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Canadian Northern Railway Mount Royal Tunnel.

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The C.N.R. is now operating about 5,000 miles of track in Manitoba, Saskatchewan and Alberta, besides its Eastern lines. It also has about 2,500 miles under construction that when completed in 1914 will make it a transcontinental system, with Vancouver, on the Pacific, and Montreal as its main eastern distributing point. When this work is finished it will be important to have proper terminal facilities already prepared in the main eastern point, and, with this in view, the Canadian Northern Montreal Tunnel & Terminal Co., Ltd., was incorporated to make the necessary developments in and about the city of Montreal.

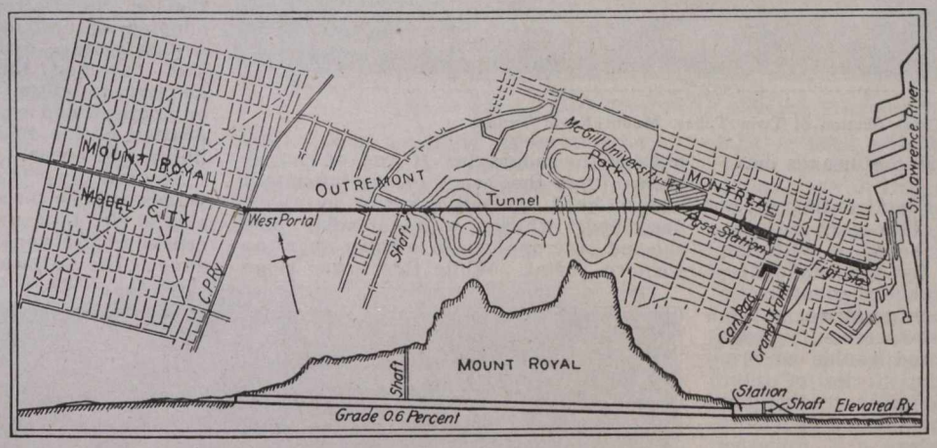
Montreal has a population of about 600,000 and is the main eastern seaport during the busiest part of the year. The business and financial part of the city is largely concentrated in a narrow strip of land between the St. Lawrence River and Mount Royal, which is already so congested that the resident section is gradually spreading up and down the river and around the mountain into Westmount and Outremont. Mount Royal forms a very positive barrier between the people living back of the mountain and the business portion of the city.

General Features of Project.

The natural location of the business centre of Montreal, between Mount Royal and the river, made the problem of entry at first appear complicated. To enter from either end of this strip meant a detour that was undesirable, and might have resulted in two separate stations for the eastbound and westbound traffic. A study of the topography and economic distribution of the city and island showed that a tunnel was the logical, as well as the economical, method of entry. It was found that the railways coming from the west could be brought from a convenient site for yards, shops, etc., near the Back River, to a junction point with the Quebec lines near the present Jacques Cartier Union Railway (G.T.R.) and thence at a very flat grade to a tunnel portal at its crossing with the C.P.R. belt line, about a mile from the Outremont yard. Thence the line will pass through a twin tunnel 3.25 miles long, down a 0.6% grade to a passenger terminal in the very centre of Montreal.

From the main passenger terminal the tracks may be extended across to the lower town on a viaduct at a level grade to connect with a viaduct along the harbor front, proposed by the Harbor Commissioners of Montreal, and a possible bridge across the St. Lawrence River. Such an extension would also include in the commercial part of the town an elaborate freight distributing depot, a department to which the C.N.R. is giving most serious thought at present. In connection with this freight department, large sorting and transfer yards are being developed back of the mountain and east of the city, where most of its shunting and mechanical part of the freight transference will be accomplished.

Back of the mountain, in the broad, gently sloping country, including some of the most fertile farms in Eastern Canada, the C.N.R. saw an opportunity for the site of a new city. With this in view, the Canadian Northern Montreal Land Company, Ltd., was incorporated to purchase this farming country and develop it as part of the general scheme of financing.



Plan and Profile of Mount Royal Tunnel.

The New Model City.

The city of Mount Royal, or as it is locally termed, the "model city," is laid out on a rectangular plan, with four diagonal boulevards radiating from the railway station, which forms the centre of the town site. There is also a meandering boulevard connecting a series of parks and playgrounds distributed over the city, in general midway between the central park and the station site and the city limits. The land, consisting of a gently sloping plane, makes the situation ideal for drainage and sanitation. The streets will be paved principally with asphalt and macadam, the stone for which will be taken from the tunnel excavation. Street car service and lighting have already been arranged for with local companies in Montreal, which assures excellent service, and through trolley connections with Outremont, Westmount and Montreal proper are contemplated. The lots are being sold under very rigid building restrictions, as it is desired to produce a quarter of town for the better class of people who are rapidly being crowded out of the more desirable parts of Montreal, as well as for the city's rapidly growing population. A short multiple unit train service through the tunnel will bring the Mount Royal station within a very few minutes of the main passenger terminal in the city proper and trolley cars will tie the street car lines of the "model city" with those of Outremont and Montreal. A small freight yard near the west portal of the tunnel will serve for the delivery of local freight and express and for the manipulation of multiple unit trains during the rush hours. The entire terminal scheme is to be utilitarian from the Back River to the waterfront. The idea is to produce structures and developments that will be attractive to the eye and so designed and disposed as to be self supporting in themselves without the assistance of the ordinary railroad traffic.

Tunnel History.

To the writer the most interesting part of the study of tunnels is its history. From the days of the cave man, through those of the Egyptians, Chaldeans, Romans and Europeans of modern times, the evolution has continued. The changes in the tunnel itself are small but the methods of excavation and construction have changed beyond recognition. The Lake Fucinus tunnel driven in the Abruzzi, during the reign of Claudius, was 6 ft. high, 10 ft. wide, and 3½ miles long. It took 11 years to build, and employed 30,000 men. To expedite this work some 40 shafts and inclines were sunk, some over 400 ft. deep.

As a comparison the present Mount Royal tunnel is practically the same length; the heading, however, is about 9 ft. high by 12 ft. wide, over 50% larger than the Lake Fucinus tunnel. It has one intermediate shaft about 240 ft. deep and another about 50 ft. deep at Dorchester St., which is at present acting as the eastern portal. The first heading was started on July 8, 1912, and since that time the shafts have been sunk and over 2 miles of heading driven on the tunnel line, besides more than ¼ mile at the shafts and in the terminal sites. The reason of this great difference in speed is method and equipment.

In the Lake Fucinus tunnel they used crowbars, chisels, picks, shovels, and possibly drills and saws with cutting edges of corundum. Most of the progress, however, was made by "fire setting," i.e., by building fires against the face of the heading until the rock was highly heated and then dashing cold water or acid, such as vinegar, on it to break the ground. Condemned criminals and prisoners were used in this work, as the death rate was terrific.

Compare this with modern tunnel prac-