

of electric operation and extra cost of maintaining tracks in the tunnel, plus the interest on the cost of building the new double track line, including the cost of electrifying the tunnel, would be less than the cost of operating and maintaining a double track line on the present location plus the interest on the cost of building the second track. The figures would not have been very decisive one way or the other were it not for the fact that there is now $4\frac{1}{2}$ miles of wooden snow sheds on the present location which will be all done away with on the new location. The maintenance and renewals of these sheds cost between \$85,000 and \$100,000 a year. To maintain and renew a double track wooden shed would probably cost at least 50% more than the above, so that with a saving of about \$125,000 a year in maintenance and renewals of snow sheds and a calculated saving in operation and maintenance of \$171,271.22 on a traffic that surely will be reached in the near future, there was no doubt as to the proper course to pursue.

As to the details of figuring economics of railway location, the writer is well aware

speed between 7 and 35 miles an hour:—
 $R = 2.2 T + 121.6 C$
 R = total resistance on level tangent.
 T = total weight cars and contents in tons.

C = total number of cars in train.

This amounts to 4 lbs. per ton to 8 lbs. per ton, depending on whether cars are fully loaded or empty. This is equivalent to a rise of from 10 ft. to 20 ft. per mile. For mixed traffic a conservative estimate is train resistance equals rise of 15 ft. per mile.

It may appear that the rate of 25c. per actual pusher mile covering the cost of repairs and engine crew wages and extra cost of maintenance is too high, but as a matter of fact it is very conservative for the repairs, maintenance and renewals of the locomotives alone will run somewhere between 7c. and 10c. per mile, and we have had cases where the locomotive crew wages alone averaged 25c per mile for the actual mileage run, on account of delays to the pusher.

The foregoing was contributed by Mr. Sullivan to the Cornell Civil Engineer, pub-

Traffic Orders by the Board of Railway Commissioners.

C.P.R. Joint Tariff on Grain.

22989. Dec. 17.—Re Supplement 2 to C.P.R. Joint Tariff on Grain and other Commodities, C.R.C. no. W. 1890, published to become effective Jan. 1, 1915. Upon reading the application of the Taylor Milling & Elevator Co. and the Ellison Milling & Elevator Co., of Lethbridge, Alta., protesting against the proposed cancellation of the joint through rates prescribed by the order 20462, Oct. 2, 1913. It is ordered that that supplement be suspended pending the hearing and determination of the matter by the Board.

Rates on School Crayons.

23007. Dec. 18. Re application of Toronto Board of Trade for an order including school crayons in the stationery list of the Canadian Freight Classification, it is ordered that the application be dismissed.

Rates on Pulpwood to Mechanicville, N.Y.

23020. Dec. 22.—Re Supplement 1 to C.P.R. Competitive Proportional, and Joint

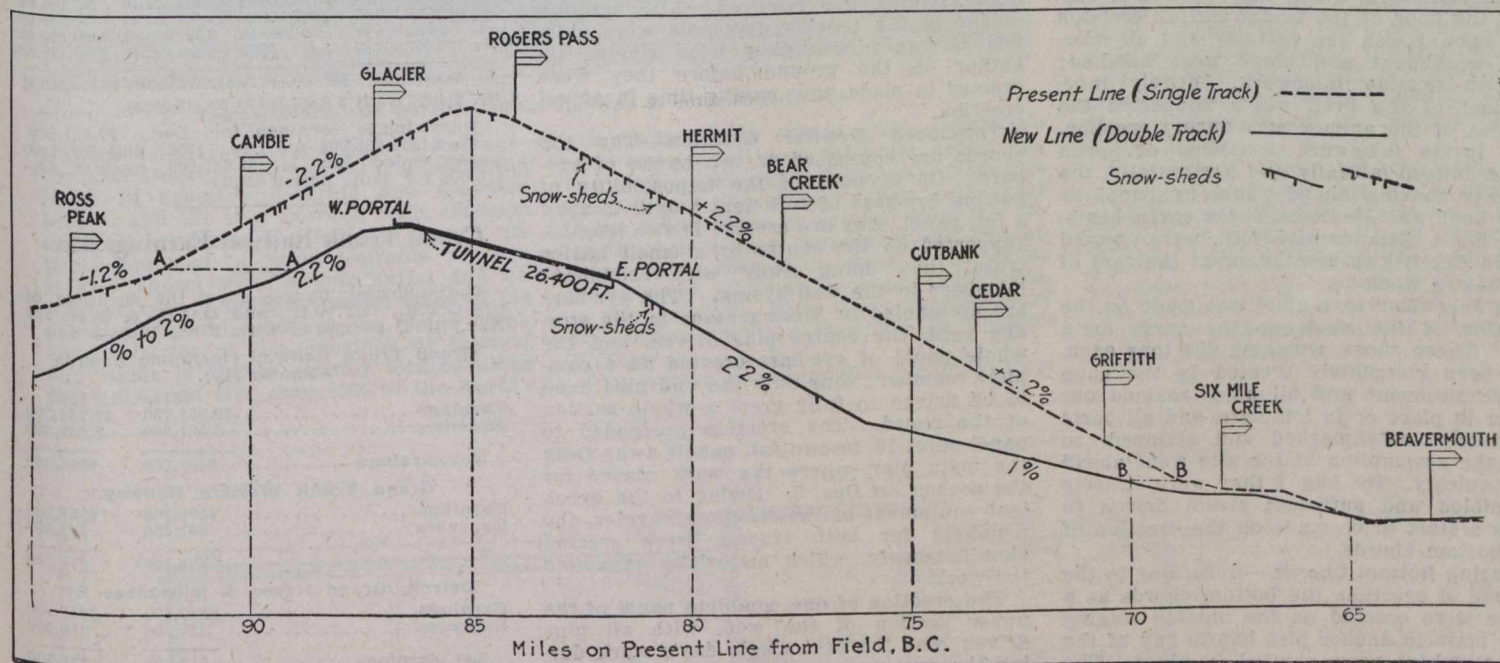


Fig. 2.—Rogers Pass Tunnel. Profile of Old and New Lines.

that it is impossible to devise any method that will show absolutely that saving in cost of operating one line over another, but he believes that the method herein followed, namely, that of comparing cost of fuel on the basis of work done rather than on a train mile or any other unit is much more logical and will give more reliable results than other methods that have been followed. The train mile is possibly the best unit for comparison in cost of wages and for cost of maintenance of equipment. In figuring maintenance of way a fixed sum should be taken, plus a rate per daily train rather than a fixed rate alone per train mile, for the reason that a certain amount of expense must be incurred regardless of whether trains are run or not. The fixed sum of \$200 a mile taken in this problem is probably about one half the actual sum that would be assumed if the entire cost of maintenance was to be included in this fixed sum per mile plus the rate per train mile for the reason that cost of maintenance of terminals and other items are not affected by the details of location between fixed terminals.

Frictional resistance, normal conditions, warm weather, modern freight equipment,

lished by the Association of Civil Engineers of Cornell University, Ithaca, New York, of which Mr. Sullivan is a graduate. Other articles on this tunnel have been published in Canadian Railway and Marine World, as follows:—April, Oct. and Nov., 1913; Jan., June, Oct. and Dec., 1914, and Jan., 1915.

Grand Trunk Railway Secured Notes.—

The G.T.R. issued in London, Eng., in December, a prospectus of £1,000,000 three year $5\frac{1}{2}\%$ secured notes dated Jan. 15, 1915, due Jan. 14, 1918, the issued price being £98 10s. The notes are secured by deposit with the trustee of £1,430,000 G.T.R. perpetual 4% consolidated debenture stock. The proceeds are to be applied to the company's general purposes. The prospectus stated that the net revenue for 1913 showed a surplus after providing for fixed charges of £975,000. The complete figures for 1914 were not available, but although the amount must be reduced owing to the depression of trade, the outbreak of war and the increase in net revenue charges, the net revenue available would cover the interest on the issue many times over. We are officially advised that the issue was fully subscribed.

Freight Tariff on pulpwood, C.R.C. no. E-2847, published to become effective Jan. 4, 1915, in connection with Boston & Maine Rd. Upon reading the application of Auger & Son and the d'Auteuil Lumber Co., both of the City of Quebec, protesting against the proposed increases in the joint through rates on pulpwood, in carloads, from C.P.R. stations south of the River St. Lawrence and east of Montreal to Mechanicville, over the C.P.R. and the Boston & Maine Rd. It is ordered that the said supplement be suspended pending the hearing of the said application at the sittings to be held at Ottawa on Jan. 5, 1915. And it is also ordered that Supplement 16 to G.T.R. Special, Local, Joint, and Proportional Tariff, C.R.C. no. E-2588, published to become effective Jan. 4, 1915, increasing its rates on the same commodity from the same territory to the same points, via Sherbrooke, Quebec, and the Boston & Maine Rd., be suspended pending the hearing aforesaid.

A decided shop economy results from the use of the outside locomotive gear, as repairs to it can be more readily handled in the locomotive house shop.