

## Bolts for cylinders.

The bolts shall have hexagon heads and nuts, and be screwed with threads on the Whitworth pitch. The bolts for bottom and tapering cylinders shall be seven-eighths of an inch diameter, and all other bolts three-quarters.

## Forty-four cylinders to be in odd lengths.

Of the ordinary cylinder, 22 rings shall be cast in seven-foot lengths, and 22 rings in five-foot lengths, to suit irregularities in the sinking of the columns.

## Moulding.

A cast-iron moulding in four segments is to be placed on the top of each column as shown, and connected thereto with  $\frac{5}{8}$  bolts with hexagon heads and nuts.

## Sinking columns.

The piers shall be sunk to the depths shown, and the Contractor may sink them by any method he considers best.

## Concrete in columns.

If the stratum is sufficiently impervious for that purpose, the columns will be pumped dry, and the concrete dropped in from the top; but if this cannot be done, the concrete shall be lowered through the water in buckets, and carefully emptied in its place. Should it be necessary to deposit the concrete in water, its strength shall be increased to 1 of cement to 4 of the other ingredients up to low water level.

## Frames.

The frames in the top of the concrete shall be made of the best heart of totara fastened together with six  $\frac{5}{8}$ -inch bolts in each, and held down by rods passing into the concrete as shown.

## Piling.

The piers of bridges Nos. 2, 3, 6, 7, 8, 9, 10, 11, 12, and 13, shall consist of timber piles driven to the depths shown on Drawing No. 6, or such other depth as may be necessary to get a solid bearing for the superstructure. All piles are to be rung before driving with a 3-inch by  $\frac{3}{4}$ -inch round hoop. The piles are to be shod with a substantial iron shoe, which will be furnished to the Contractor at Dunedin. No pile driving to be commenced at any bridge without giving six days' notice previously to the Engineer in charge of the work.

## Superstructure of bridges.

The lower chord of the girders in the Taieri and Waiholo Bridges shall be of plate iron, of the form and dimensions shown on Drawing No. 5, but the remainder of the superstructure of these bridges, and all the superstructure of Nos. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, and 13, shall be of timber, secured with iron bolts and straps, as shown on Drawings Nos. 7 and 8.

## Joints.

All joints, abutments, shoulders, and sides of tenons and scarfs to be worked perfectly true, and to fit accurately, and to be covered with red lead before being put together. Tenons generally to be 5 inches long, and to be draw-bored to receive trenails of hard wood made with hollow auger or trenailing machine. All trenails to be well seasoned and kept dry, and to be one-sixteenth inch more in diameter than the hole bored for them, and to be covered with red lead before being driven. All capsills and mudsills to be morticed on to the posts or piles. All string pieces to be accurately notched down to capsills or floor beams by notching  $\frac{3}{4}$  inch from each, to be scribed and accurately fitted.

## Contractor to supply rods and gauges.

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

## CULVERTS AND DRAINS.

## Sizes.

16. The culverts to be built on this portion of the Railway shall be of the sizes as shown on Drawings Nos. 1 and 2.

## Stone culverts.

The stone culverts shall be built of rubble, set in cement mortar, except between twenty-five miles and the termination, when lime mortar may be used; the stones shall be schist, blue stone, or hard limestone. Arches shall be of brick, laid in rings, except at the Chain Hill, where stone laid in beds not more than 6 inches thick may be used. All the exposed beds and joints of masonry and brickwork in culverts shall be neatly pointed with cement mortar, and the tops of walls and arches are to receive a coat of cement  $\frac{3}{4}$ -inch thick, the whole being covered with a well-wrought clay puddle.

## Pitching.

The bottom of the culvert is to be pitched with stone, of the depth shown, and of a minimum area of one-half square foot, well packed, pinned, and grouted up with cement mortar. The pitching in the 5 × 3 foot culverts being carried out six feet clear of the entrance.

## Timber culverts.

In all the timber culverts, the frames to be accurately mortised and tenoned and pinned; the planking to be securely spiked on to the frames, the