

Contractor to supply rods and gauges.

The Contractor shall provide all proper rods and gauges for setting out and testing the dimensions of bridges and timber openings that the Engineer may require.

#### CULVERTS AND DRAINS.

Timber culverts.

13. Timber culverts shall be erected where shown on longitudinal section.

The frames shall be accurately mortised, and tenoned, and pinned; the planking to be securely spiked on to the frames, the whole of the timber to be heart of totara or matai; 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.

Masonry culverts.

Masonry culverts shall be erected where shown on longitudinal section. They shall be of rubble masonry, set in cement mortar, with coping of brick on edge.

Drains at culverts.

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

#### BALLASTING AND PERMANENT WAY.

Ballast.

14. The ballast is to consist of shingle, scoria, broken stones, or sand previously approved of, and is to be disposed as shown in Drawing No. 34. In all cases the embankments and cuttings are to be cleared from mud, and brought to an uniform formation level before the ballast is laid on.

Permanent way.

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 three miles of sidings.

Gauges.

The Contractor is to provide and have upon the ground at all points when 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.

Laying of permanent way.

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.

Bending rails.

For the curves, the rails will require bending. This, as well as the straightening of all bent rails, must be effected by a press, or by striking with 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.

Laying sleepers.

Great care must be taken to lay all the sleepers 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.

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.

Sleepers.

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

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, or puriri. The remaining 25 per cent. may be of matai (*Podocarpus spicata*) or birch (*Fagus fusca* or *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 bevel.

Rails and fastenings.

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-