepers quite square to the rails on straights, and as near as may be on curves. Where the line is straight, the rails will be level across the line; but where the line is curved, the rails will be canted, the difference of level between the two rails being such as the Engineer shall order. Laying sleepers.

When suitable material for ballast is not found immediately on the line, the sleepers may be laid on formation, being carefully tamped with dry earth. The Contractor will be permitted to run ballast and material trains over the line thus laid at a speed not exceeding ten miles an hour, but the ballasting and lifting must be proceeded with with all possible despatch.

The changes of gradients shall be made by a gradual curve.

Changes of gradients.

There are to be 2,050 sleepers per mile, to be spaced as directed. The following timbers to be used to the extent of not less than 75 per cent. of the whole:—Totara, jarrah, Oregon pine, kauri, and puriri. The remaining 25 per cent. may be of matai (*Podocarpus spicata*) or birch (*Fagus fusca*, or *Fagus Solandri*). They shall be 7 feet long, and 7 inches by 5 inches, all of heart. They are to be flatted top and bottom, true and out of wind; but any extra width beyond 7 inches need not be removed. The rail seats are to be accurately adzed to a correct level. Sleepers.

The rails will weigh 40 lbs. to the yard; they will be jointed with Ibbotson's patent steel clip-joint, weighing about 12 lbs. each joint, and fastened to the sleepers by six fang-bolts to each rail, and two spikes to each sleeper where fang- Rails and fastenings.