

## Northumberland Straits Tunnel.

The important question of the size of the tunnel is one which must be decided by two considerations, viz., that of first cost and that of the comparative facilities for the interchange of traffic between the mainland and Prince Edward Island.

The preliminary expenses and the cost of shafts, brickyards, pumping plant, compressed air, electrical and ventilating machinery would not be very materially affected by the size of the main work, and these items together with the cost of engineering and the allowance for contingencies are included in the following approximate estimates for the different sizes of tunnel which, however, are exclusive of land, interest during construction and rolling stock and also exclusive of the cost of the necessary alterations and additions to the railway systems on either side of the straits, which, I am informed, do not come within the scope of my present instructions. I have, however, included the necessary length of land tunnel in Prince Edward Island, leaving only the ordinary above ground extensions to be dealt with separately.

If it were a question of passage of traffic only, this might probably be quite satisfactorily met by the construction of a tunnel having an internal diameter of 11 feet (slightly larger in diameter than the electric subway in London which is carrying a heavy passenger traffic) and operated with special rolling stock, which could, however, be so designed as to run over the existing railways of the 3-6 gauge in the island, so that passengers would only have one change of carriage at the New Brunswick end of the tunnel, a matter of no great importance. Such a tunnel would also accommodate freight cars of special design suitable for all classes of ordinary traffic.

A cross section of such a tunnel showing rolling stock is given in appendix G.

I am informed that the transshipment of potatoes, eggs and fresh fish is objectionable, especially in winter. Exposure to frost could, however, be avoided by running the main line and tunnel cars alongside one another in a freight shed at Money Point, properly warmed for the purpose. By suitable arrangements, of which I have had experience elsewhere, the delay and inconvenience of transshipment can be reduced to a minimum. Against this slight inconvenience must be set the largely enhanced expenditure, not only upon the full sized tunnel, but also upon rolling stock of the 4-8½ gauge, if the island traffic is to run through to its destination without change of car, and such through working would also in all probability involve much empty running in the absence of return freight.

Such a tunnel constructed, as shown in appendix G, in the dry portions of the work of brickwork in cement averaging 1-6" thickness (the bricks being of local manufacture) and where feeders occur with cast iron casing 1¼" in thickness with 6" flanges laid with permanent way, having steel rails weighing 50 lbs. to the lineal yard, I estimate to cost, subject as hereinbefore mentioned, £66-10-0 nearly per lineal yard, or say £897,500 from shaft to shaft, or with the land tunnel and contingencies a total sum of £1,075,200—(at \$5 to the £) \$5,376,000. Should it be decided that the tunnel must be of sufficient dimensions for an ordinary railway of the 4-8½" gauge, and that the railways of the island shall be altered to that gauge a tunnel of 16 feet in diameter would appear to just accommodate passenger and freight cars of the normal Canadian and American type, but not drawing room and sleeping cars, nor some of the cars reported to me as running upon the Intercolonial railway. This size does not allow of a very satisfactory permanent way, nor does it provide proper space for the platelayers.

Such a tunnel constructed in the shale of brickwork in cement, 1'-10½" in thickness and when feeders occur with cast iron casing 1-1½" in thickness with 9 flanges and laid with permanent way having steel rails weighing 70 lbs. to the lineal yard,—I estimate to cost, subject as hereinbefore mentioned, £122-10-0 nearly per lineal yard, or say £1,652,500 from shaft to shaft, or with the land tunnel and contingencies a total sum of £1,971,800—\$9,859,000.

I am of opinion that to properly accommodate the Canadian and American rolling stock generally (exclusive of the special cars on the Intercolonial Railway) the tunnel should have an internal diameter of not less than 18 feet.

Such a tunnel constructed as specified for the 16-foot tunnel, I estimate to cost, subject as hereinbefore mentioned, £140 sterling per lineal yard, or say £1,890,000