CANADIAN NORTHERN RAILWAY CONSTRUCTION AND DEVELOPMENT 1919 THE LAST YEAR.

Canadian Railway and Marine World

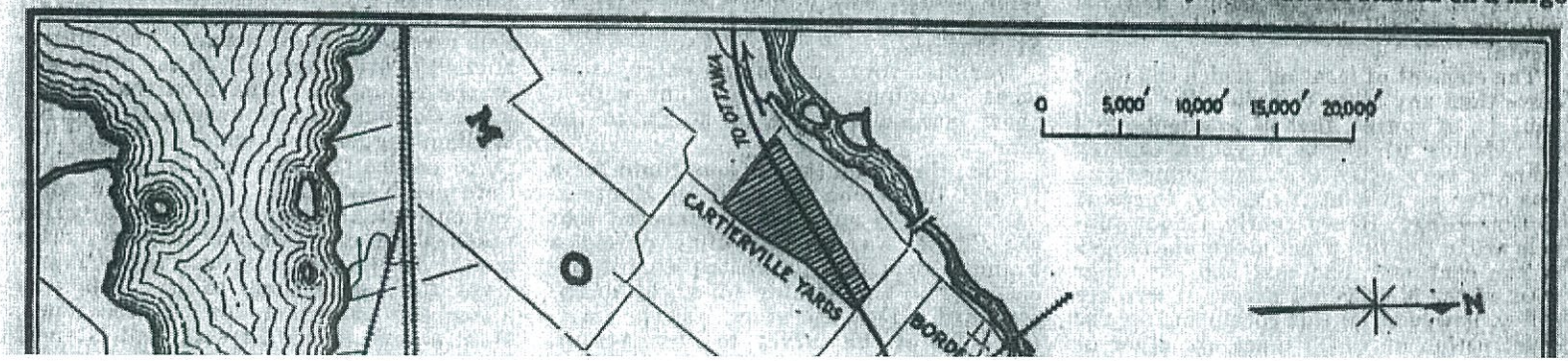
January, 1919

The Canadian Northern Railway's Montreal Tunnel From an Economic Point of View.

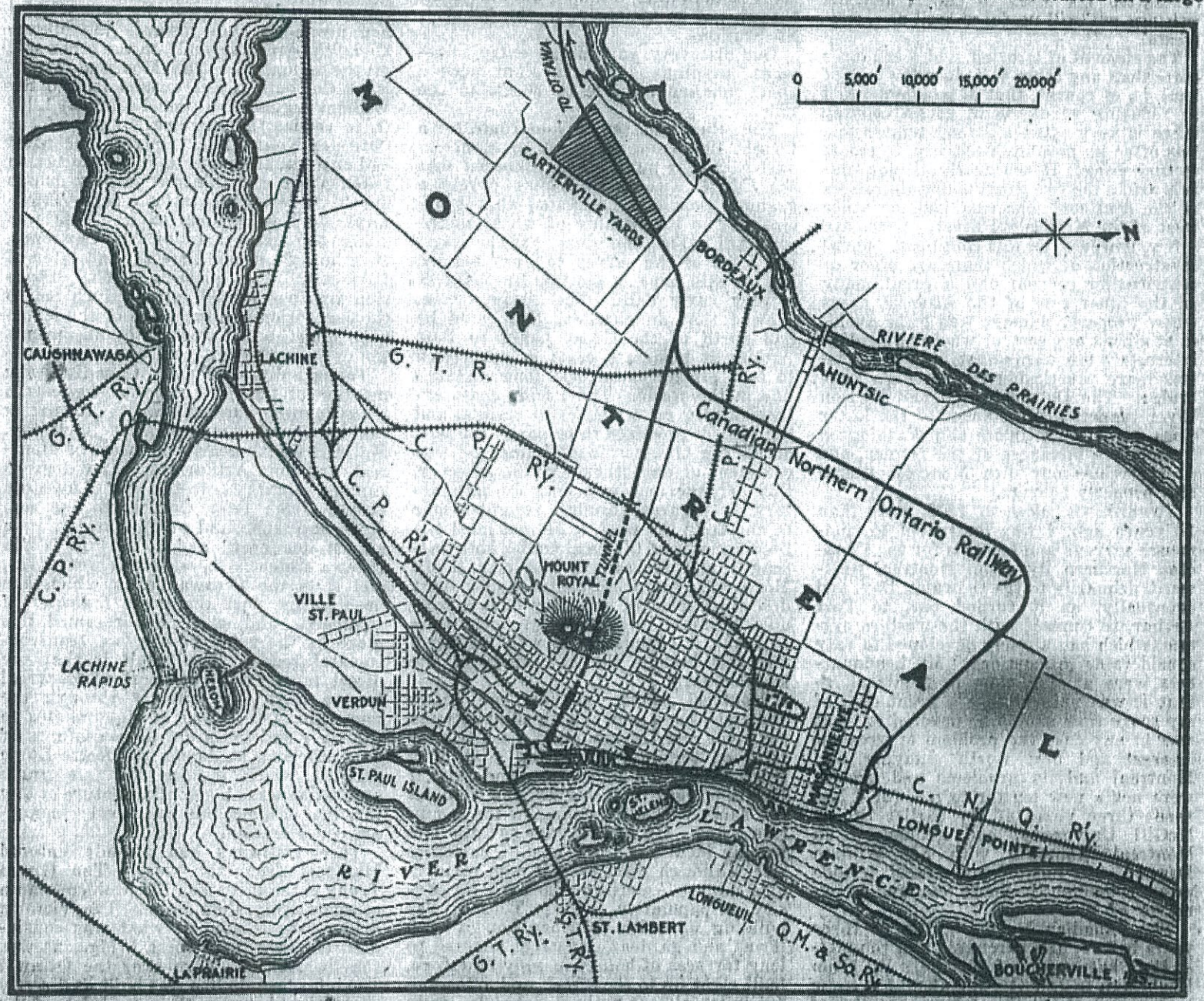
By H. K. Wicksteed, B.A.Sc., C.E.

This paper has been written in response to a very kind invitation to give something of interest in connection with the history of the Montreal tunnel. What were the considerations which led up to it, and made it seem a practical scheme? As the Canadian Northern Passenger Department has put it in its window dressing, "Why was the tunnel built?" because the construction side has been dealt with very ably by my colleague, S. P. Brown, and I believe is to be dealt with further by one of his assistants, J. L. Busfield, and they are both better posted in details of it than I. Mr. Brown has made tunnelling a specialty, and his whole soul was in his work, and I may say that it is a pretty large and comprehensive notably since the introduction of railways. Nearly all our great tunnels have been built to carry railways past, or under, obstructions of one kind or another, so that the history of tunnelling is almost altogether confined to the last 70 or 80 years, and most of the great tunnels are much younger than that.

Railway construction started on a large

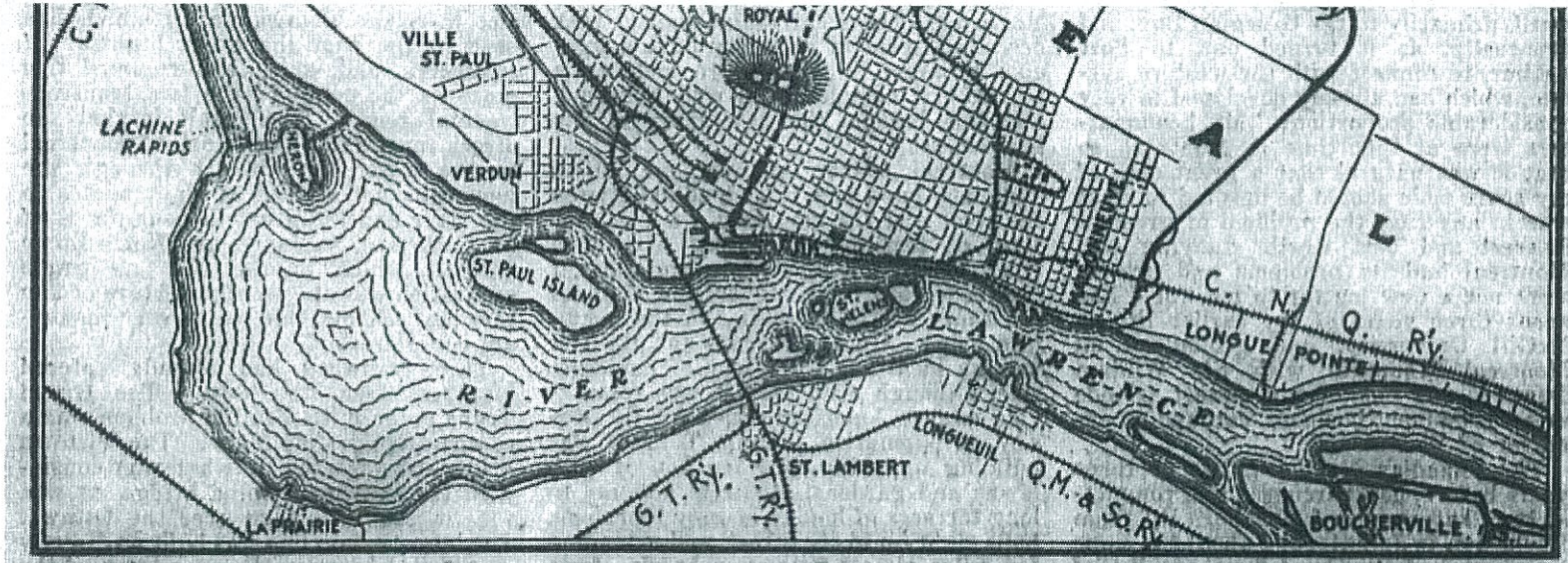


...ssing; Why was the tunnel built? It is a pretty large and comprehensive Railway construction started on a large



January 1919

And I have given my paper the title of soul. scale first in England, where population



And I have given my paper the title of "The Montreal tunnel from an economic point of view."

With the actual construction of the tunnel I do not propose to deal to any greater extent than is necessary to enable you to understand the problem, not because there were not a great number of intensely interesting points about it, and not because I was not in the tunnel a great many times during its progress, but because I have given my paper the title of "The Montreal tunnel from an economic point of view."

With the actual construction of the tunnel I do not propose to deal to any greater extent than is necessary to enable you to understand the problem, not because there were not a great number of intensely interesting points about it, and not because I was not in the tunnel a great many times during its progress, but soul.

Both by temperament and training, it is the economic side of things which has always appealed to me most. Railways are commercial concerns, and the tunnel is an essential part of a great railway. If it cannot be justified in a commercial sense, if it cannot pay interest on its cost, it has no right to exist. This economic aspect of engineering works has come into great prominence of late years, and scale first in England, where population was already dense, and traffic was waiting to be carried in large volume. A railway once built, even on what we should now consider very crude lines, was practically sure of paying its way from the very start, and the cost was a minor consideration as soon as the potentialities of the steam railway came to be understood. It was when the building of railways extended to this continent of great dis-

January 1919

tances, and at the same time sparse population, that it was found that not only were fixed charges a very heavy drain on railway earnings, but that capital was very hard to get in any case, and had to be brought in from outside, hence the difference in cost between the early American roads and the English ones, and the expedients of sharp curvature, heavy grades, and cheap construction, which were used to reduce the capital cost; and hence the fact that so much English capital went into American roads. As time went on, and the traffic became heavier, and as, too, other lines were built between the same termini and competition became keen, there came the era when the balancing of cost against more perfect location and construction began to be a regular study, and while I think a good many of the earlier engineers, Latrobe, for instance, had thought a good deal about these matters (their works shewed that they did), it was Wellington who first committed his ideas to paper, and his writings are still useful as well as monumental.

The element of location, which conduces more than any other to reduce the cost of haul, is, of course, that of gradients, and in reducing gradients in rough country there is very often a strong temptation, less often an absolute necessity, to resort to tunnelling. Hence nearly all our tunnels are in the two great mountain ranges of the continent, one east and the other the river front, and within a very short time thereafter, a connection with the Harbor Commissioners' tracks. This had already secured for the road an ocean terminal, and it developed later that from this farm, now the Longue Pointe yard (and a very busy yard indeed), there extended a very marked depression clear across the island to the Riviere des Prairies, and the only one of its kind between Racine and Bout de l'Isle. Everywhere else there was a high, broad-backed ridge of limestone to the north of the mountain itself, and to the south a long talus slope of sand and glacial drift.

The Northern Colonization Ry., afterwards the Quebec, Montreal & Occidental Ry., and now part of the C.N.R., climbed over the top of the limestone at Mile End, at an elevation of 200 ft. above the river, and down again with a very strenuous grade of 90 ft. to the mile, to Hochelaga. The Ontario & Quebec Ry., the C.P.R.'s entry from the southwest, climbed over talus debris, and dropped similarly, although not so viciously, to the Windsor St. Station.

Our discovery gave us an entry somewhat circuitous, it is true, but with a short maximum grade of 30 ft. to the mile.

This, then, was the obvious route for a freight line from the west to Montreal harbor, and it must be remembered that the C.N.R. was at that time purely a granger road and interested almost ex-

Montreal as its headquarters. Montreal began to grow very rapidly indeed, and is said to be increasing in population nearly 10% a year, and has now a population of over 800,000. Montreal a few years ago had an area of 19 square miles, and a population of 580,000. Cleveland, with about the same population, occupied 45 square miles; Boston, with 670,000, covered 43 square miles. Between 1900 and 1910 Montreal added 10,000 people to each square mile, New York only 4,000, and Chicago only 2,500. Montreal, to use the words of a writer in an American paper, was "choking to death for want of room." In its efforts to find this it has extended down the river almost to Bout de l'Isle, and upward almost to Lachine, and answers much more closely even than Duluth itself, to the Eastern Yankee's description of that city as being "25 miles long, a mile wide, and pretty nearly a mile high."

The long-sighted men, my business friend for one, and Sir Wm. Van Horne for another, had repeatedly cast wistful and prophetic eyes towards the hinterland, "the great beyond" on the other side of the mountain. The Montreal Tramways Co. built a line around it, and Sir William suggested a tunnel of about 1,000 ft. to reduce the extreme summit of the Cote des Neiges hill. Only at one point had any actual expansion in this direction taken place, and this was largely due to the C.P.R. Mile End station and the Tram-

January 1919

the Place Viger station. Ten years later still came the Ontario & Quebec Ry., which paralleled the Grand Trunk from Vaudreuil to Dorval, and then rose over the terrace and followed along its edge to the present Windsor St. station. What the governing ideas were in selecting this location I can only guess, having never met the designer, but a desire to eliminate property damages and grade crossings as far as possible is evident, and the solution has been accomplished in a very clever way. It is on the whole a very satisfactory entry, but the C.P.R. is under the disadvantage, with the double approach, of having to keep up two separate terminals and a great number of passengers have to travel across town from one to the other, in coming, for example, from Quebec to Toronto. It may almost be said that there are three terminals, for the Mile End station is getting to be very popular with short distance passengers to and from the north and west. The Windsor St. approach is very interesting, not only as a very good piece of work, but as showing the development of railway ideals, and the demands of the public in respect of abolition of crossings and concealment and suppression of smoke and noise.

Advent of C.N.R.—Nearly 30 years after the C.P.R. comes the Canadian Northern. Thirty years makes a great difference in a problem of this kind. Land values have grown prodigiously in the meantime, due to the ever increasing congestion. And the education of the public, assisted by a railway commission anxious to please it, has gone on apace. Grade separation has become absolutely essential, and the absolute abolition of smoke and noise almost so. At the same time, and from the railway point of view, passenger trains have become longer and heavier, and harder to haul, so that grades must be flattened to the utmost, especially in regard to starting and stopance unless he has his stomach full, and some little money in his pocket.

We have here a number of essentials to be provided for and a still greater number of desiderata, also many things to avoid. The most important necessity of all at the moment perhaps was the finding of the necessary capital. Railway terminals are expensive things at the best, and this was an era of extravagance in this respect. The Pennsylvania had spent many millions on its New York entry. The New York Central was following suit with a magnificent scheme, better balanced financially, but still enormously expensive. Kansas City was building a joint $45,000,000 terminal, and St. Paul was considering a scheme which involved encroachment on the rights of its very respectable and oldest citizen, the Mississippi River—almost as old and respectable as the Montreal mountain itself, although somewhat dirtier. But these were all in connection with roads of long standing and financial strength. They were improvements and consolidations rather than new schemes. The Canadian Northern, while it had been earning at a great rate, was also extending and building equally fast, and had largely discounted its future in its borrowings. Even in a growing northwest, it takes some months before a new piece of road can earn its own living, and some of the C.N.R. construction was of a nature and through such country as could not be expected to yield any adequate income except as part of the completed system.

The most obvious route was to parallel the two older roads and it was very seriously proposed, but the writer for one never took to the proposition. It was neither the inexpensive route of the older Grand Trunk, nor could the very neat grade separations which the C.P.R. effected 30 years ago be repeated and duplicated. The C.P.R. line had been badly

the prospective profits finance the construction of the tunnel? The idea once suggested took root, and some of the great financiers of the world became directly interested in it, and the idea of the tunnel entrance became an established one.

But this merely fixed the principle of the tunnel, not the line of it, and there were several lines suggested other than that adopted. A line just south of Park Ave. was strongly advocated, the reason given being that it would be closer to the surface and much of it could be built by the cut-and-cover method. It was pointed out in rebuttal that this would disorganize all the underground economy of the district, sewers, water pipes, and gas, and that the streets would be impassable and the abutting properly uninhabitable during the whole time of construction, unless the enormously costly methods of of the New York subways were adopted. So far from being an extravagance, the bold line under the highest part of the mountain was the cheapest, in that it avoided all property damage, except for about 2,000 ft. on the city end.

This argument prevailed finally and the bolder line was adopted, but there was still a good deal of latitude in the choice of line. At the west end a long strip of property was offered, reaching nearly to the Back River. It so happened that on this property was the best point at which to cross the C.P.R.'s Atlantic and North Western line, so this end was promptly and satisfactorily settled. The east end was the subject of longer debate and some warmth of argument. Most English-speaking people think of Montreal as extending from the mountain to Dorchester St., and from Park Ave. to the confines of Westmount, with an addition for business purposes extending east and south for half a mile from the Place d'Armes, and of St. Catherine St. as

January 1919

meantime, due to the ever increasing congestion. And the education of the public, assisted by a railway commission anxious to please it, has gone on apace. Grade separation has become absolutely essential, and the absolute abolition of smoke and noise almost so. At the same time, and from the railway point of view, passenger trains have become longer and heavier, and harder to haul, so that grades must be flattened to the utmost, especially in regard to starting and stopping. Maintenance of way and operating expenses have been increasing in a much faster ratio than the corresponding passenger rates and receipts. Only the increasing volume of traffic, offset the growing discrepancy, and served to stave off the bankruptcy of the railways.

The passenger business alone was not the only thing to be considered. The Grand Trunk, during its 60 years of occupancy, and the C.P.R. during its shorter term of existence, had surrounded and honeycombed Montreal with a network of industrial spurs, sidings, and yards, in every direction. The Canadian Northern had only one small yard in the extreme north end, and its connection on the same terms as the other lines with the Harbor Commissioners' tracks for overseas business. But business to and from the local industries, the wholesale houses, cold storage plants, etc., etc., has to be hauled from 3 to 5 miles by motor trucks to Moreau St. The handicap is altogether too great. In the district bounded by McGill St., the Lachine Canal, Windsor St. produced, and Lagauchetiere St. alone, there are something like 150 of these smaller industries and plants, and a great many more within a mile radius of the Haymarket Square. Passenger business may perhaps be described as the spiritual and intellectual function of the railway body corporate, but freight is the wholesome and nourishing food which enables it to do its work and carry on its functions. The passenger service is the side which appeals to the ordinary layman passenger, just as a man's face and bearing does to a new acquaintance, but he cannot keep up the prepossessing appear-

not be expected to yield any adequate income except as part of the completed system.

The most obvious route was to parallel the two older roads and it was very seriously proposed, but the writer for one never took to the proposition. It was neither the inexpensive route of the older Grand Trunk, nor could the very neat grade separations which the C.P.R. effected 30 years ago be repeated and duplicated. The C.P.R. line had been badly bent in order to effect its entry. Everything pointed to the north, instead of the south shore of the Ottawa, as being the Canadian Northern's proper route, and in this case the bend would become a right angle elbow. The right of way would be absolute destruction for 2 miles or more, and grade separation could be effected only by a continuous track elevation for the same distance. It would have been plagiarism of the worst and most expensive type. It was proposed to join with the Grand Trunk, but this would merely have mitigated some of the evils of parallelism, not removed them, and the Canadian Northern would have lost its identity and its independence at a most important point, and neither of these propositions would have been any solution of the freight problem.

The tunnel was the obvious solution of the whole question, and it was adopted by the writer at a very early stage, but how was the money to be found? Here came in the question of expansion, of a greater Montreal. The piercing of the mountain, the inauguration of a fast and frequent electric service through it, would vastly enhance the value of the inaccessible lands beyond. Thousands of acres, sloping gently towards the Back River, were available, if they were once brought within easy reach of the business and shopping district. As soon as the programme was announced, real estate men would quickly absorb all the available land, subdivide it and sell at enormous profit. Why should not a syndicate be formed which would take this part of the business out of the hands of the real estate men, buy up the land and out of

to cross the C.P.R.'s Atlantic and North Western line, so this end was promptly and satisfactorily settled. The east end was the subject of longer debate and some warmth of argument. Most English-speaking people think of Montreal as extending from the mountain to Dorchester St., and from Park Ave. to the confines of Westmount, with an addition for business purposes extending east and south for half a mile from the Place d'Armes, and of St. Catherine St. as being the main and only important artery. This is only a small part of Montreal in reality, but the conviction in the Anglo-Saxon mind that this is Montreal, the whole of Montreal, and nothing but Montreal, is almost as fixed and ineradicable as the Englishman's idea that the whole world is centered about his own tight little island. As a result of this obsession, it was difficult to get any site off St. Catherine St. even seriously considered. A line near University Ave. was actually adopted, and abandoned only when it was shown that this was of no use except for purely passenger business; that there was no chance for extension eastward, and that it must for all time to come remain a dead end branch 6 miles long, and worse in this respect than either the C.P.R. or the G.T.R.

Finally, the present line was adopted mainly for the reasons that it gave a continuous line from the mountain to the water front, with opportunity to connect with the Harbor Commissioners' tracks, and through them with the system extending to Quebec and Chicoutimi; that in doing this it passed through some of the best freight producing districts in Montreal, and that it did all this with a minimum of property damage and with an absolute avoidance of grade crossings or even distortion of street grades. There is, further, an avowed intention on the part of the Harbor Commission to build a dam across the river to St. Helen's Island and a bridge from it to the east shore, which will furnish a route for such roadways and railways as care to avail themselves of it. It is more than probable that the Quebec, Montreal & South-

January 1919

ern and the Intercolonial will avail themselves of the chance, for the Grand Trunk's great bridge is already congested and overcrowded, but this is a matter for the future.

The choice of a station site on this route was another matter of debate, which it is somewhat irrelevant to go into now. The choice, for the present at any rate, is on Lagauchetiere St. within easy reach of Dorchester St., but not so far below the surface as the latter.

Grades Through Tunnel.—Closely allied to the question of alignment and in some respects even more important is that of grades. I have already alluded to the increasing length and weight of passenger trains. The C.N.R.'s standard transcontinental train averages 11 cars, and with this its Pacific type locomotives get over the 1% grades of the Lake Superior Division with reasonable ease. On the other hand, if the grade is flattened too much, on a long tunnel and approach such as this, trouble with drainage is apt to occur, especially in winter. The grade through the tunnel is 6/10 of 1%, or 32 ft. per mile, and is continuous from end to end; the west portal being thus 100 ft. higher than the east. From the west portal the same rate of grade carries us down through the Model City for nearly the same distance. The long cutting on city, or east, end, the roof ran into clay, although the bottom and most of the wall remained in limestone. This clay was known beforehand to exist, and it is of a very plastic and semifluid formation and contains numerous shells such as now exist in northern seas. On account of its semi-fluid nature, and because this section led under streets and close to the foundations of buildings, it was decided to take this out under a shield protection, the shield being followed up with an arch of concrete blocks pre-cast in voussoir shape.

Practically no leakage, even of water, was ever visible during the progress of the work, and yet considerable settlement of the street overhead took place. Probably the moisture evaporated and escaped as invisible vapor. A great many of the houses had been set down on this soft clay and had suffered from settlement before the work was started; the further settlement was therefore of less consequence than it would otherwise have been. Through this section the individual tracks are carried in separate tunnels with a thin wall between them. The same is true of a few hundred feet at the West Portal, but the body of the tube is a single opening.

The heading was a "bottom" one 8 x 12 ft. and was put through with very good

of material was removed, because there happened to be a very large and almost vacant piece of property at this point, on which material could be wasted for the time being, until the tunnel became available for hauling it away.

Anecdotes.—Mr. Brown, in his enthusiastic belief in and support of everything connected with the tunnel working, got into some rather amusing situations which he relates himself with considerable humor. On one occasion he was dining in a house almost over the line of the tunnel, and his host took occasion to remonstrate against the heavy blasting which sometimes shook the house and made his women folk nervous. Brown assured him that this had been stopped altogether and only the lightest of charges were being used, and especially at night. Just then a tremendous shot was fired, and all the front windows were smashed. It was a very embarrassing moment, and Brown had some difficulty in preserving his dignity and his host's respect.

On another occasion a discussion arose with reference to the effect of the vibration, occasioned by moving trains on some of the delicate instruments in McGill University, which is almost immediately over the line of the tunnel; the seismograph,

January 1919

portal the same rate of grade carries us down through the Model City for nearly the same distance. The long cutting on the west approach, was introduced with a purpose, viz.: to allow the civic expansion to go on overhead without too much distortion of street grades.

In consideration of the electrical operation, the headroom required under the bridges was reduced from the regulation 22½ ft. to 16½ ft., and the problem of grade separation rendered so much the easier of accomplishment. Near Cartierville the Montreal Park & Island Ry., and a main road alongside it, have been carried underneath. Absolute grade separation is thus secured, not only through the city itself and its transmontane annex, but for the entire length of the electric zone, nearly 9 miles, and Cartierville, a promising suburban settlement on the bank of the Riviere des Prairies, is now brought within 18 or 20 minutes of the heart of the city.

The tunnel itself is a very interesting one and ranks among the great tunnels of the world, being 3.25 miles long. Only the three great Alpine tunnels, the Mount Cenis, the St. Gothard, and the Simplon, completely eclipse it in length, and there is only one in Canada which is longer, the C.P.R. Rogers Pass tunnel. It was predicted beforehand that the difficulties would be comparatively few, and so it turned out. Very little water was met with, and this where it was expected, near the west portal, at the contact between the limestone and the older rocks on which it rests unconformably. The core of the mountain was almost exclusively Essexite, a basaltic volcanic rock, somewhat hard to drill, but otherwise quite

single opening.

The heading was a "bottom" one 8 x 12 ft. and was put through with very good speed. For a time, in fact, the American record for hard rock tunnelling was broken by an average advance of 26 ft. a day for a whole month. As soon as a sufficient advance had been made, the enlargement to full section was commenced, the arch being taken out first, and the two "benches" afterwards.

As the east end is in the city and there was no means of getting rid of large quantities of material except by teaming for several miles, this work had to be done from the west end, and for this reason the heading was driven faster from this end, and this meant working down hill. Under these circumstances the small flow of water was particularly fortunate, as the amount of pumping was small.

Shafts.—In order to expedite the work, a shaft was sunk 250 ft. one mile from the west end. This made it possible to follow up with the enlargement on the westerly mile without interference from the heading from the shaft, but as a matter of fact the rapid progress of the heading was to a large extent wasted, because the war intervened, and work on the enlargement was impeded by the difficulty in finding the necessary capital to carry it on. The shaft was, however, designed to carry an elevator in the future to a substation at its foot, and with this in view, was sunk to one side of the center line of the tunnel. This, as may be imagined, greatly increased the difficulty of alignment of the tunnel. To offset a line on the surface, to two plumb lines, only some 12 ft. apart and 250 ft. long,

versity, which is almost immediately over the line of the tunnel; the seismograph, for instance, which is intended expressly for recording terrestrial vibrations. Brown stoutly maintained that there would be no effect whatever, and that in New York a similar instrument near the subway had taken less notice of the blasting and the subsequent train running, than it had of the San Francisco earthquake 3,000 miles away. He suggested that the instrument be set up in a basement on McGill College Ave. while a blast was being fired, and they would see for themselves how absurdly small the effect was. The suggestion was acted on, the instrument set up, the blast was fired, and the seismograph went out of business altogether.

Reasons for Electrification.—As mentioned previously, the tunnel was planned from the beginning for electric traction. No effort was made to avoid the inevitable in this respect. It was felt that while very much cheaper in initial cost, a steam service through such a long tunnel would not be popular with the public; fans and artificial ventilation would have to be installed, and that even outside the tunnel, on the city end, there would be a strong opposition to steam operation over the streets, and justly so, for Montreal is already more saturated with coal smoke than even Toronto.

Some will remember the fatal disaster in the St. Clair tunnel, when it was operated by steam locomotives, although this is not much more than one-third the length of the Montreal one. Some minor mishap necessitated a stop at the lowest point in the tunnel, and some of the train

January 1919

turned out. Very little water was met with, and this where it was expected, near the west portal, at the contact between the limestone and the older rocks on which it rests unconformably. The core of the mountain was almost exclusively Essexite, a basaltic volcanic rock, somewhat hard to drill, but otherwise quite unobjectionable.

It was at first thought that most of it would not require lining, and had it been a steam operated road in the open country, it is quite probable that very little lining would have been put in, but its nearness to the terminal, and the adoption of the trolley system, which meant support from the roof, made even a small fall a very serious matter, as it would both delay and endanger the traffic. Some little seaminess and disintegration showed itself after exposure to the air, and in the end it was all lined with a thin sheeting of concrete, except about 1,000 ft. This applies to the rock section.

For something over half a mile at the to carry an elevator in the future to a substation at its foot, and with this in view, was sunk to one side of the center line of the tunnel. This, as may be imagined, greatly increased the difficulty of alignment of the tunnel. To offset a line on the surface, to two plumb lines, only some 12 ft. apart and 250 ft. long, and then offset this line again at the bottom of the shaft, was an operation requiring care and patience, but it was accomplished without appreciable error by H. T. Fisher and his staff. A second shaft was sunk, some 70 ft. just to the north of Sherbrooke St., and at the bottom of this the shield was put together. A third shaft was projected at Pine Ave., but considerable opposition was met with from the wealthy residents of the neighborhood, and it was abandoned, and undoubtedly the advantage from it would merely have expedited the driving of the heading, not of the completed tunnel. A fourth shaft was sunk on Dorchester St., and it was from this that a large quantity than even Toronto.

Some will remember the fatal disaster in the St. Clair tunnel, when it was operated by steam locomotives, although this is not much more than one-third the length of the Montreal one. Some minor mishap necessitated a stop at the lowest point in the tunnel, and some of the train hands were asphyxiated by the waste gases from the locomotive before help could be got to them. Even on a passenger train, although the trip lasted a very few minutes, there was a certain sense of suffocation and a feeling of relief when the trip was over. This accident precipitated the inevitable change to electric traction, and in the case of the Pennsylvania and Detroit tunnels, electricity was installed from the very first.

In the Montreal tunnel, in actual experience, the air is just as fresh as it is outside, and there is quite a marked natural circulation through it. The air at the city end is nearly always warmer than that at the west, or country, end, and

January 1919

rises from the terminal excavation, causing a strong draught of cool air from west to east. With the west end warmed up by a westerly sun, while the east is in shadow, the current will very probably be reversed, but the normal conditions seem to be as above.

The electrification work, which is a very interesting study in itself, was under the very able charge of W. C. Lancaster. A study was made for developing power at St. Ursule falls, on the Canadian Northern line, some 60 miles east of Montreal, and transmitting to Montreal, but the power was not very reliable, and to make it so meant a lot of interference with vested rights and privileges, which threatened to raise the capital cost and resultant charges to a point which meant that it would cost more per h.p. than it could be obtained for from the Montreal Light, Heat & Power Co., and an arrangement was made with that company to supply the necessary power.

The system is a direct current of 2,400 volts, much higher than we have been accustomed to up to the present. The locomotives take the current by a pantagraph from a trolley wire, and weigh 80 tons. The third rail system was considered, but on account of the heavy snowfall about Montreal, and occasional accumulations of ice, it was not considered desirable. In actual test these locomotives haul a 7 or 8-car train against the adverse 6/10% grade through the tunnel in 7 minutes, or practically 30 miles an hour.

The electric zone extends at present only to Cartierville, which on account of its being a convenient point at which to establish a divisional yard with locomotive house and shops, was considered the best point at which to make the change. It is altogether probable that as the intermediate country gets settled up with suburban residences, a movement which has already commenced, it will be extended to St. Eustache, a very prosperous town with beautiful surroundings, and we hope eventually to Ottawa. Only the heavy cost of installation prevented this being done in the first place. The route to Ottawa, lying as it does along the banks of the river, and generally within sight of it and of the Laurentian Hills beyond, is quite the most attractive of the four existing ones, and within a mile of being the shortest. It has already made a good start in popularity, and with the additional attraction of electric traction, it should pretty nearly monopolize this business.

January 1919

Canadian Northern Railway Construction, Betterments, Etc.

St. Charles River Bridge.—Work on the cofferdams of the new Ste. Anne railway bridge on the St. Charles River at Quebec, is reported to be in progress, and it was expected everything would be in readiness to start the masonry work by Jan. 1. This is part of the work being carried out by Quinlan & Robertson for the Public Works Department. The bridge is used by the C.N.R.

Mount Royal Tunnel & Terminal Ry.—The Board of Railway Commissioners, Dec. 4, reserved its decision on the company's application for approval of transfer tracks and connections between its tracks and those of the Jacques Cartier Union Ry., a G.T.R. subsidiary.

Ottawa-Toronto Line.—Tenders were received to Dec. 14, for the removal of the present substructure of the bridge at the Trent River crossing at Glen Rose, mileage 43.5 on the Maynooth Subdivision, about 13 miles north of Trenton, Ont., and the construction in place thereof of 7 concrete piers. We were officially advised Dec. 18, that the contract will not be awarded for the present, it having been decided to carry the work over to the summer.

Ottawa-Port Arthur Line.—We are officially advised that a contract is about to be let for the erection of a steel bridge at mileage 147.4 on the Pembroke Subdivision, where the Little Madawaska River enters Trout Lake, 10 miles east of Brent, the divisional point in Algonquin Park. The two abutments are 15 ft. and 17 ft. high, respectively, and rest on a very hard, compact sand and gravel formation about 6 ft. below the river bed.

January 1919

the summer.

Ottawa-Port Arthur Line.—We are officially advised that a contract is about to be let for the erection of a steel bridge at mileage 147.4 on the Pembroke Subdivision, where the Little Madawaska River enters Trout Lake, 10 miles east of Brent, the divisional point in Algonquin Park. The two abutments are 15 ft. and 17 ft. high, respectively, and rest on a very hard, compact sand and gravel formation about 6 ft. below the river bed. The superstructure will consist of a 68 ft. through plate girder span. The existing structure is a 6-span pile trestle bridge. The new bridge is being built in line with the company's policy of replacing wooden structures with more permanent work, but its construction is being hastened owing to the fact the lumber companies wish to drive logs down the river in the spring, and the railway wants to give them a proper clearance for their drive.

Cherry St. Yards, Toronto.—We are officially advised that a contract, covering the grading for 3 additional team tracks of 500 ft. length, at the Cherry St. yards, Toronto, has been let to Verrochio and Costalleni, Toronto.

Fort William, Ont.—Construction is reported to be in progress on a platform for loading and unloading cattle, on property recently acquired off Vickers St., between Bethune and Cameron Streets.

Union Station for Port Arthur.—The Port Arthur, Board of Trade has been collecting information in connection with a project for the erection of a union station in that city, and is reported to have sent a memorandum on the subject to

January 1919

President D. B. Hanna. A deputation from the board of trade expects to arrange for an interview with the directors in Toronto on an early date.

Elrose Jct.-Alsask Branch Line.—Track has been laid this year westerly from Eston, the formal terminus of a branch 84.4 miles long from Elrose Jct., for about 40 miles, and in the new time table which came in operation at the end of October provision was made for operating a train service on 20 miles of the new mileage. The stations are as follows: Snipe Lake, mileage 90.9; Madison, mileage 97.6; Glidden, mileage 104. Track laying is reported to have been completed to mileage 121. We were officially advised at the end of June (see Canadian Railway and Marine World, July, pg. 293), that it was intended to extend this line during this year from Easton 43 miles to Alsask, where the Saskatoon-Calgary lines crosses the Saskatchewan-Alberta boundary.

Hanna-Medicine Hat Extension.—Grading is reported to have been completed on this line for about 40 miles, to within a few miles of the Red Deer River. The construction programme for 1918, as detailed in Canadian Railway and Marine World for July, pg. 293, set out that some grading had then been completed out of Hanna, and that an additional 47 miles would be done during 1918, carrying the work up to the Red Deer River. The contractor for the grading is W. A. Dunton, Winnipeg. An unconfirmed report says that tracklaying is expected to be gone on with during the winter.

Oliver-St. Paul de Metis Line.—Ballasting is reported to have been completed to mileage 22 from Oliver, and ballast is reported to have been distributed on the remaining 22 miles of right of way, on which track has been laid. The bridge at Waskatenow Creek is reported to have been completed and a water tank built. Beyond mileage 44, bridging and other work is reported to be in progress to mileage 100, to which point the grading had been practically completed prior to 1918.

January 1919

President D. B. Hanna's Message to Canadian National Railways' Employes.

D. B. Hanna, President Canadian National Railways, issued the following circular Dec. 24:—As a first official greeting to all employes of the Canadian National Railways, this Christmas message is to wish for you and yours the continuation of peace and good will. With the new year close at hand, which we enter under such changed conditions, it is opportune to ask your co-operation in making a success of government owned railways in the wider field which the combined system now serves. Our duties to this end should be regarded as a public trust. Our aim must be efficient transportation service, which we know can only be achieved through the loyal support of all employes. At this time we are getting back some of those who have so well represented Canada on Flanders fields. Those who return to our service we welcome. It should hardly be necessary to say to our employes that while travelling on our lines returned soldiers should be treated with all consideration and respect, and that their journey should be made as comfortable as possible for them, also that information as to returning soldiers should be handled with special care and thought of the great importance of such information to those personally concerned."

January 1919

Canadian Northern Railway Directors' Inspection of Canadian Government Railways.

As stated in Canadian Railway and Marine World for December, D. B. Hanna, President, left Toronto, Nov. 26, for a trip over the C.G.R. in Quebec, the Maritime Provinces and Eastern Ontario, accompanied by most of the other directors, viz.: A. J. Mitchell, Vice President; Major Graham A. Bell, C.M.G., acting Deputy Minister of Railways and Canals; Robt. Hobson, Hamilton, Ont., and R. T. Riley, Winnipeg. Other directors joined them en route, viz.: A. P. Barnhill, K.C., of St. John, N.B., at Ottawa; Sir Hormisdas Laporte, at Montreal, and Thos. Cantley, of New Glasgow, N.S., farther down the line. The party also comprised M. H. MacLeod, Vice President, Operation, Maintenance and Construction; and R. P. Ormsby, Secretary, C.N.R. S. J. Hungerford, Assistant Vice President, accompanied the party to Quebec, and F. P. Brady, General Manager, Eastern Lines, joined them at Montreal. Division and other local officials joined the party en route, travelling through their respective jurisdictions.

The party travelled by a special train of official cars and a baggage car. From

the bridge into Quebec, and the opening of the National Transcontinental Ry. St. Malo shops, and the mayor stated that he was preparing a memorandum on the needs of Quebec in connection with the N.T.R. and the terms of the contract entered into between the Dominion Government and the city. Subsequently the party inspected the Louise docks, the C.P.R. terminal facilities at the Palais station, the Canadian Northern Ry. and Quebec & Lake St. John Ry. terminals, and the site of the proposed new union station. The Quebec Harbor Commissioners entertained the party at luncheon at the Chateau Frontenac.

The memorandum referred to by the mayor, and which was forwarded to Mr. Hanna subsequently, asked that the obligations of the contract of August, 1910, under which the city gave $2,000,000 of river frontage to the Dominion Government, be fulfilled. These obligations are that the principal workshops of the system be located in the city. The St. Malo shops were erected at a cost of $2,000,000 and are capable of employing 1,500 men. They have not been put in operation, and

folly that was almost criminal. If the money that had been expended on the eastern portion of that line had been expended on double tracking the I.R.C., there would be no need of resolutions calling for that work now. Sir Hormisdas Laporte, R. Hobson, A. P. Barnhill, K.C., R. T. Riley, G. A. Bell and A. J. Mitchell, other directors, also spoke, as well as F. P. Brady, General Manager, Eastern Lines.

At Cape Tormentine, N.B., and at Port Borden, P.E.I., the directors looked over the car ferry terminals, and subsequently inspected the work in progress in laying a third track on certain of the lines on the island, to provide for the operation of standard gauge rolling stock. Civic and other deputations were received at Charlottetown, and representations made as to the people's needs in regard to railway accommodation.

After having inspected the lines and terminals on Cape Breton Island, together with the car ferry terminals on both sides of the Strait of Canso, which separates the island from the mainland of Nova Scotia, the party reached Halifax, Dec. 5,

January 1919

other local officials joined the party en route, travelling through their respective jurisdictions.

The party travelled by a special train of official cars and a baggage car. From Toronto they went to Ottawa by C.N.R., thence to Montreal by G.T.R., leaving there Nov. 27 at 2.30 p.m. for Montreal, where they were entertained to dinner at the St. James Club. They left Montreal that night by I.R.C. and on arriving at Chaudiere the train was stopped for some time. Early on the morning of Sept. 28 they went over the Quebec bridge and the N.T.R., to Quebec, arriving there at 11 a.m. They left Quebec that afternoon, reaching Riviere du Loup at 11 p.m., where they stayed the balance of the night, leaving there Sept. 29 at 10 a.m., and going on to Chatham, where they spent the night. Chatham was left on the morning of Sept. 30 and Moncton reached at noon, where they spent the balance of that day and Sunday, Dec. 1, until 7.45 p.m., when they left for Cape Tormentine. On Dec. 2 they left Cape Tormentine by the car ferry steamship Prince Edward Island, arriving at Borden, P.E.I., at 8.30 a.m., and visiting Summerside and Charlottetown, leaving the latter place at 4 p.m. and arriving back at Cape Tormentine at 7.45 p.m., leaving at once for New Glasgow, which was reached Dec. 3 at 4 a.m. They left New Glasgow the

that the principal workshops of the system be located in the city. The St. Malo shops were erected at a cost of $2,000,000 and are capable of employing 1,500 men. They have not been put in operation, and the rolling stock is being hauled 1,850 miles to Winnipeg for repairs. The contract also calls for the expenditure of $2,000,000 on the St. Lawrence waterfront in Champlain Ward, including deep water dock frontage, storehouses and other terminals, towards providing which nothing has been done. The city would also like to have carried out the obligation to take a share of the grain trade of the west to the port; the provision of new rolling stock on the line to Winnipeg; the establishment of direct ocean passenger and mail traffic to and from Quebec; the establishment of passenger traffic over Quebec bridge and the consideration of the Champlain market property question.

At Moncton, N.B., after an inspection of the Canadian Government Railways general offices, representatives of the city council and board of trade were received by the directorate in the general offices. A number of points were brought up for consideration, among them being the question of the removal of the general offices and various officials from Moncton; the rumored cutting down of the shop staffs, the question of a second track between Moncton and Halifax, and the

terminals on Cape Breton Island, together with the car ferry terminals on both sides of the Strait of Canso, which separates the island from the mainland of Nova Scotia, the party reached Halifax, Dec. 5, and had a conference with the city council and board of trade. Mr. Hensley brought up the question of differential rates; the mayor raised the question of the Y on the track on Kempt Road, Fairview, and the matter of the building of a new passenger station at the ocean terminals; H. R. Silver dealt with the matter of adequate facilities for the storage of products, and A. H. Whitman raised the question of warehousing. Mr. Hanna, in reply, stated that the Fairview crossing was a question of engineering and would receive attention. The other matters would also receive full consideration; but there was so much to do in connection with the whole system that it was not always possible to deal with the interests of any one section just as the people of that particular section might desire. A resolution in favor of double tracking, passed by the board of trade was put in by G. F. Pearson, and matters connected with an elevator system were raised by A. H. Whitman. After luncheon, the directors made a thorough inspection of the ocean terminals, and the work in progress there, and then visited Dartmouth.

At St. John, N.B., the party visited the

January 1919

where they stayed the balance of the night, leaving there Sept. 29 at 10 a.m., and going on to Chatham, where they spent the night. Chatham was left on the morning of Sept. 30 and Moncton reached at noon, where they spent the balance of that day and Sunday, Dec. 1, until 7.45 p.m., when they left for Cape Tormentine. On Dec. 2 they left Cape Tormentine by the car ferry steamship Prince Edward Island, arriving at Borden, P.E.I., at 8.30 a.m., and visiting Summerside and Charlottetown, leaving the latter place at 4 p.m. and arriving back at Cape Tormentine at 7.45 p.m., leaving at once for New Glasgow, which was reached Dec. 3 at 4 a.m. They left New Glasgow the same day at 2 p.m., stopped over at Mulgrave and Point Tupper, and reached North Sydney at 8.45 p.m., staying there all night. On Dec. 4 they visited Sydney Mines and Sydney, leaving the latter place at 7.30 p.m., and arriving at Halifax, Dec. 5, at 7.25 a.m. They left Halifax the same day at 10 p.m., arrived at St. John, N.B., Dec. 6, at 6.25 a.m. and left there at midnight for Fredericton, which was left on Dec. 7 at 11.25 a.m., Montreal being reached Dec. 8 at 7.30 a.m., and the party stayed there that night and the following day, looking over the tunnel, terminals and other property. Montreal was left Dec. 9 at midnight via C.N.R. for Ottawa, where Dec. 10 was spent until 4 p.m., when they left for Toronto, arriving there during the night.

The party spent some time at the Quebec bridge, making an inspection of the structure, and the yards on both sides of the river, and immediately on reaching Quebec Mr. Hanna had a conference with the mayor. Among the questions discussed were the running of I.R.C. trains over establishment of direct ocean passenger and mail traffic to and from Quebec; the establishment of passenger traffic over Quebec bridge and the consideration of the Champlain market property question.

At Moncton, N.B., after an inspection of the Canadian Government Railways general offices, representatives of the city council and board of trade were received by the directorate in the general offices. A number of points were brought up for consideration, among them being the question of the removal of the general offices and various officials from Moncton; the rumored cutting down of the shop staffs, the question of a second track between Moncton and Halifax, and the rumored direction of traffic to St. John, via McGivney Jct. Mr. Hanna, in reply, pointed out that the directors were making their first official trip over the eastern lines to see things for themselves, and to hear all that could be said at the various centers, so that they might be able to formulate a policy. There was not the slightest intention of removing any of the shops from Moncton, but as to what office changes, or what departments, if any, would be moved, he could not say, but nothing would be done without full consideration. It is the directors' intention to manage the system entirely free from any political influence whatever. In connection with the management of such a railway system as the Canadian National Railways, it is necessary to have central offices somewhere, and these will be in Toronto.

Thos. Cantley, one of the directors, and President of the Nova Scotia Steel & Coal Co., said that in his opinion the building of certain portions of the National Transcontinental Ry. was an act of monumental was a question of engineering and would receive attention. The other matters would also receive full consideration; but there was so much to do in connection with the whole system that it was not always possible to deal with the interests of any one section just as the people of that particular section might desire. A resolution in favor of double tracking passed by the board of trade was put in by G. F. Pearson, and matters connected with an elevator system were raised by A. H. Whitman. After luncheon, the directors made a thorough inspection of the ocean terminals, and the work in progress there, and then visited Dartmouth.

At St. John, N.B., the party visited the St. John Drydock & Shipbuilding Co.'s works at Courtenay Bay, and the site of the proposed drydock, and discussed the railway facilities required in connection with the same. Then they had a conference with the mayor, the city commissioners, the board of trade, and other representative men. A memorandum was presented by the board of trade, mentioning, among other matters, the necessity for a general development of the harbor, in order that the ocean carrying trade might be extended, and it was suggested that this could be done by the appointment of a Dominion Harbor Commission. Closer connection with the National Transcontinental Ry. by a route via McGivney Jct. was suggested; also a more extended system of government railway terminals in the main harbor of the port; a new railway passenger station; improved warehouses for freight; considerable trackage extensions, and an improved passenger train service. Mr. Hanna replied in general terms, pointing out that the directors were making a gen-

January 1919

eral inspection of the whole system, in order to gather information before adopting any policy or plans. The directors had to consider what was essential for the operation of the entire system, and for the development of the trade of the Dominion. Subsequently the party looked over the new elevator, and visited the railway properties in the city. After luncheon with the mayor at the Union Club, they left for Fredericton.

At Fredericton, on Dec. 7, the directors received a civic and trade delegation, which discussed the question of a union station for the city, a new railway bridge across the river in the city, the suggested McGivney Jct. connection with the National Transcontinental Ry., and the provision of a connection between the St. John & Quebec Ry. west of Fredericton with the railways in Maine. The party left Fredericton about noon for Montreal via McGivney Jct. and the National Transcontinental Ry. to Levis.

The provision of a direct connection between the National Transcontinental Ry. and St. John, N.B., has been agitated ever since the project for building the line was made public. After considerable discussion, plans were made in 1909 for building the St. John & Quebec Ry. from Grand Falls to St. John, but the building of the northern section from Centerville to Grand Falls is at present in abeyance, and the section south of Gagetown has been diverted to a connection with the C.P.R. at Westfield. In this way the purpose of building the St. John & Quebec Ry. has been defeated, as it has no connection with the National Transcontinental Ry., and does not enter St. John. The most recent proposal is to provide such a route via McGivney Jct., which is at mileage 79 on the old Canada Eastern

January 1919

Club, they left for Fredericton.

At Fredericton, on Dec. 7, the directors received a civic and trade delegation, which discussed the question of a union station for the city, a new railway bridge across the river in the city, the suggested McGivney Jct. connection with the National Transcontinental Ry., and the provision of a connection between the St. John & Quebec Ry. west of Fredericton with the railways in Maine. The party left Fredericton about noon for Montreal via McGivney Jct. and the National Transcontinental Ry. to Levis.

The provision of a direct connection between the National Transcontinental Ry. and St. John, N.B., has been agitated ever since the project for building the line was made public. After considerable discussion, plans were made in 1909 for building the St. John & Quebec Ry. from Grand Falls to St. John, but the building of the northern section from Centerville to Grand Falls is at present in abeyance, and the section south of Gagetown has been diverted to a connection with the C.P.R. at Westfield. In this way the purpose of building the St. John & Quebec Ry. has been defeated, as it has no connection with the National Transcontinental Ry., and does not enter St. John. The most recent proposal is to provide such a route via McGivney Jct., which is at mileage 79 on the old Canada Eastern Ry., running between Newcastle and Fredericton, and at mileage 96 from Moncton on the National Transcontinental Ry. The proposition is that export freight be diverted from the N.T.R. at McGivney Jct., taken over the old Canada Eastern line into Fredericton, thence over the St. John & Quebec Ry. and the C.P.R. into St. John.

January 1919

Steam Railway Track Laid in 1918.

A table of new track laid in 1918 by steam railways throughout Canada, made up from official replies to Canadian Railway and Marine World's annual circular, is given below. The total is 121.32 miles of new track, against 230.16 miles of new track laid in 1917. The new mileage was laid by five railways, the largest being by the Canadian Northern Ry., viz., 45.14 miles. With the exception of 4.18 miles of track laid on the Grand Trunk Pacific Ry. to secure an entrance into Saskatoon over the C.P.R., the whole of the track laid during the year was on lines owned by the Dominion Government, the New Brunswick Government, and the British Columbia Government. The distribution of the track laid by provinces was: British Columbia, 50 miles; New Brunswick, 32; Saskatchewan, 27.15; Quebec, 10; Alberta, 2.17.

	Miles.	Miles.
Canadian Northern Ry.		
Moose Jaw terminals to Grand Trunk Pacific Ry., Sask.....	1.31	
Glidden to mileage 122.88, Sask....	21.66	
Hanna towards Medicine Hat, Alta.	2.17	
Glen Lake to mileage 30, Malabot district Vancouver Island, B.C...	20.00	
		45.14
Grand Trunk Pacific Ry.		
Duro to Enger, Sask.....	3.23	
Harfeld to Yorath, Sask.....	0.95	
		4.18
Pacific Great Eastern Ry.		
From 12 miles north of Clinton, B.C., for 30 miles north.....		30.00
Quebec & Saguenay Ry.		
Mileage 15 from Cap Tormentine to Baie St. Paul, mileage 25.....		10.00
St. John & Quebec Ry.		
Queenstown to Westfield, N.B.....		32.00
Total		121.32

During 1917, the Essex Terminal Ry. laid 10 miles of track, connecting the quarries yard at Windsor with the steel works at Ojibway, of which we were not advised in time for inclusion in the table for that year.

The C.P.R. reconstructed 2 miles of track between Leaside Jct. and North Toronto, during 1918.

January 1919

Ry., India.

The Canadian Northern Ry. received the following additions to rolling stock, during Nov., 1918, ordered by the Dominion Government: 707 steel frame box cars, 40 tons capacity, from Canadian Car & Foundry Co., and 118 ballast cars, 50 tons capacity, from Eastern Car Co.

Canadian Government Railways re-

January 1919

The Canadian National Railways Inaugurated.

The following order in council was passed at Ottawa Dec. 20:—"Whereas the Minister of Railways and Canals reports that by the order in council dated Nov. 20, 1918 (P.C. 2654), the persons, from time to time comprising the board of directors of the Canadian Northern Ry. (which controls and operates the Canadian Northern Ry. System) were appointed a board of management of the Canadian Government Railways; That, as a matter of convenience in connection with the operation of both systems under one management, the use of one name as a collective or descriptive title for both systems is highly desirable, and refers to the established use of the term Canadian Northern Ry. System as a descriptive (but not corporative) title for all lines of railway owned or controlled by the Canadian Northern Ry. Co., and also to

January
1919

the use of the name Canadian Government Railways, which is also merely one of description; That the use of such a title is a mere matter of description for convenience of reference and does not create a new legal corporate entity, or affect in any manner whatsoever the legal status or the rights or obligations of the individual corporations collectively so denoted.

"Therefore His Excellency the Governor General in council doth hereby order and direct the board of directors aforementioned to use as a collective or descriptive designation the name Canadian National Railways, in lieu of the names Canadian Northern Ry. System, and Canadian Government Railways, wherever such last mentioned names are or may be at present used (including, without restricting the generality of the aforegoing, all operated and traffic forms) in respect of the whole of the lines of railway and railway properties controlled or operated by the board; provided that deeds, leases, agreements, and documents of all kinds requiring execution under seal shall continue to be drawn and executed under the respective corporate names of the corporations (including the Crown), owing or entitled to the properties affected thereby, and

January 1919

be drawn and executed under the respective corporate names of the corporations (including the Crown), owing or entitled to the properties affected thereby, and that nothing in this order shall be taken to restrict or enlarge or otherwise affect the liability of such respective corporations for any of their respective acts or omissions, the corporate entity in each case being preserved and the rights and liabilities remaining the same as heretofore, notwithstanding the use of the collective or descriptive designation herein ordered."

January 1919

D. B. Hanna, President, issued the following circular Jan. 1:—"Effective this date, the railways heretofore known as the following, viz.: Canadian Northern Ry. System, Eastern and Western Lines; Canadian Government Railways, National Transcontinental Ry., Intercolonial Ry. of Canada, Prince Edward Island Ry., will be operated under the name of the Canadian National Railways, the headquarters of which will be in Toronto. In operating and corresponding, officers of any of the above mentioned railways will in future use the name Canadian National Railways. We shall be obliged if in future the public and our connections will address their communications and reports to the proper officers of the Canadian National Railways."

Electric Railway Lines Acquired by Canadian Northern Railway.

The Toronto Suburban Ry., which operates 10.26 miles of lines on streets and highways in the western portion of Toronto and in the town of Weston, and two interurban lines on private right of way, one from Weston to Woodbridge, 13 miles; and one from Lambton to Guelph, 46.3 miles, a total of 69.53 miles, and which is controlled by Sir Wm. Mackenzie and associates, is being acquired by the Canadian Northern Ry. and will be operated as part of the Canadian National Railways.

The Canadian Northern Ry. is also acquiring the Toronto Eastern Ry. Co.'s charter and other property, which are also controlled by Sir Wm. Mackenzie and associates. This line is projected to run from Toronto to Cobourg, Ont. A contract was let and construction started in 1914, grading being done from Bowmanville west to Pickering Village, 19.5 miles, and track was laid and ballasting done from Bowmanville to Whitby, 14.5 miles. No overhead or other electrical work was done and, owing to the war, all construction was stopped.

The Chatham, Wallaceburg & Lake Erie Ry., also controlled by Sir Wm. Mackenzie and associates, will not, it is said, be taken over by the Canadian Northern. Its Toronto offices, heretofore in one of the C.N.R. buildings in Toronto, have been removed to 43 Victoria St.

The Board of Railway Commissioners

January 1919

every little detail pertaining to the special the 26 letters in the alphabet, I filed my other systems they may have in use.

The Canadian Northern Railway's Montreal Tunnel and Electric Zone Construction and Operation.

By W. G. Gordon, Transportation Engineer, Canadian General Electric Co.

The City of Montreal is divided into two principal levels; the commercial and financial quarter being on a plain only a few feet above high water, and the residential and shopping districts being at a height of about 75 ft. above the river. As the space between Mount Royal and the St. Lawrence River is limited, this district has become very congested. Business has largely forced the residence section up and down the river, and around the mountain. The tunnel under Mount Royal was built with the idea of giving the Canadian Northern Ry., which property now belongs to the Dominion of Canada, an entrance into the heart of the city, and to render available a large area for residential purposes, only a few minutes by train from the main terminal.

The location of the present temporary terminal is about midway between the two levels and it is proposed to extend an elevated line, at the same uniform grade, which will connect with the proposed viaduct on Montreal Harbor Commissioners' lines, thus giving direct access to trans-Atlantic steamers, and all the harbor facilities.

The tunnel is 3.1 miles long and is the shortest line that could be devised to take advantage of the geological formation. It has a uniform grade of 0.6% toward the city to ensure proper drainage. In order to meet the various physical conditions, different cross sections were used; where hard, sound rock, unsound rock, and soft ground, were encountered respectively. The twin section type of tunnel was adopted for economy in construction, ease and economy in ventilation, protection and safety in case of derailment or accident.

In addition to working from both ends of the tunnel, a shaft was sunk one mile from the west portal at Maplewood Ave. When the heading from the west portal met that being driven from the Maplewood Ave. shaft, the lines checked within 1/16 in. on the alignment, and ¼ of an inch in grade, and where the headings between the Maplewood Ave. shaft and that from Dorchester St. met, under the highest point of Mount Royal, the error was ⅝ of an inch in alignment, and ⅛ of an inch in grade.

The method employed was to drive a bottom center heading about 8 ft. high by 12 ft. wide, as this heading could be driven ahead rapidly without much regard for the character of the ground, and full sized excavation could be developed from it at as many places, simultaneously, as desired. Four drills were used in each heading, supported on a horizontal bar; the drills being operated by compressed air at a pressure of about 100 lb. a sq. in. The breakups, where the upper part of the tunnel section was excavated to its full width and height, were opened at intervals of from 500 to 800 ft. along the center bottom heading, the practice being to open up as many of these as necessary to keep up with the heading progress. The compressed air used for operating the drills and other pneumatic machinery was obtained from two plants, one at each end of the tunnel, with an aggregated capacity of 11,000 cu. ft. of free air a minute, compressed to 110 lb. to the sq. in. The muck from the tunnel was handled by two 10-ton and one 8-ton trolley locomotives, and six 5-ton storage battery locomotives.

The load curve was worked up on the following data of train weights and speeds:

Class.	Trailing tons	Speed level	0.6% up grade	Schedule
Transcontinental..	1180	37.0	26.5	21.2
Express and local.	550	37.5	27.1	21.6
One motor car....	60	50.0	41.5	22.2
Three motor cars..	180	50.0	41.5	22.2
Three motor cars and two trail cars...	280	47.3	34.3	21.8
Freight.....	1000	32.5	23.5	...8

The substation is a handsome building, and will harmonize with the buildings which will be erected in the neighborhood. Power is purchased from the Montreal Light, Heat & Power Co. at 63 cycles, 11,000 volts, 3 phase. It is delivered to the substation by a lead covered, 3-conductor cable, carried in a duct through the tunnel, and also by an overhead line, to ensure continuity of service. The general arrangement and capacity of the switching equipment provides for the later addition of a steam auxiliary plant at the Back River, near the Cartierville yards, for extension of the electrification of the main line to Ottawa.

There are 2 motor generator sets with provision for a third, later. Each of these sets consists of a synchronous motor, direct coupled to and on common bedplate, with two 750 k.w., 1,200 volt, d.c. generators, the set running at 600 r.p.m. The generators are connected in series, giving 1,500 k.w. at 2,400 volts per unit. The sets have an overload capacity of 200% for 5 minutes. The heavy overload capacity of these machines is obtained by the use of a pole face winding of tubes and rods through holes near the pole faces, which is so connected as to directly oppose the armature reaction, thus ensuring satisfactory operation up to the heavy overload mentioned. The pole face windings are all connected on the ground

February 1919

side of these machines. The shunt fields of the d.c. generators and the synchronous motor fields are arranged for 125 volt excitation. Each of the synchronous motors is started by a 3 phase, 11,000 volt compensator. This auto transformer has one coil per phase, with suitable starting tops brought out.

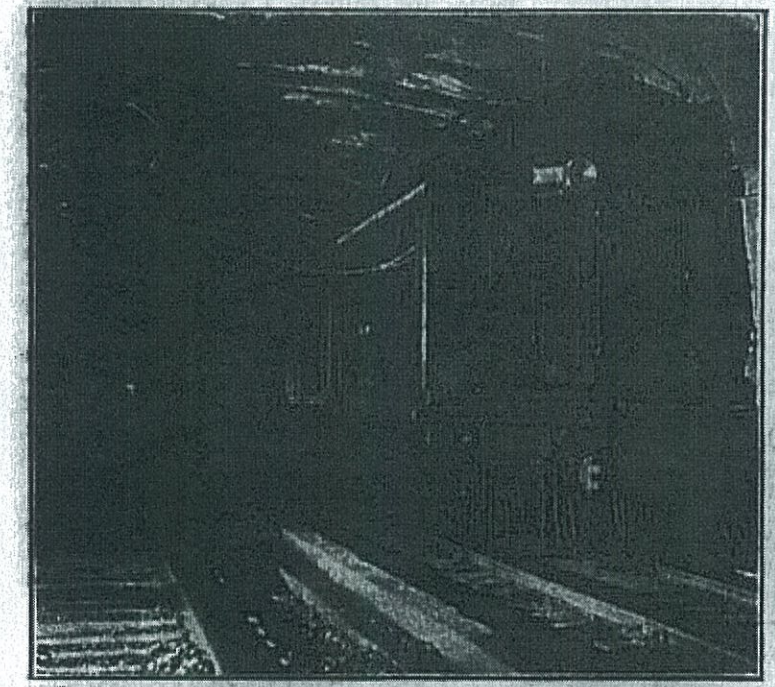
The 3 exciter sets each consist of a 50 k.w., 125 volt, d.c. generator, driven by induction motor. The generators are commutating pole type, flat compounded for the specified voltage, and are especially

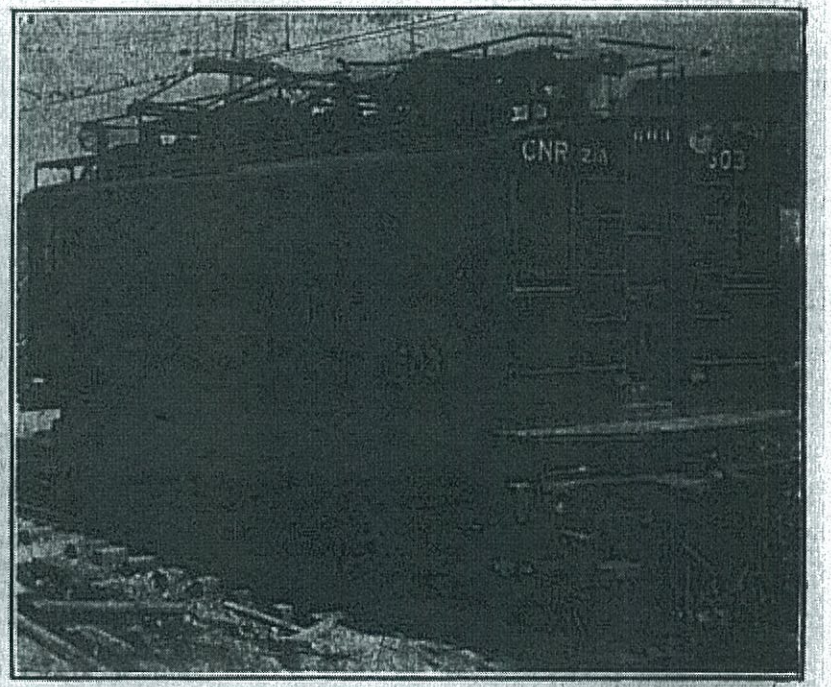
line switches excepted, either instantaneously or with a time limit action as desired. The incoming line switches operate automatically on the reversal of power only. The synchronous motor starting switches are remote control, solenoid operated, mounted in cells, and have a rupturing capacity of 2,000 arc amperes at 11,000 volts.

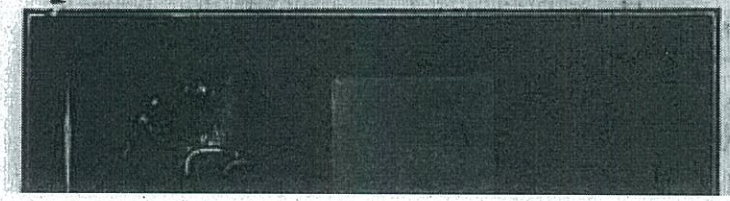
The main switchboard is of three section panels of natural black slate, 90 inches high. The 2,400 volt direct current circuit breakers and lever switches

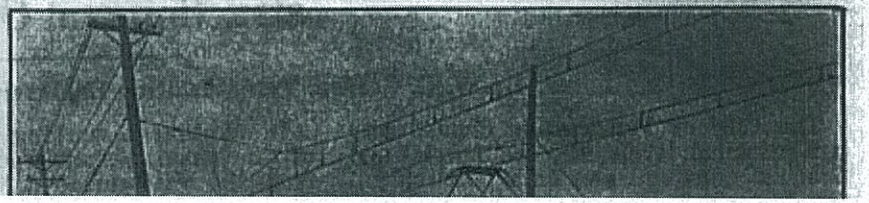
weight of the locomotive upon the 8 driving wheels. The running gear consists of two 4-wheel trucks, articulated together by a heavy hinge. The equalization of the trucks is accomplished by a semi-elliptic leaf spring over each journal box, connected through spring hangers to the frame and to the equalizer bars. The equivalent of a 3-point suspension is thus obtained through the side equalization of one of the trucks and both side and cross equalization of the other truck.

The friction draft gear is mounted in

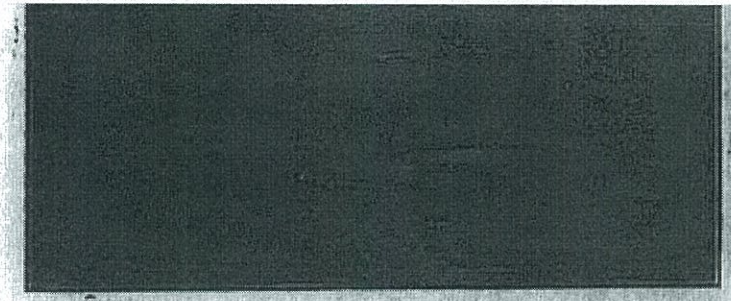


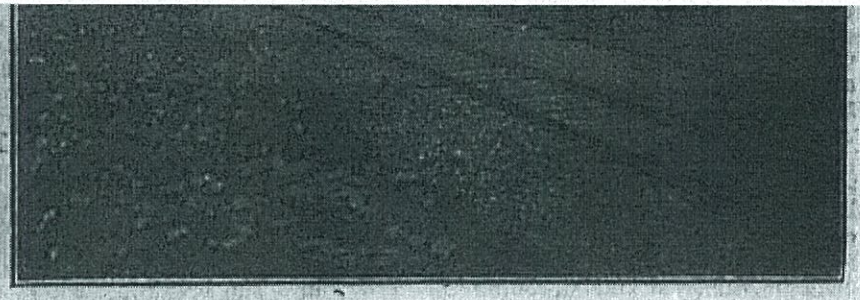






February 1919





Montreal Terminals Electrification, Canadian Northern Railway.

Upper row: Left, locomotive pulling in messenger and taking current from opposite track. Right, locomotive with low catenary construction. Lower row: Left, control apparatus in operator's cab. Right, catenary construction tangents.

adapted for exciter work and voltage regulator control. A bank of six 100 k.w. single phase transformers supply the induction motors of the exciter sets and miscellaneous station requirements.

All oil switches on the 11,000 volt circuits, except the synchronous motor, magnetizing and starting switches, are enclosed in masonry cells, and have 2 breaks per pole, each break in a separate tank. These switches have a rupturing capacity of 16,000 arc amperes at 11,000 volts. They are motor operated and will open automatically on overload, the incoming are mounted on a panel, back of and above the main switchboard. They are operated by insulated handles on the front of the main board, so as to eliminate any possibility of the operator coming in contact with the 2,400 volt circuit. The circuit breakers are mounted between fireproof barriers and are equipped with powerful magnetic blowouts. The field switches are mounted on a base back of the panels with the operating handles on the front of the main board.

There are 6 locomotives in operation. Each locomotive has 4 axles, with all the the end frame casting of the truck. This type of construction restricts the hauling and buffing stresses to the truck side frames and articulated joint, thus relieving the cab and apparatus from the effects of severe shocks. The cab, which is of the box type, is divided into 3 compartments, the center one for the apparatus, and the two end ones for the operator. Each operator's compartment is supplied with controller, control switches, ammeter, air brake and pantograph control, air gauges, 2,400-volt cab heater, bell rope, and control for the whistle and

February 1919

sanders, thus providing the locomotive with complete double end control. The motors are nose-supported in the usual way, and geared to the axle by twin gears, each of 4 in. face.

The motor equipment consists of 4 GE-229-A commutating pole motors, wound for 1,200 volts and insulated for 2,400 volts, 2 of these motors being permanently connected in series for operating on the 2,400 volt trolley circuit. The one hour rating of each motor is 320 h.p. at 1,200 volts. The motors are designed for forced ventilation, which is obtained by a blower in the locomotive cab. Either pair of motors may be cut out, by a special handle on the change-over switch. The locomotives are geared for a free running speed on tangent level track of approximately 45 m.p.h., and are operated as 2-speed machines, with 10 points in series and 9 points in series and 9 points in series-parallel. The master controller used is of the non-automatic type, and has 2 handles, one regulating the applied voltage at the motors and the other for controlling the direction of rotation of the motors. The rheostats, which form the external motor resistance, are placed near the roof of the cab and provided with ample natural ventilation.

The master controller and contactor

Overall height; pantograph down	15 ft. 6 in.
Height over cab	12 ft. 10 in.
Overall width	10 ft. 0 in.
Total wheelbase	28 ft. 0 in.
Rigid wheelbase	8 ft. 8 in.
Total weight, all on drivers	82 tons
Wheel diameter	48 in.
Tractive effort at 30% tractive co-efficient	49,800 lb.
Tractive effort at one-hour rating	20,300 lb.
Tractive effort at continuous rating	16,200 lb.
Speed at rated amperes, one-hour rating	23.4 m.p.h.
Total horse power, one-hour rating	1280 h.p.
Speed at rated amperes, continuous rating	24.6 m.p.h.
Total horse power, continuous rating	1090 h.p.

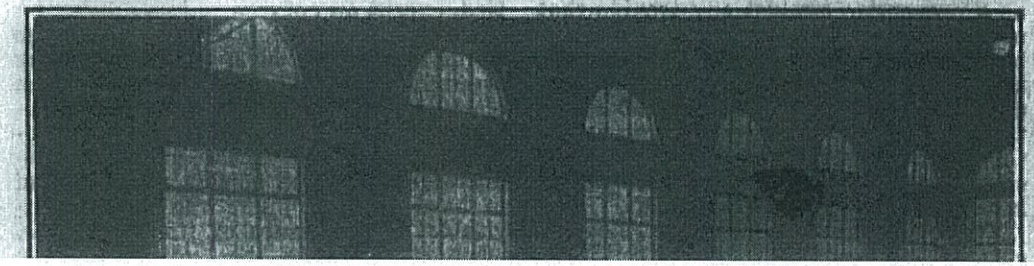
Gearing, 80-25. Reduction, 3.2.

The multiple unit motor cars for handling local traffic are not yet in operation. The principal dimensions of these cars are given in the following table:

Length over buffers	67 ft. 5⅝ in.
Length over body corner posts	57 ft. 6¼ in.
Truck centers	42 ft. 9 in.
Width over side sill angles	9 ft. 10½ in.
Width over eaves	10 ft. 2¾ in.

commutating pole motors insulated for 2,400 volts. Two of these motors are permanently connected in series for 2,400 volt operation. Ventilation of the motor is accomplished by drawing air into the armature at the pinion end by the fan on the armature shaft. The air passes longitudinally through the whole interior of the motor and is expelled through an opening in the frame at the commutator end, protected by wire mesh.

The control is of the non-automatic type for multiple unit operation. The equipment includes a motor generator set for furnishing 600 volt current for the control circuits, the air compressor and lighting circuits. This set consists of two 1,200 volt motors, operating in series on 2,400 volt, direct connected to a 600 volt generator. The master controller, contactors, switches, reverses and pantograph



February 1919

contactors and for lighting the cab and headlights is obtained from a motor-generator set, the motor of which has two 1,200 volt windings and two 1,200 volt commutators in series for operation on 2,400 volts. This set is mounted in the center cab and also drives the blower for providing forced ventilation to the main motors.

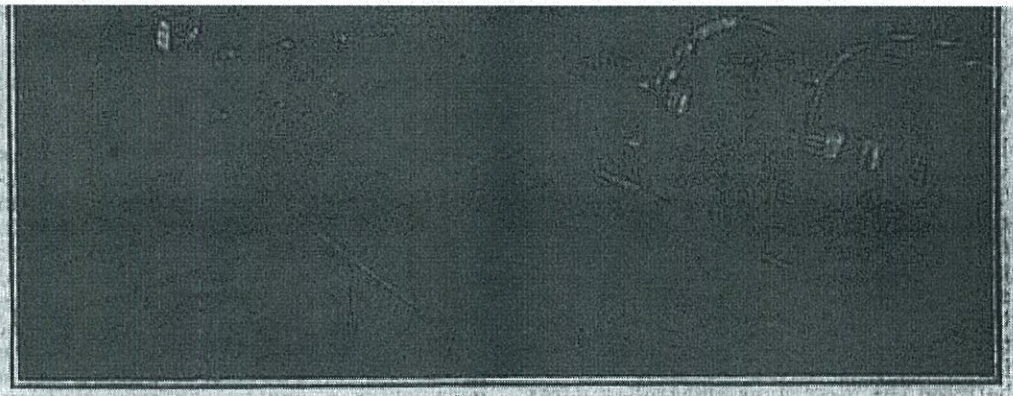
Fuses of the copper ribbon type, placed in fuse boxes, provide protection for each individual circuit, as well as the main circuit from the trolley. These fuse boxes are all arranged to blow into a common chamber, designed to take care of the arc. In addition to the fuse on the main circuit, a main switch is also provided. This is of the knife blade type, being opened and closed by a handle, in a position for easy operation in case of emergency, or when it might be necessary to open the circuit while carrying current. This main switch blows into the chamber provided for the fuses, and has a powerful magnetic blow-out.

The trolleys are of the slider pantograph type, pneumatically operated and mounted on insulated bases. Two pantographs are used per locomotive.

A speedometer, similar to the type largely used on automobiles, but especially designed for locomotives, is located in each operating cab. These are connected to the driving wheels of the locomotive by flexible shaft and gearing.

A combined straight and automatic air-brake equipment is provided on each locomotive. It includes a 2,400 volt motor driven air compressor, the set consisting of two 1,200 volt motors, operating in series on 2,400 volts, and direct connected to an air compressor having a displacement of 100 cu. ft. of free air a minute. The approximate total weight of each locomotive is 83 tons. Some of their principal dimensions and characteristics are given in the following table:

Length inside knuckles	37 ft. 4 in.
Length over cab	31 ft. 0 in.
Height top of rail over roof	13 ft. 0 in.
Height top of rail to underside of side sill	3 ft. 7½ in.
Center to center of body side bearings	4 ft. 10 in.
Center to center deck sills	5 ft. 6 in.
Approximate weight loaded and equipped	160,000 lb.



Switchboard in Substation, Mount Royal Tunnel.

The electric hot air system of car heating is used. One complete heater is placed underneath each car and receives its energy direct from the 2,400 volt supply. The heater has a capacity of approximately 25 k.w. and is constructed for 2 heat combinations, so as to provide for changes in temperature conveniently and economically. The complete heating equipment consists of the heating unit, blower and regulating mechanism, the controlling switch and thermostat of the regulating mechanism being arranged for operation from the 600 volt supply. Air is forced over the heating unit by the blower, and distributed to the car through the air ducts along the sides of the car. The blower used for the circulation of the air is operated by a motor, which is connected in series with the heating unit on the ground side. The capacity of the blower is approximately 1,000 cu. ft. of air a minute.

The motor equipment consists of 4 fully ventilated GE 239-a, 125 h.p., 1,200 volt, are essentially the same construction and appearance as those already described for the locomotives. The controller has 5 steps in series and 4 steps in parallel. It differs from the locomotive controller in having the usual motorman's operating handle, instead of a lever. This handle is provided with the so called "dead man's" feature, for cutting off power and applying the air brakes in case the motorman removes his hand. Copper ribbon fuses, similar to those on the locomotive, are used, and an aluminum cell lightning arrester is installed on each car.

[EDITOR'S NOTE.—The multiple unit cars have not yet been built, so the description must be taken as applying to what is intended.]

Special local conditions and extremely low temperatures introduced features, making the design of the catenary system for this electrification somewhat out of the ordinary. The present electrified track is about 10 miles long and in this distance there is a passenger terminal station and passenger car yard in the city, a double track tunnel, double tracks in a cut with low clearances under highway bridges, a long stretch of single track, both tangent and curve, and a large freight yard with repair shops and storage tracks. The

February 1919

temperature in the coldest winter weather reaches 35 deg. below zero; while in the hottest summer weather it will go as high as 110 in the sun. In the early spring severe sleet storms sometimes occur.

The poles are of eastern white cedar. The specifications for these poles, and also for the creosote oil used as a preservative, were based upon those of the National Electric Light Association. Steel poles are used in the terminal yard in the city, on account of their more sightly appearance. The wood poles are set 7 ft. in the ground and are all back-guyed. They are long enough to carry 2 cross arms for feeders, signal circuit and a 3-phase transmission line for supplying the shops in the Cartierville yard with electric power. On top of the poles there is a no. 000 copper ground wire, which serves both as a protection against lightning for the circuits on the poles, and also as a preventive against any trouble that might be caused by breakage of the rail bonds, which latter are of the welded V-type. The poles throughout the single track construction are spaced 150 ft. on tangents and 120 ft. on the 2-deg. curve. On the double-track portion, where the overhead clearance is limited, the spacing is reduced to 105 ft. on tangents.

The messenger for the electrification outside the tunnel consists of a ½ in., 7-strand Siemens-Martin steel cable, with an ultimate strength of 11,000 lb. and an elastic limit of 6,600 lb. Two no. 0000 copper feeders are installed, one the full length of the electrification outside the tunnel, and the other for about a mile west of the substation. The messenger is anchored every half mile by running the end of one half mile length past the end of the next for a distance of one span.

keep the trolley wires the right distance apart at certain points, such as where the trolley wire for a turn-out approaches the main trolley wire at an angle. Each link is composed of 2 malleable iron brackets, with clamp ears, connected by a ½ in. pipe, the length of which is adjusted between the brackets and held by set screws.

Egg type insulators are used in two sizes. The larger, used with a ½ in. and ⅜ in. steel cable, withstands a wet flash-over test of 14,000 volts, and has a breaking strength of 22,000 lb. The smaller, used with ⅜ in. and ¼ in. steel cable, withstands the same voltage test, and has a breaking strength of 12,000 lb. The insulator used on the bracket construction is of the ordinary glazed porcelain, double petticoat, pin type, 4¼ in. in diameter. It has a wet flash-over test of 20,000 volts. The messenger rests in the groove in the top of this insulator, and is not tied, except on curves.

The contact wire is of special bronze composition, size 0000, with a breaking strength of 65,000 lb. a sq. in. and an elastic limit of 39,000 lb. a sq. in. Its section is American Electric Railway Association's standard 0000 grooved trolley wire. The use of this wire, instead of hard drawn copper, was thought advisable, both because of its longer life, when subjected to the wear caused by sliding pantographs, and also because it could be pulled up tighter than copper, on account of its greater streigth. This latter reason was considered of special importance, because of the wide variation in temperature in Montreal, with the consequent great variation in the sag of ordinary copper trolley wire between winter and summer.

The trolley wire is hung straight over the center of the track, as the natural

atmospheric temperatures. The right sag at any given temperature was also of importance, as a check on the tension. This information was supplied in tables to which the line gang worked, the sags and tensions being given at 5 deg. intervals. In the tunnel the overhead clearance was so limited that the catenary had to be very flat. This meant pulling the messenger up very tight for spans of reasonable length. A cable of phosphor bronze was decided upon, composed of 19 wires, and having an overall diameter of 0.888 in. This cable has an ultimate breaking strength of 22,000 lb., and an elastic limit of 18,600 lb. This messenger is supported every 90 ft. from the roof of the tunnel by a combination of iron yokes held in the concrete by four 1-in. bolts. The cross yoke carries the messenger insulator, and is supported on two insulators carried on the 2 end yokes, so that there are 2 insulators between the messenger and the ground. The insulators are of glazed porcelain, and have a wet flash-over test of 20,000 volts. All clamps and small parts of the messenger supports are of malleable iron sherardized. The yokes are of 2 x ⅝ in. and 1½ x ⅞ in., mild steel, painted with an asphaltum compound as a protection against rust.

Two no. 0000 phosphor-bronze contact wires hang side by side from the messenger. The hangers for each contact wire are spaced 15 ft., or 7½ ft. between adjacent hangers. The hanger lengths very from 6 in. to 13¾ in., with 90 ft. span. The 2 hangers nearest the messenger support, viz., those 11¼ and 13¾ in. long, are made with 2 loops, one sliding inside the other, where the clearance to the roof is small. The remaining hangers are similar to those used outside the tunnel, except that the loop is wider, in order to

February 1919

7-strand Siemens-Martin steel cable, with an ultimate strength of 11,000 lb. and an elastic limit of 6,600 lb. Two no. 0000 copper feeders are installed, one the full length of the electrification outside the tunnel, and the other for about a mile west of the substation. The messenger is anchored every half mile by running the end of one half mile length past the end of the next for a distance of one span. It is then made fast to an anchor eye on the bracket, through an insulator and turn-buckle, and the same point of the bracket is guyed back to the next pole, which in turn is guyed against this strain. The two messengers, where they pass each other, are kept from 8 to 10 in. apart. By anchoring the trolley wire on the same bracket, the anchorage becomes a section insulation, the air space between the messenger and trolley wires forming the insulation. Where a section insulator is not required, a copper jumper is placed between the messenger and trolley wires. For the double track portion of the line, cross-span construction is used, the cross-span being a ⅝ in., 7-strand Siemens-Martin steel cable. The messenger is fastened to this by a small malleable clamp. This cross-span is made up with a turnbuckle, strain insulator, and wedge grip in each end, and fastened to the poles by means of eyebolts.

In yard work spanning more than 2 tracks, the construction is similar, but with the addition of a cross messenger of ½ in. cable above the ⅝ in. cable. This cross messenger is made fast to the poles directly, without insulators or turn-buckles, and carries the weight of the spans below through lengths of ¼ in. steel cable. These fasten to eyes in the tops of the messenger hangers, and to to the cross messenger, by Crosby clips. There is a strain insulator in each of these lengths.

Pull-offs are used on curves, for holding the contact wire and messenger in the correct position over the track, and at intervals on long tangents, for steadying the contact wire. The pull-offs are made of sherardized steel tubing, bent to avoid fouling the pantograph. Each pull-off is fitted with a clamp ear at one end and an eye at the other. Adjustable links are sometimes required with the pull-offs, to

[illegible] could be pulled up tighter than copper, on account of its greater streigth. This latter reason was considered of special importance, because of the wide variation in temperature in Montreal, with the consequent great variation in the sag of ordinary copper trolley wire between winter and summer.

The trolley wire is hung straight over the center of the track, as the natural side sway of the pantograph is sufficient to prevent wearing grooves in the contact strips. The height of the trolley wire above top of rail is ordinarily 23 ft., except along the double track construction and in the tunnel, where it is 16 ft. In this section 2 wires are used over each track. They hang side by side, supported from the same messenger, the hangers of one wire being staggered with those of the other. These double wires do not raise the hanger loops as high as would a single wire, when a pantograph passes along, which is an obvious advantage where the head room is limited. Sparking and consequent wear, both of the contact shoes and contact wires, is reduced to a minimum, as there is always good contact between the slider strips and one of the contact wires. The hangers are all of the long-loop type, having a malleable iron, single bolt, clamp ear, and a strap varying in length to suit its position in the span. All parts are sherardized. In spans of all lengths from 150 ft. to 90 ft. the hangers are spaced 15 ft. apart.

Lightning arresters of the magnetic blow-out type are installed at half mile intervals. The arrester is placed near the top of the pole, and the ground wire run down the pole to a ¾ in. iron pipe driven about 10 ft. into the ground. Before driving this pipe, a 2 in. pipe was driven down about 5 ft., then withdrawn and the hole filled with rock salt. The ¾ in. pipe was driven down through the salt. In addition to these arresters on the poles, aluminum cell arresters are installed in the substation on the positive busbars and on each feeder.

In order to string the messenger cable with the proper tension, a dynamometer was used. It was therefore necessary for the foreman of the line gang to know what the tension should be at different

are spaced 15 ft., or 7½ ft. between adjacent hangers. The hanger lengths very from 6 in. to 18¾ in., with 90 ft. span. The 2 hangers nearest the messenger support, viz., those 11¼ and 18¾ in. long, are made with 2 loops, one sliding inside the other, where the clearance to the roof is small. The remaining hangers are similar to those used outside the tunnel, except that the loop is wider, in order to take the larger messenger. It was found that the 2 messenger cables and the 4 contact wires over the 2 tracks in the tunnel would give ample conductivity, so that no feeders through the tunnel were required. Both the messenger and contact wires are anchored every half mile. Two bridles of ½ in. steel cable are fastened to the messenger by six ⅞ in. Crosby clips, and the ends of the bridles are fastened each way, through 2 cemented-type strain insulator in series, a turnbuckle and wedge grip, to roof plates. The contact wire is anchored by lapping the ends for one span and then carrying each end up and slightly to one side of the center, making fast to a roof plate through 2 insulators, a turnbuckle and a wedge grip.

At the only curve in the tunnel, one of 2-deg., 2 pull-offs are placed in each span, over each track, one for each of the contact wires. The pull-offs are fastened to the tunnel arch through 2 strain insulators in series by an expansion bolt. The 2 pull-offs are placed 7½ ft. apart, and this arrangement prevents hard spots and at the same time keeps the 2 contact wires close enough together for satisfactory operation.

The United States Court, sitting at Grand Rapids, Mich., on Dec. 27, refused to grant the Grand Rapids, Grand Haven & Muskegon Interurban Ry.'s application to prevent the state from enforcing the 2c a mile railway rate. This is a matter in which the G.T.R. is interested.

Vancouver, B.C., merchants are asking the railways running into the city to abandon the 5c arbitrary rate, and a report states that the Board of Railway Commissioners may be appealed to upon the matter by the Vancouver Board of Trade.

February 1919

The Grand Trunk Pacific Railway System Placed in the Hands of the Minister of Railways, as Receiver.

While the serious condition of the G.T.P.R. finances has been well known for several years, the announcement made on Mar. 8, that the Dominion Government had appointed the Minister of Railways, Hon. J. D. Reid, as receiver for the system, including all subsidiary companies, came with dramatic suddenness, and was probably as great a surprise to the company's officials as to the public. The correspondence which led up to this action, the order in council appointing the receiver, and subsequent correspondence, are given in the order of their dates as follows:

G.T.R. Says it Will Be Unable to Pay Interest.

Frank Scott, Vice President and Treasurer, G.T.P.R., wrote the Finance Minister, and acting Prime Minister, Sir Thomas White, Feb. 25, as follows:

"Referring to our recent conversations

With reference to the balance of the appropriation of the vote of $7,500,000 by parliament, $923,311 was paid to your company on your certificate no. 10, dated Jan. 28, 1918, approved by the acting Deputy Minister of Railways. This certificate expressly states that this sum is 'on account of cash deficit in the operations of the company from April 1, to Nov. 30, 1918, inclusive,' and 'is required to enable the company to meet its operating obligations.' The small balance of the vote amounting to about $28,000, will, I understand, be required for the same purpose. There seems no doubt that the deficit in operation should have priority over all other charges.

"I have already informed Mr. Kelley, President of the company, and yourself, that it is not the intention of the government to ask parliament to provide a further vote for the G.T.P. while our ne-

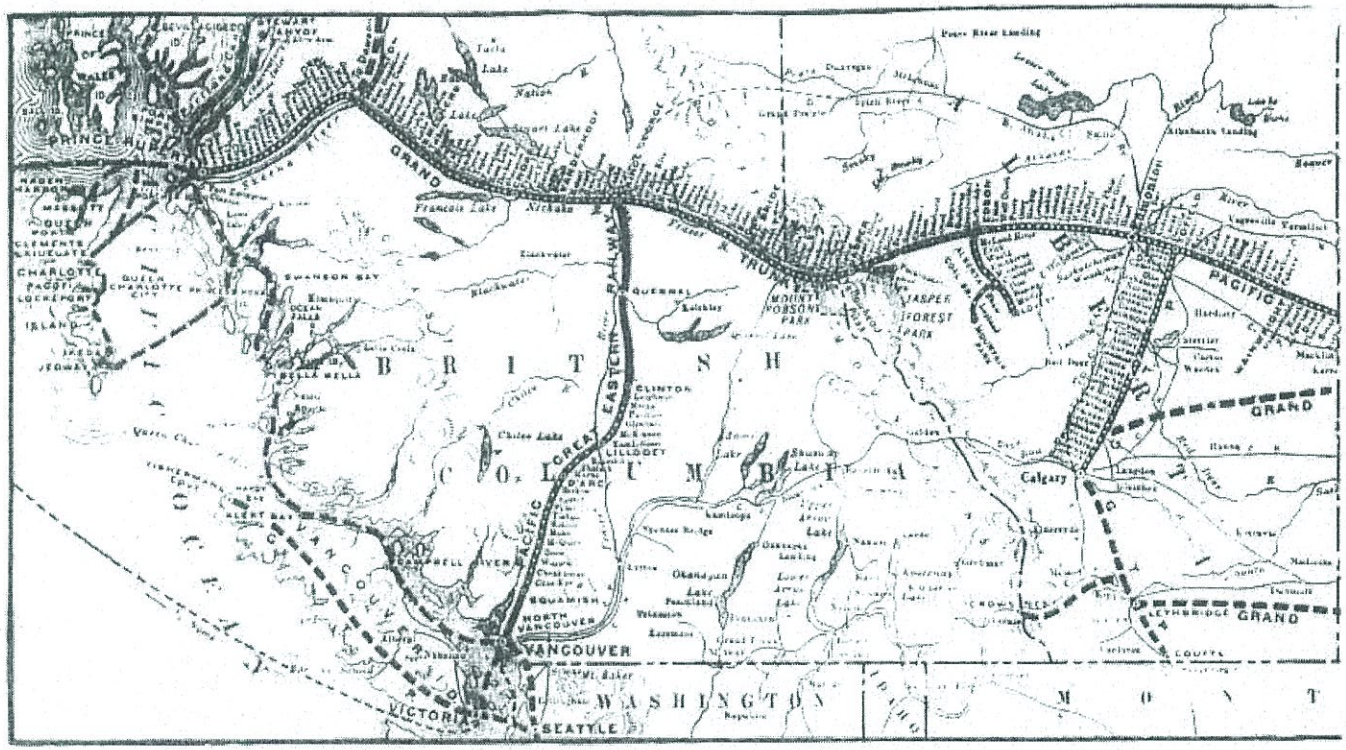
Mar. 5, simply acknowledging his letter of Mar. 4, stating the company's intention to discontinue operations after Mar. 10.

Order in Council Appointing the Minister of Railways as Receiver.

The following order in council was passed at Ottawa, Mar. 7.:—

Whereas under the authority of The Appropriation Act no. 2, 1918, the Governor in council advanced $7,471,399.93, or thereabouts, to the Grand Trunk Pacific Ry. Co., for certain purposes in said act defined, including the meeting of deficit in operation of the G.T.P.R. System, such sum being in addition to other large sums previously advanced under previous authority for similar purposes.

And whereas a letter dated Mar. 4, 1919, from the Vice President of said



company was received by the Minister

April 1919

place be erected at once to replace the one destroyed by fire several years ago.

Canadian Northern Ry.—In reference to a press report stating that plans were being prepared for a line from Montreal to La Tuque, Que., we are officially advised that the company already has a line between these points, and does not require a second one.

Tenders were received recently for the following works:—

For the construction of 8 abutments and one culvert between Sydenham and Ottawa on the Rideau subdivision, and for the construction of 2 concrete culverts and 2 concrete abutments at mileage 17.1 and 17.5 on the Pembroke subdivision, Ottawa-Port Arthur line.

Tenders will be received to April 3, for the construction of 2 concrete abutments and concrete culverts between Oshawa and Cobourg, on the Trenton Subdivision; and for track filling and concrete work on the Muskoka Subdivision between mileage 130 and 149, Parry Sound; the construction of concrete piers at the Seguin River crossing on the industrial spur, Parry Sound, and train fitting and

April
1919

Canadian National Railways Construction, Betterments, Etc.

Construction plans for the year.—A large number of deputations from various parts of Western Canada, waited upon D. B. Harris, President, Canadian National Rys., Mar. 5, to urge the building of lines through the territories in which they are variously interested. The ideas of the deputations, as to what lines should be built and where they should pass existing lines, and the reasons why they should be built were given at length. We understand that due consideration was given to the suggestions, and that while, necessarily, some of them cannot be acted on, others will be. Other deputations have urged the construction of new lines, etc., in Eastern Canada.

Prince Edward Island Ry.—Superintendent Grady is reported to have said Mar. 13, that as soon as weather conditions permit the work of laying a third rail on the line will be proceeded with, and that it is hoped to have the work completed by the end of July. The work at Emerald includes the building of a concrete work on the Sudbury Subdivision between Parry Sound and mileage 30. Also for the construction of 6 abutments and 2 culverts between Gormley and Mount Albert, on the Muskoka Subdivision.

In connection with the prospective line from Toronto to Hamilton and on to the Niagara frontier, A. G. Garden, President Hamilton Board of Trade, sent the following telegram to President D. B. Hanna, Mar. 5: "What prospect is there for the extension of the Canadian National System through Hamilton to the frontier?" Mr. Hanna replied from Ottawa ,on Mar. 7 as follows: "Canadian Northern Ry. acquired right of way to and through Hamilton for the construction of line from Toronto through Hamilton to Niagara frontier, and absolutely requires the whole width of right of way which we own through your city for our purposes. Board of directors of Canadian National Rys. are on record as approving of the early construction of this line, and arrangements are now under

to Melfort on the north, and from Vonda on the south, to Saskatoon, is being looked into.

It is probable that the Canadian Northern prairie territory, track will be laid on some 200 miles already graded and that about 150 miles of new line will be built, making about 350 miles of new branches will be taken from the main line, making a total of about 740 miles of track to be laid altogether.

We are officially advised that the tunnels proposed to be built in the Rosebud Valley, Alta., are situated between mileage 191.9 and 193.8 on the Calgary-Vegreville line and will form part of the revision of location for that distance. The object of the revision is to eliminate 6 crossings of the Rosebud River, the line being carried at present on temporary timber structures. The revision will also eliminate some bad curvature, and will effect a saving of about 0.4 of a mile of track. Outside of the tunnel work, there will be about 125,000 cu. yd. of excavation necessary. The work to be done has no unusual engineering features.

Railway Finance, Meetings, Etc.

April 1919