

CANADIAN  
PACIFIC  
ONTARIO &  
QUEBEC

NORTH  
TORONTO  
C. H. RIFF

## North Toronto Station. Canadian Pacific Railway.

A short preliminary description of the station which the C.P.R. is building in the north end of Toronto for joint use with the Canadian Northern Ry., appeared in *Canadian Railway and Marine World* for July. For some time work has been progressing on track elevation across the north end of the city the new station forming a part of the whole general scheme which involves the raising of the tracks for about 3 miles with the elimination of all grade crossings. This line has been used by the C.P.R. principally as a freight cut off between Leaside Jct. and West Toronto from which point the main line runs down to the union station in the lower part of the city. Origin-

work has been started, the excavations and foundations being nearly completed. This station has been designed on a larger scale than would be required for C.P.R. traffic alone, as the Canadian Northern in planning a permanent entrance into Toronto decided on the northerly entrance, arrangements being made with the C.P.R. to build the station, the C.N.R. to use it jointly as a terminal. It is the Canadian Northern's intention to use this station for most, if not all, of its Toronto passenger service but the C.P.R. will retain its connection with the present union station near the water front only using the North Toronto station for certain trains.

by two lower sections containing the station facilities. On the Yonge St. side there will be a 140 ft. clock tower, the 30 ft. spire of which will be of terra cotta. The station building will be 114 x 78 ft., the broader side facing south, with the tracks on the north side passing it at an angle of about 15 degrees. The central or high section of the station will be the main waiting room, 70 x 51 ft., with a centrally located entrance from the driveway on the south side. Flanking this waiting room on the west will be the ticket offices and telegraph offices. Flanking the east side of the waiting room will be the women's room, smoking room, lavatory facilities, and telephone booths. Adjoining the waiting room in the north-east corner will be the news stand and staff lavatory. Directly opposite the main



Fig. 1.—New North Toronto Station for Joint Use of Canadian Pacific and Canadian Northern Railways.

ally the Leaside-West Toronto line was the only entrance into Toronto of the Ontario and Quebec Ry., which was absorbed by the C.P.R. in its early days, and subsequently a connection was built from Leaside Jct. to connect with the union station, and all passenger trains from the east were run over it. For several years a connecting stub line service was operated both ways between Leaside Jct. and West Toronto, and about three years ago the C.P.R. decided to make use of the line from North Toronto to Leaside Jct. for passenger traffic, starting therefrom one of its Toronto-Montreal night trains, and running one of the Montreal-Toronto night trains into it. This proved such a success that a further development of the northern entrance was decided on. The smallness of the existing station made necessary further accommodation, the result of which is the new station on which

A perspective of the new station is shown in fig. 1, a ground floor plan in fig. 2; and the trackage arrangement in the station vicinity, with its relation to the city transportation conveniences, in fig. 3. The station is being built on the east side of Yonge St., at the present end of the Toronto Ry.'s Yonge St. line, which passes down through the centre of the city. With this convenient and through street car line, the new station will be very easily reached from the business centre of the city. The rapid growth of the city northward makes the North Toronto location particularly available for that section of the city, the new location being more centrally located with regard to the centre of population than the present down town union station.

The new station will be a single storey brick and stone structure, the central section of which will have a high roof, flanked

entrance will be the entrance to the midway under the tracks. The vestibule under the tower will lead into the concourse along the north side of the west end of the waiting room, connecting at its east end with the midway. The south and west sides of the station will have a sidewalk, so that passengers may either alight at the main entrance centrally on the south side, or at the tower vestibule, the expectation being that the latter entrance will be used by the majority of passengers who have already secured their tickets, and only require to pass directly to the trains, relieving the main waiting room of much of the congestion that might otherwise occur. Along the west side of the station there will be a 15 ft. driveway, so that vehicles may drive up to either station entrance, and pass through under the tracks through this driveway and out on Yonge St. to the north of the station.

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The midway will be a passage 30 ft. wide passing from the rear of the station to the far side of the tracks, under the latter. The elevation of the tracks makes a difference in grade between the track platforms and the station level of 15 1/4 ft., giving a headway in the midway of about 14 ft. Passing over the midway will be 6 through tracks, the two southerly for eastbound passenger

provided with umbrella roofs, and provision has been made for their future extension to 1,190 ft. These platforms will be reached from the midway by two 6 ft. stairways on the east side. The plans provide for future stairways opposite the present proposed stairways, and another to a platform contemplated for the south side of the tracks. The baggage room, 137 x 62 ft., will oc-

cupy all the section beneath the tracks between the midway and Yonge St. driveway. From the latter the baggage is to be raised through 4 doorways, and will be rolled on trucks to the platform level by two 15 x 5 1/2 ft. elevators. Provision is made for a future elevator to the contemplated southerly platform. From the south-west corner of the baggage room a spiral

stairway will ascend to the track level, where the station master's office will be located in the tower above the vestibule. Passenger communication with the baggage room will be through the vestibule. The building will be of brick construction, faced with Tyndale stone, while the section under the tracks will be of steel and concrete construction. Around the sidewalk

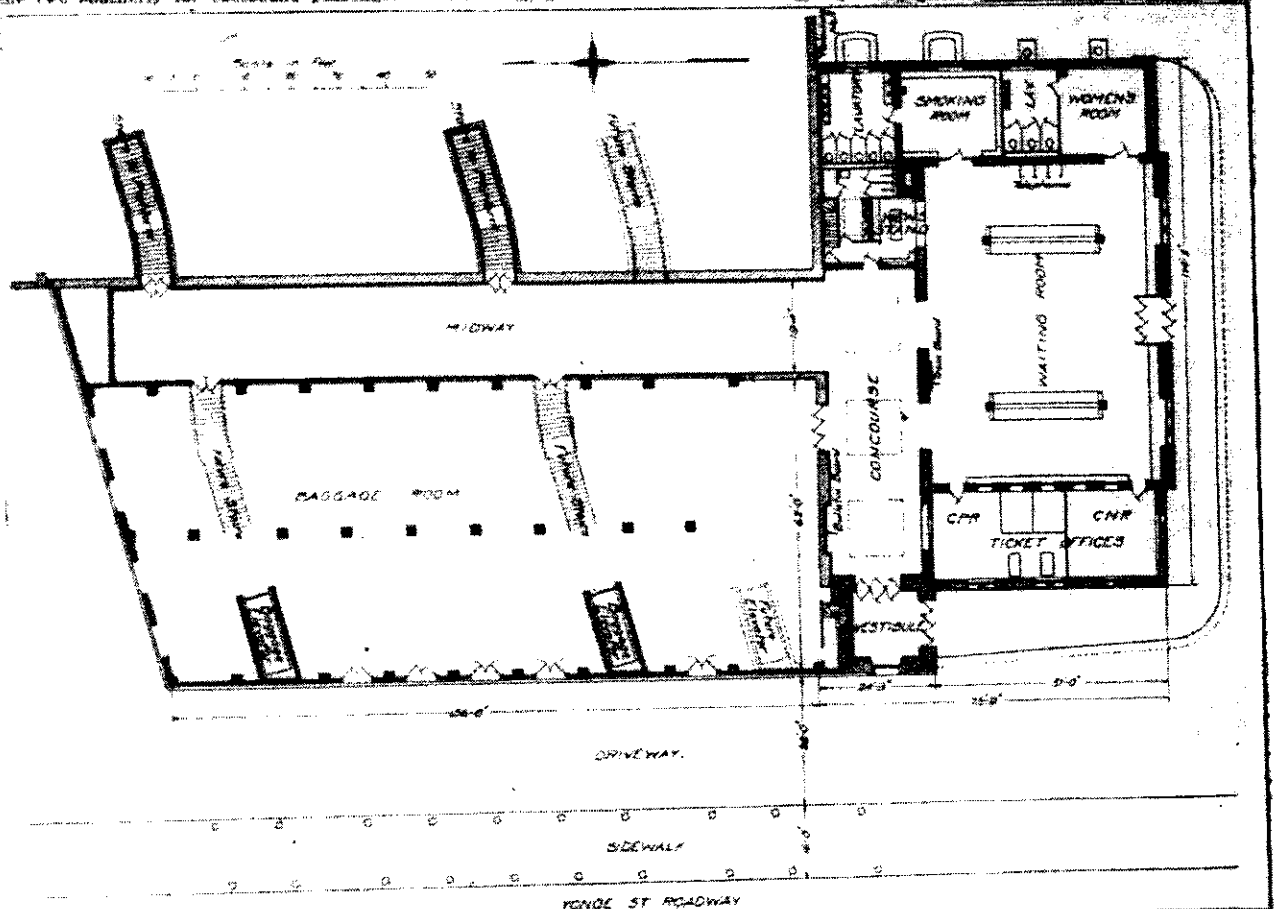


Fig. 2.—Ground Floor Plan of New North Toronto Station.

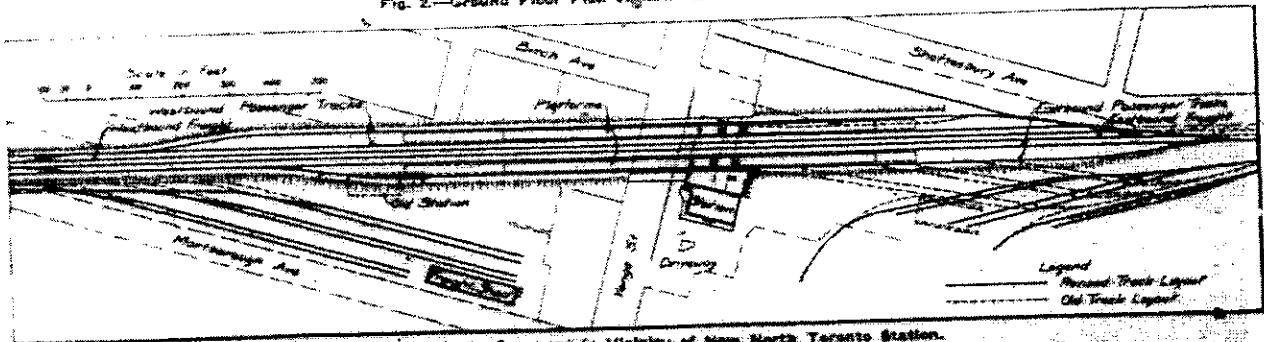


Fig. 3.—Track Arrangement in Vicinity of New North Toronto Station.

service and the two southerly for westbound passenger service, at 11 ft. centre, with an 800 ft. platform 30 ft. wide between each pair. The central pair of tracks, at 11 ft. centre from each other and from the adjoining passenger ones, will be for through freight, the southerly one for eastbound, and the southerly for westbound freight. The passenger platforms will be

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The construction and the foundation have been done by T. Lyall and Sons, on a percentage basis.

# Canadian Railway and Marine World

September, 1915.

## North Toronto Grade Separation, Canadian Pacific Railway.

By B. Ripley, M. Can. Soc. C. E., Engineer North Toronto Grade Separation, Canadian Pacific Railway.

The North Toronto viaduct construction on which was started in a small way during the autumn of 1912, is nearing completion. The general scheme, which is shown in fig. 1, comprises the elevating of four lines of track between Summerhill Ave. on the east and Ingersoll St. on the west, with additional passenger facilities at Yonge St. [The new station was described in Canadian Railway and Marine World for August.—Editor.] During Sept. 1912 a trestle was erected between Poplar Plains Road and Summerhill Ave., and the filling in to make up the embankment was commenced from the trestle. This permitted the work on the subway at Avenue Road to be proceeded with. Fig. 1 shows this subway as completed. During its construction the street traffic was diverted on the property acquired for the purpose just east of the street, which facilitated the handling of the work very considerably, and the traffic was not resumed on Avenue

The work at the Howland Ave. subway was started Aug. 12, 1913, the traffic having been diverted over the tracks at Albany Ave. by means of a temporary wooden bridge erected at that point for the purpose.

The work at Bathurst St. subway was started Aug. 22, 1913. In carrying out the work at this point, it was necessary to remove a portion of the tracks of both the Toronto Ry. and Toronto Suburban Ry. After a portion of the excavation had been taken out, a large pocket of gravel containing water was struck, the water making the work a great deal more difficult. This difficulty was also experienced in alterations to water mains, sewers and the laying of the underground electric wires. The foundations were taken slightly deeper in this case than in any other, in order to eliminate the possibility of disturbance by the installation of other underground utilities, at a later date. The street traffic was handled by means of

work to be done at this point, and the city offered no objections at that time, but many difficulties have arisen to delay the work. During the autumn of 1913 the city applied to the Board to have the south approach made level instead of having the 5% approach which had previously been agreed on. The Board ordered in effect that the city could have this on condition that it pay the extra expense incurred by the C. P. R., giving it a certain period in which to decide as to what it wanted. The level approach idea fell through; the C. P. R. had plans prepared for the carrying out of the work, but it was so late in the autumn of 1913 that the work was held over until the following spring. Meanwhile the city applied to the Board for an order compelling the C. P. R. to build the subway at this point, with an increase in the headroom of 4 ft., making an 18 ft. subway, with a 3 1/2% approach. The Board ordered that the city



Fig. 2.—West Abutment Wall of Yonge Street Subway.

Road itself until the whole work, including the paving and sidewalks, was completed. During this period, the Toronto Ry. operated a stub line service from the C. P. R. tracks to the end of the Avenue Road line at St. Clair Ave. [This subway was described in detail in Canadian Railway and Marine World for Sept., 1913.—Editor.]

Other work was not started until early in the summer of 1913, owing to an appeal by the City to the Governor in Council, to change the railway profile west of Avenue Road. Work on Davenport Road subway was however, started on July 7, 1913. Conditions at this point were somewhat complex, because the subway which was built, and which is known as the Davenport Road subway, really takes both Davenport and Poplar Plains Roads. The general plan, fig. 1, shows the layout at the intersection of these two streets. The alterations necessary to the underground public utilities occasioned thereby involved a large amount of work, the greater portion of which had to be undertaken before the subway could be constructed. The finished subway, viewed from the north, is shown in fig. 1.

The work at Spadina Road was commenced July 12, 1913, the traffic having previously been diverted by a temporary wooden bridge over the tracks at Huron St., at which point also the traffic from Davenport and Poplar Plains Roads was largely handled.

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The work at the Christie St. subway was started Sept. 16, 1913. The traffic was handled by means of a plank roadway and a temporary wooden bridge over the C. P. R. tracks on the west side of the street. The work at this point is almost completed, the bulk of the paving of roadway and sidewalks being finished.

Work was begun at Shaw St. Oct. 6, 1913, prior to which a temporary street had been opened up between Shaw St. and Ossington Ave. over the Toronto Power Co.'s property. This made it possible to divert the traffic from Shaw St. to Ossington Ave. during construction.

The work at Ossington Ave. was commenced June 15, 1914. A 4 ft. circular sewer, laid bare by the excavation, was lowered to comply with the depression of the roadway.

Work was started at Dovercourt Road subway May 5, 1914. Alterations to the sewer were also made necessary by the depression of the street.

At the Yonge St. subway, although the running of trains on the level was abandoned on May 26, 1914, and all the railway traffic run on a trestle overhead, as shown in fig. 1, the work at this point has not progressed very far. The Board of Railway Commissioners for Canada approved, in 1912, of the

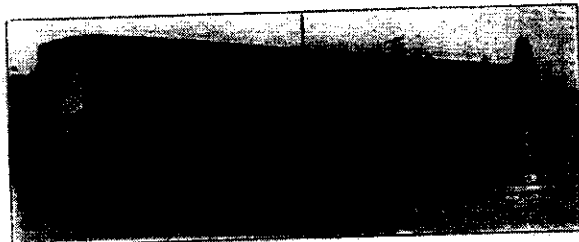


Fig. 1.—Avenue Road Subway as Completed.

could have this conditional on the additional cost over and above that of a 14 ft. headroom subway being borne by the city. Before anything further was done the city decided to widen the street at this point from 66 to 86 ft., the widening to be done on the west side. The C. P. R. prepared its plans accordingly, and before the work was again got under way, the city decided to make another change, and to have the street widened on the east instead of the west side. The Board of course issued orders accordingly. This made it necessary to take a strip off the front of the C. P. R. property, which it had purchased for a station site. Some difficulties arose over the settlement to be made between the city and the C. P. R. in this connection, and before the work was again got under way the bylaw in reference to the widening of Yonge St. was rescinded, and of course it was impossible to do any work. A new bylaw, however, had been passed expropriating sufficient property to widen the street on the east side throughout the length of the subway, and the work is now being proceeded with.

Fig. 4 shows a temporary trestle and span at this point. The vehicular traffic is carried underneath the steel span, but the pedestrian traffic is carried on the east side of the street underneath the trestle near the small shanty shown in that figure. Fig. 2 shows the south half of the west abutment, which has already been constructed, and it is ex-

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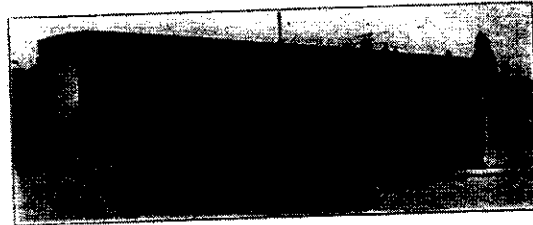


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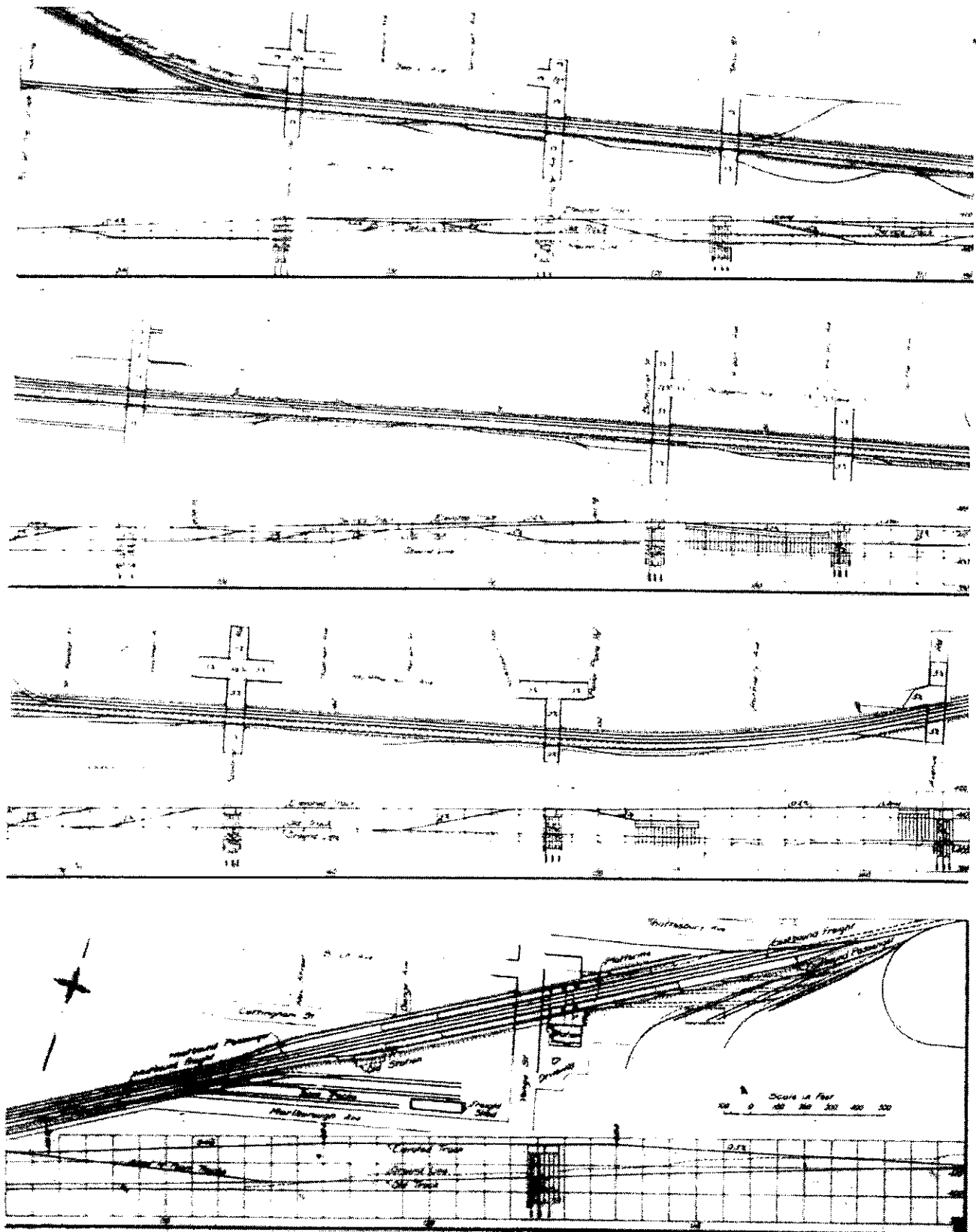


Fig. 1.—Plan and Profile of Track Elevation Across North Toronto.

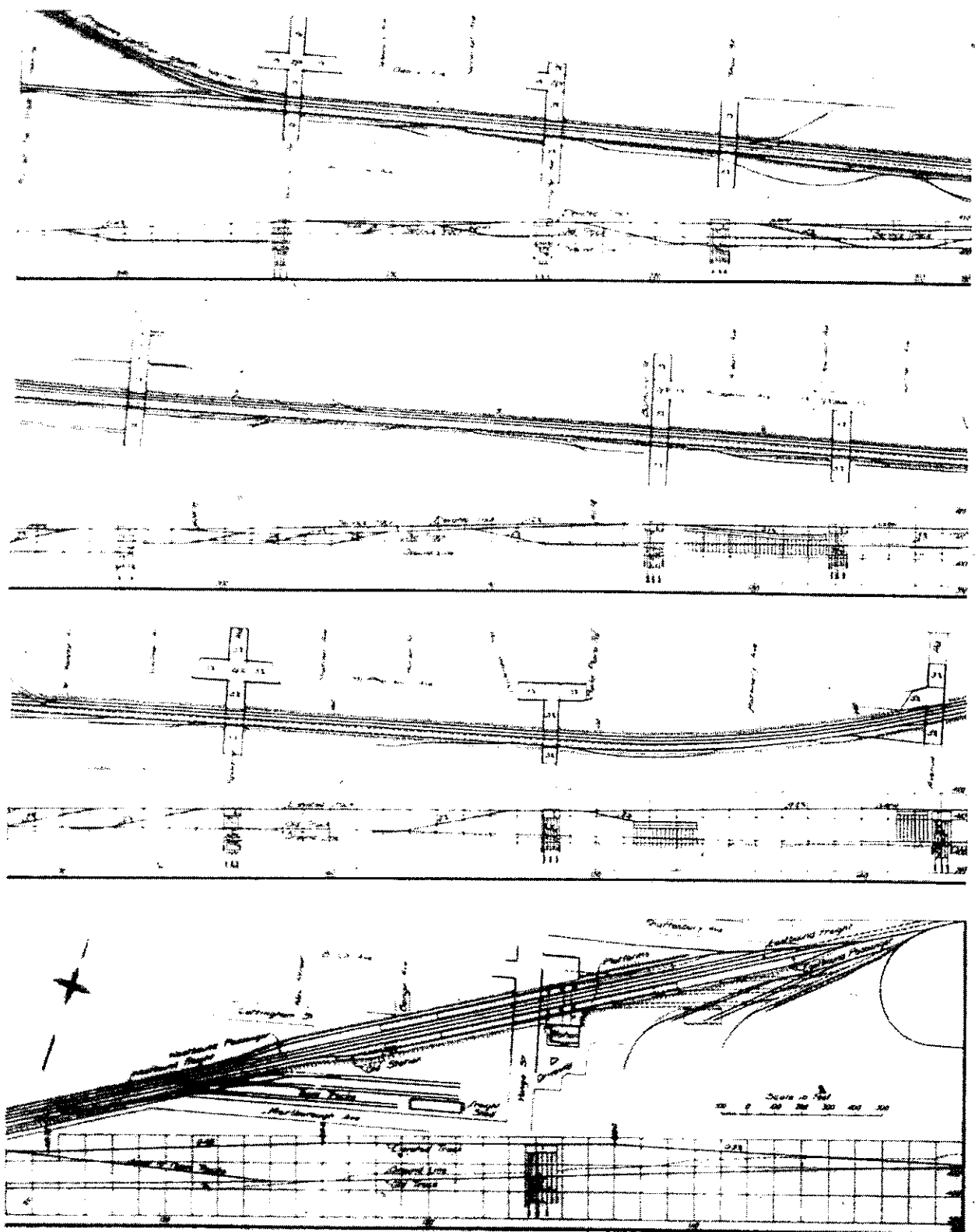


Fig. 1.—Plan and Profile of Track Elevation Across North Toronto.



pected that unless unforeseen conditions arise the work at this point, which involves heavy expenditures, will be completed, including the paving of the street, before the next freeze up. The depression of the street at this point is  $\frac{3}{4}$  ft., making it necessary to make some very extensive alterations to the underground utilities, which consist of water mains, sewers, power and telephone conduits, and gas mains. To the east of the street and underneath the C. P. R. tracks will be located a driveway to the station and baggage rooms, the latter being located under the tracks. The driveway will be 23 ft. wide, and the baggage rooms will be about 140 x 60 ft. The new station has been located, as is shown in fig. 1, just east of Yonge St., and south of the tracks.

In building up the embankment between the subways, the earth work, about 230,000 cu yds. of which is already placed, was hauled from Leaside Jct. To the west of Avenue Road, instead of building expensive trestle work, the tracks were pumped up, or lifted in 6 in. lifts, without interfering with the traffic. At the streets where subways were to be built, timber work corresponding to the deck of a standard railway trestle was placed underneath the tracks on ties in such a way that when a 6 in. lift

own half of the viaduct, but between Yonge St. and Avenue Road, the portion which includes the passenger facilities will be owned

solely by the C. P. R., but the Canadian Northern Railway will enjoy the facilities by paying a rental.

## Birthdays of Transportation Men in September.

Many happy returns of the day to—  
G. W. Alexander, Local Treasurer, G.T.R., Western Lines, Detroit, Mich., born at Light Cliff, Yorks., Eng., Sept. 10, 1855.  
H. Bailey, ex-Bridge and Building Master, Dominion Atlantic Ry., now of Huntsville, Ont., born there, Sept. 2, 1879.  
W. B. Bamford, Division Freight Agent, Atlantic Division, C.P.R., St. John, N.B., born at Belleville, Ont., Sept. 10, 1863.  
G. T. Bell, Passenger Traffic Manager, G.T.R. and G.T.P.R., Montreal, born there, Sept. 7, 1861.  
W. H. Bigger, E.C. Vice President and General Counsel, G.T.R., and G.T.P.R., Montreal, born at The Carrying Place, near Trenton, Ont., Sept. 19, 1852.  
E. J. Biala, Foreman Tinsmith, Grand Trunk Pacific Ry., Transcona, Man., born Sept. 26, 1878.  
E. R. Bremner, ex-Division Freight Agent, Ottawa Division, G.T.R., Ottawa, born at Toronto, Sept. 9, 1875.

ston, C.P.R., Calgary, born at Hull, Eng., Sept. 24, 1869.  
J. E. Hutchison, General Manager, Montreal Tramways Co., Montreal, born at Brockville, Ont., Sept. 15, 1863.  
C. B. King, Manager, London St. Ry., London, Ont., born at Galena, Ind., Sept. 12, 1871.  
S. King, ex-Superintendent, Canadian Car and Foundry Co., Montreal; Director, National Steel Car Co., Ltd., Hamilton, Ont., now of London, Ont., born at Thetford, Norfolk, Eng., Sept. 12, 1863.  
R. E. Larmour, Assistant General Freight Agent, C.P.R., Vancouver, born at Brantford, Ont., Sept. 24, 1868.  
H. D. Lumsden, M. Can. Soc. C. E., Engineering Department, C.P.R., Toronto, born at Belhairs, Scotland, Sept. 7, 1844.  
G. S. Lytle, Car Service Agent, Manitoba Division, C.P.R., Winnipeg, born at Decatur, Ia., Sept. 23, 1874.  
C. D. MacKintosh, Superintendent, District



Fig. 1.—Yonge Street Subway Site in Early Stages of Work.



Fig. 2.—Davenport Road Subway as Completed.

was made on the earth work, a 6 in. lift could be made with the deck of the trestle already placed underneath the tracks, by placing ordinary 6 in. sawn railway ties underneath the caps to form cribwork. As the lifting proceeded the cribwork was formed so as to permit driving piles. After the final height or elevation of the tracks had been attained, pile bents were driven, the cribwork was removed, and steam shovel excavation commenced. It was necessary, of course, to drive the piling below the foundation levels, and in some cases on account of the great density of the material encountered, it was necessary to replace the pile bents as many as two and three times, by driving fresh piles.

The substructure of the subway at Avenue Road was built by Jennings and Ross, Toronto and the superstructure by Canadian Bridge Co. The substructures of subways at Davenport Road, Spadina Road, Howland Ave. and Bathurst St. were built by Wells and Gray Toronto, and the superstructures by Dominion Bridge Co. The substructures of subways at Christie, Shaw, Ossington Ave. and Dovercourt Road were built by McParlane, Pratt, Hanley, Ltd., Toronto, and the superstructures erected by Dominion Bridge Co. Wells and Gray have the contract for the substructure of Yonge St. subway and the superstructure has been awarded to Dominion Bridge Co. The superstructure of Yonge St. involves 3,500,000 lbs. of steel. This is by far the largest amount of steel in any of the subways along the viaduct. It is the C. P. R.'s intention to double track its line between Summerhill Ave. and Leaside Jct., and it is understood that the Canadian Northern Ry. will run into North Toronto over the C. P. R. tracks. To the west of Avenue Road the C. N. R. will

M. H. Brown, Division Freight Agent, Ontario Division, C.P.R., Toronto, born at Victoria Square, Ont., Sept. 1, 1866.  
W. B. Bulling, ex-Assistant Freight Traffic Manager, Eastern Lines, C.P.R., Montreal, born there, Sept. 16, 1868.  
W. E. Burke, Assistant Manager, Canada Steamship Lines, Ltd., Montreal, born at Belleville, Ont., Sept. 23, 1881.  
A. D. Cartwright, Secretary, Board of Railway Commissioners, Ottawa, born at Kingston, Ont., Sept. 20, 1864.  
A. S. Dawson, M. Can. Soc. C. E., Chief Engineer, Department of Natural Resources, C.P.R., Calgary, Alta., born at Picton, N.S., Sept. 6, 1871.  
W. E. Duperow, Assistant General Passenger Agent, Grand Trunk Pacific Ry., Winnipeg, born at Stratford, Ont., Sept. 1, 1872.  
W. H. Estano, Traffic Auditor, Intercolonial Ry., Moncton, N.B., born at Halifax, N.S., Sept. 29, 1874.  
C. B. Foster, Assistant Passenger Traffic Manager, Eastern Lines, C.P.R., Montreal, born at Kingston, N.B., Sept. 30, 1871.  
J. P. Ferguson, representing Galena Signal Oil Co., Ottawa, Ont., born at Drummondville, Que., Sept. 12, 1864.  
R. S. Gosset, Auditor of Disbursements, Canadian Northern Ry., Toronto, born there, Sept. 28, 1879.

John Gray, General Agent, G.T.R., Toronto, born at River Beaudette, Que., Sept. 28, 1863.

D. W. Hatch, Travelling Agent, Atchison, Topeka and Santa Fe Ry., Montreal, born at Bedford, Que., Sept. 1, 1841.

W. R. Howard, Chief Dispatcher and Trainmaster, District 1, Atlantic Division, C.P.R., Brownville Jct., Me., born at St. Andrews, N.B., Sept. 14, 1871.

E. Humphreys, Fuel Agent, Alberta Divi-

1. Alberta Division, C.P.R., Medicine Hat, born at Auckland, New Zealand, Sept. 24, 1882.

F. J. Mahon, Inspector of Telegraphs, Saskatchewan Division C.P.R., Saskatoon, born at Montreal, Sept. 13, 1863.

W. A. Mather, Superintendent, District 1, Alberta Division, C.P.R., Medicine Hat, born at Oshawa, Ont., Sept., 1895.

J. F. Mundie, City Freight Agent, C.P.R., Montreal, born at Prescott, Ont., Sept. 20, 1857.

M. B. Murphy, Superintendent, District 2, Central Division, Canadian Northern Ry., Winnipeg, born at Napa, Cal., Sept. 11, 1866.

J. Paul, District Freight Agent, Canadian Northern Ry., Winnipeg, born in Ephraim Tp., Grey Co., Ont., Sept. 13, 1888.

W. J. Pickrell, Master Mechanic, Ontario Division, C.P.R., Toronto, born at London, Ont., Sept. 15, 1866.

W. D. Robb, Superintendent of Motive Power, G.T.R., Montreal, born at Longueuil, Que., Sept. 11, 1867.

E. W. Taylor, General Freight Agent, Reid Newfoundland Co., St. John's, Nfld., born at Carleton Place, Ont., Sept. 1, 1876.

F. G. Wood, Commercial Agent, Canadian Northern Ry., St. Louis, Mo., born at Toronto, Sept. 15, 1896.

H. A. Young, Ontario Storage and Carriage Co., Ltd., Toronto, born at Brooklyn, N.Y., Sept. 1, 1864.

Eastern Canadian Passenger Association.  
—The monthly meeting of the association was held at Quebec August 3, instead of Montreal, as customary.

The railway mail clerks in the Winnipeg district have offered to the Dominion Government a machine gun, with eight men to operate it.

## Opening of North Toronto Station, Canadian Pacific Railway.

The new station at North Toronto, which is being built by the C.P.R., although not fully completed, was officially opened for traffic June 14, when train 24 left at 10 p.m. for Montreal via Peterborough, carrying also Ottawa sleeping cars. A. D. MacTier, General Manager, Eastern Lines, who came to Toronto for the opening, was entertained at dinner at the National Club, with a number of other guests, by the Mayor and city council, after which the party proceeded to the new station, every portion of which, including the platforms, was thronged with spectators. Speaking from a dais erected in the main wait-

Ottawa via Belleville and Kempton, at 1.55 p.m.; no. 713 for Teeswater, via Streetsville, at 4.45 p.m.; no. 608 for Lindsay at 5.15 p.m., and no. 707 for Owen Sound, via Bolton, at 5.35 p.m. The other arriving trains are no. 605 from Lindsay at 10.30 a.m.; no. 708 from Owen Sound at 8.10 p.m.; and no. 714 from Teeswater via Streetsville at 8.45 p.m.; and the York, from Ottawa via Kempton and Belleville, at 9.20 p.m.

The new station forms part of the whole general scheme of track elevation across the north end of the city, which is now approaching completion, involving the raising of the tracks for about 4

West Toronto, and about four years ago the C.P.R. decided to make use of the line from North Toronto to Leaside Jct. for passenger traffic, starting therefrom one of its Toronto-Montreal night trains, and running one of the Montreal-Toronto night trains into it. This proved such a success that a further development of the northern entrance was decided on. The smallness of the existing station made necessary further accommodation, the result of which is the new station, which is now almost complete. This station has been designed on a larger scale than would be required for C.P.R. traffic alone, as the Canadian Northern

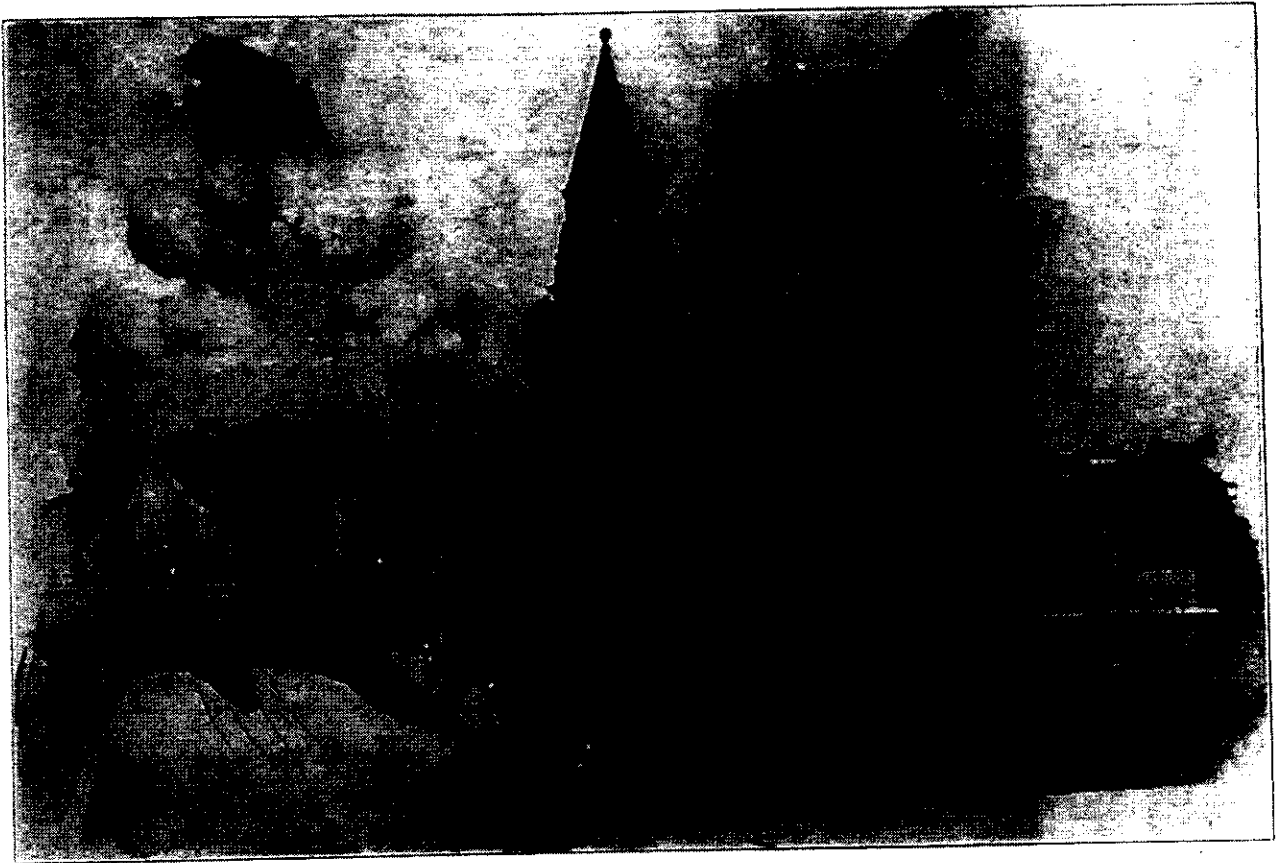


Fig. 1. North Toronto Station, Canadian Pacific Railway.

This view, made from the architect's drawing, does not show the butterfly roofs over the platforms extending along the north side of the station and over the subway. They will be shown in another view, which will be published in Canadian Railway and Marine World as soon as the tower is completed, and the whole building, etc., can be photographed in a finished condition.

ing room the Mayor introduced Mr. MacTier, who spoke briefly, and was followed by Sir James Carroll and C. J. Parr, M.P., of New Zealand, and several members of parliament and members of the city council. The Mayor then declared the station open and the party proceeded upstairs to one of the platforms to see train 24 start sharp on time.

At present five trains leave the station each week day and five arrive, the Sunday service being one train out and one in. In addition to the Toronto-Montreal train, leaving at 10 p.m. as above mentioned train 23 from Montreal via Peterborough, carrying also Ottawa sleeping cars, arrives at 8 a.m. The other departing trains are the Rideau, for

miles, with the elimination of all grade crossings. The North Toronto line has for a number of years been used by the C.P.R. principally as a freight cut off between Leaside Jct. and West Toronto from which points the main line runs down to the union station in the lower part of the city. Originally the Leaside-West Toronto line was the only entrance into Toronto of the Ontario & Quebec Ry., which was absorbed by the C.P.R. in its early days, and subsequently a connection was built from Leaside Jct. to connect with the union station, and all passenger trains from the east were run over it. For several years a connecting stub line service was operated both ways between Leaside Jct. and

in planning a permanent entrance into Toronto decided on the northerly entrance, arrangements being made with the C.P.R. to build the station, the C.N.R. to use it jointly as tenants. It is the Canadian Northern's intention to use this station for most, if not all, of its Toronto passenger service, but the C.P.R. will retain its connection with the present union station near the waterfront, only using the North Toronto station for certain trains.

A perspective of the new station is shown in fig. 1; a ground floor plan in fig. 2; and the track arrangement in the station vicinity, with its relation to the city transportation conveniences, in fig. 3. The station is located on the east

side of Yonge St., at the present end of the Toronto Ry.'s Yonge St. line, which passes down through the centre of the city. With this convenient and through street car line, the new station is very easily reached from the business centre of the city. The rapid growth of the city

and along structure, the central section of which has a high roof, flanked by two lower sections containing the station facilities. On the Yonge St. side there is being built a 140 ft. clock tower, the 36 ft. spire of which will be of terra cotta. The station building is 114 x 76

waiting room on the west are the ticket offices and telegraph offices. Flanking the east side of the waiting room are the women's room, smoking room, lavatory facilities, and telephone booths. Adjoining the waiting room in the north-east corner are the news stand and staff

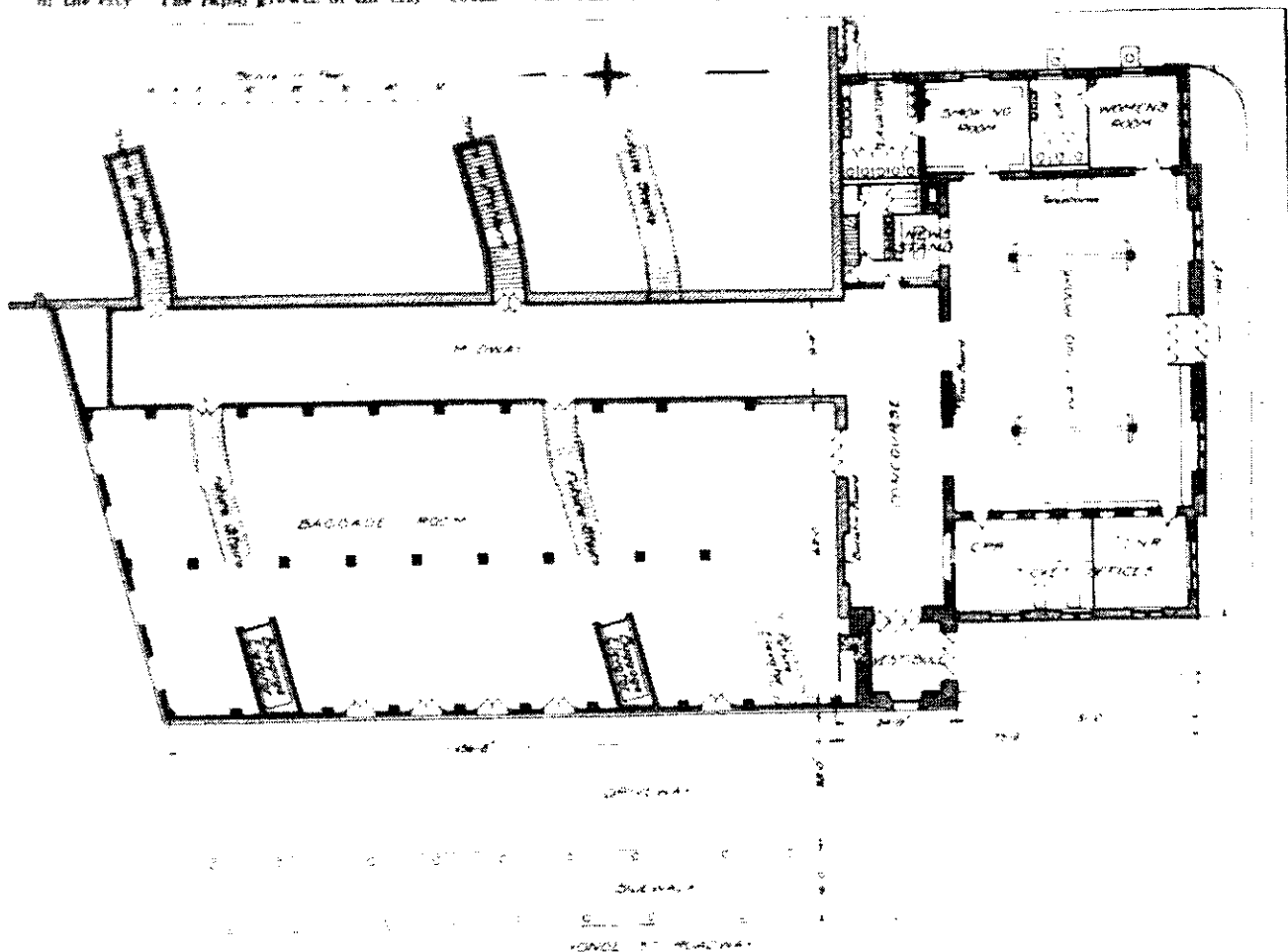


Fig. 2. Ground Plan, North Toronto Station, Canadian Pacific Railway.

The stairs from the north east end of the midway shown in the above plan as "future stairs" have been built. The two projected stairs on the west side of the midway also shown as "future stairs" have not been built.

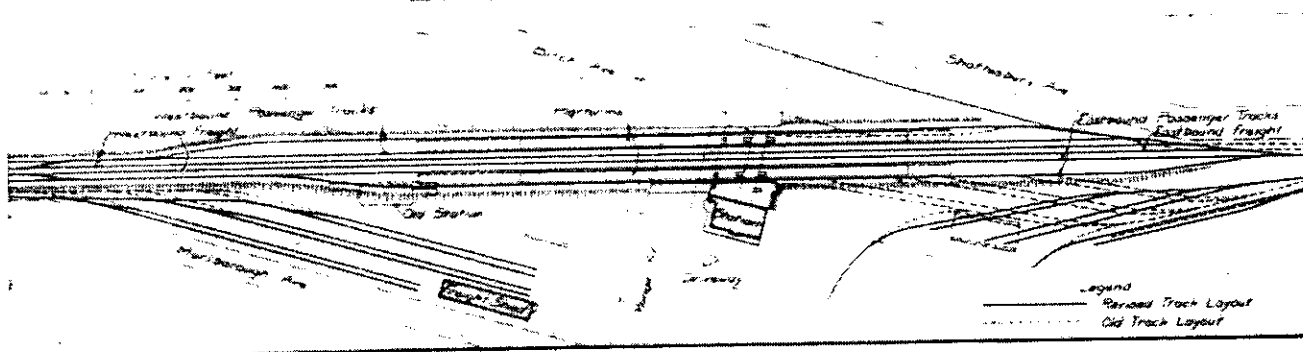


Fig. 3. Track Arrangement, North Toronto Station, Canadian Pacific Railway.

northward makes the North Toronto location particularly available for that section of the city, the new location being more centrally located with regard to the centre of population than the present down town union station.

The new station is a single story brick

ft., the broader side facing south, with the tracks on the north side passing it at an angle of about 15 degrees. The central or high section of the station is the main waiting room, 70 x 51 ft., with a centrally located entrance from the driveway on the south side. Flanking this

lavatory. Directly opposite the main entrance to the midway under the tracks. The vestibule under the tower leads into the concourse along the north side of the west end of the waiting room, connecting at its east end with the midway. The south and west sides of the station have

sidewalks with metal canopies, so that passengers may either alight at the main entrance centrally on the south side, or at the lower vestibule, the expectation being that the latter entrance will be used by the majority of passengers who have already secured their tickets, and only require to pass directly to the trains, relieving the main waiting room of much of the congestion that might otherwise occur. Along the west side of the station is a 28 ft. driveway, so that vehicles may drive up to either station entrance, and pass through under the tracks through this driveway and out on Yonge St. to the north of the station.

The midway is a passage 20 ft. wide passing from the rear of the station to the far side of the tracks, under the latter. The elevation of the tracks makes a difference in grade between the track platforms and the station level of 15½ ft., giving a headway in the midway of about 14 ft.

Passing over the midway are 6 through tracks, which now connect with two main tracks to the west and a single track to the east, but are so located as to connect in the future with the proposed double track to the east on the revised grade. The northerly two tracks are for westbound trains and the southerly two for eastbound trains, each pair being at 31 ft. centres and tributary to a single platform. The two centre tracks at 13 ft. centres from each other and from the adjoining passenger ones are not tributary to a platform and are reserved for freight or other through train movements, the southerly one for eastbound and the northerly one for westbound. As all passenger trains will originate and terminate at the West Toronto yards and may stand in the North Toronto station for a considerable time, this arrangement gives the greatest possible flexibility in operation, by assigning certain tracks for standing trains and keeping certain others open for through movements at all times.

The platforms are 20 ft. 3¼ in. wide and 600 ft. long to accommodate 10-car trains. The portions over the baggage room and subways are of reinforced concrete, and the remaining portions are of wood which will be replaced with concrete when the fill upon which they are built has settled. When traffic requirements warrant, they may be extended to a maximum length of 1,600 ft., thus permitting each platform track to accommodate two trains, or a total of four eastbound and four westbound trains clear of the through tracks.

Butterfly, or inverted umbrella roofs, some 360 ft. long, extend over the concrete portions of the platforms, protecting access to the stairways and elevators. When the fill settles sufficiently to give proper foundation, they will be extended to cover the full length of the platforms. The roof proper is of wood, on a steel frame, which is supported by steel posts in the middle of the platforms. It has a spread of 25 ft. and extends well over cars standing on the platform tracks, thus giving, in many respects, the same protection as the Bush type of train shed when trains occupy the platform tracks. The platforms are reached from the midway by three 6 ft. stairways on the east side. The plans provide for future stairways opposite the present proposed stairways.

The baggage room, 137 x 62 ft., occupies all the section beneath the tracks between the midway and Yonge St. driveway. From the latter the baggage is passed through 5 doorways, and is

raised on trucks to the platform level by three 15 x 5½ ft. elevators. From the southwest corner of the baggage room a spiral stairway ascends to the track level, where the station master's office is located in the tower above the vestibule. Passenger communication with the baggage room is through the concourse.

The whole exterior of the building, with the exception of the spire, is faced with limestone from Tyndall, Man. The choice of this Canadian stone has been justified by the excellent color effect of the masonry in the mass, an effect equal to any that could have been obtained by the importation of the better known building stones from the United States. The spire on top of the tower will be faced with terra cotta of a color and texture to tone in with the limestone facing of the remainder of the building. The section under the tracks is of steel and concrete construction.

The main waiting room, tower vestibule and concourse are lined with marble for their entire height, the architectural effect being obtained by the use of different colored marbles, all set in practically the same plane, so as to avoid as far as possible all offsets and other dirt collecting projections. The plaster ceiling of the main waiting room is treated in a broad manner with large panels. The midway is lined with glazed brick for its full height, as are the staircases heading up to the platforms.

A complete system of electric clocks of British manufacture will be installed; of these the large tower clock with four 8 ft. dials will form a part. The clocks throughout the building will be controlled by a master clock which will be synchronized daily from the company's chief time station at Montreal.

All ornamental ironwork such as door frames, stairs, large windows and the marquise on the south and west fronts has been executed by a Toronto firm and all the steel sash throughout the building have been imported from England. The plastering, marble, heating, ventilating, plumbing and electric work has all been carried out by Toronto firms. Wherever possible, and there are but few exceptions, all materials and labor employed in the construction of the building are of Canadian or British origin, and, in accordance with the company's requirements, Canadian timber has been used for all woodwork, whether rough lumber or finished mill work.

The plans were prepared by Darling & Pearson, architects, Toronto, under the J. M. R. Fairbairn, Assistant Chief Engineer, C.P.R., and D. H. Mapes, Engineer of Building, C.P.R. The contractors are P. Lyall & Sons Construction Co. Ltd.

The track elevation work, which included extensive baggage room and roadway construction under the tracks, was carried out under the charge of Blair Ripley, M.Can.Soc.C.E., Engineer of Grade Separation, C.P.R., now Officer Commanding No. 1 Overseas Construction Battalion.

The Board of Railway Commissioners held sittings for hearing complaints as follows: Winnipeg, June 12; Saskatoon, Sask., June 14; Quebec, Que., June 17; Edmonton, Alta., June 15; Vancouver, B.C., June 26; Victoria, B.C., June 28; Montreal, June 28. Sittings will also be held as follows: Nelson, B.C., July 5; Calgary, Alta., July 10; Moose Jaw, Sask., July 12; Regina, Sask., July 13; Winnipeg, July 14; Fort William, Ont., July 17; Sudbury, Ont., July 19.

### Canadian Northern Railway Guaranteed Securities.

In the article in Canadian Railway and Marine World for June on "Further Dominion Aid to the Canadian Northern Ry. and the Grand Trunk Pacific Ry." on pg. 225, in the second paragraph under the heading "Returns to Parliament," line three, reference was made to the "Total amount of stock outstanding," while at the end the word "securities" was used. The word "stock" was used inadvertently instead of securities, which word was used in the return submitted in the House of Commons by the Minister of Finance. As generally understood the word "stock," refers to shares or common stock, and not to bonds, debentures or other securities which are secured by mortgage, guarantee or otherwise, and a correspondent contends that even the word "securities" does not properly express the character of the C.N.R.'s outstanding indebtedness mentioned in the return.

As mentioned above the word "securities" was used in the return submitted to Parliament, and if our correspondent feels very much excited about it use he should communicate with the Minister of Finance, instead of with us.

The return referred to, which is in the form of a seasonal paper, is headed "Statement of Securities Outstanding." The securities listed include bonds of different kinds, 1st mortgage stock, 1st mortgage debenture stock, terminal debenture stock, branch lines stock, second charge stock, perpetual consolidated debenture stock, and perpetual debenture stock.

In the table at the conclusion of the second paragraph referred to the total amount of securities issued was stated as \$383,770,798. This was made up by adding the \$25,000,000 of income bonds to the \$358,770,798 of guaranteed and unguaranteed securities issued. The total guaranteed and unguaranteed securities authorized amount to \$383,438,742.

### Canadian Ticket Agents' Association.

The Association's annual outing was held at Port Arthur, Ont., June 12 and 13. The party, numbering about 200 arrived in the city on the Northern Navigation Co.'s steamship Harmonic from Sarnia, and were received by a reception committee of the city council and the board of trade. After the formal reception the members held the annual business meeting, and the ladies were taken for auto trips in the city, and were entertained in the evening by the Women's Canadian Club. The members held their annual smoking concert on June 12, and on June 13, the entire party were taken on a trip around the bay on the tug Whalen, and in the afternoon went via the Canadian Northern Ry. to Kakabeka Falls. They returned east by the C.P.R. steamship Assiniboia to Port McNicoll.

The following were elected officers at the annual meeting, all being located in Ontario:—President, A. M. Hare, Tillamburg; 1st Vice President, E. R. Blow, Whitby; 2nd Vice President, H. F. Whittier, Trenton; 3rd Vice President, J. Ranford, Clinton; Secretary-Treasurer, E. de la Hocke, London; Auditor, B. Casswell, Smiths Falls. Executive Committee, J. Jackson, Clinton; W. McInery, Toronto; W. J. Moffatt, Toronto; F. W. Churchill, Collingwood; C. B. Jones, Orillia.

following additions to rolling stock: 2 steel sleeping cars from the National Steel Car Co., 37 stock cars from Canadian Car and Foundry Co., 26 vans from C. G. R. shops at Moncton, N.B., and 11 consolidation locomotives from Canadian Locomotive Co.

which work is now in progress, and as to the location of a hotel which is to be built on a site other than False Creek. A proposition as to a site on Main St., owned by the city, is to be submitted at an early meeting of the civic bridges and

railways committee. While the company, Mr. MacLeod said, was ready to carry out its agreement to put up a 250 room hotel away from False Creek, it would rather put up a larger hotel on its own property at False Creek.

### Canadian Northern Railway Construction, Betterments, Etc.

**Canadian Northern Ontario Ry.**—A plan, profile and book of reference of the C. N. O. R. location through the township of McGregor, Thunder Bay District, mileage 544.45 to 566.13 has been filed in the Registry office at Port Arthur, Ont. The Board of Railway Commissioners has approved of this location.

**Canadian Northern Ry.**—A press report states that the company's officials are considering plans for the electrification of the line to Victoria Beach, Man. The suggestion is to make connection with the main line at Elmwood or Kildonan, and run to and from Winnipeg by Elmwood bridge. The present route to Victoria Beach is via Transcona, the total distance being 75 miles. The report states that work is to be started in the spring of 1917, and will necessitate the relaying of the track with 85 lb. rails.

Work is in progress on the alterations of St. Mary's Hall, corner of Eighteenth Ave. and First St. Calgary, Alta., necessary to make it suitable for station purposes. An addition 70 ft. long is being built on the south side for freight and express purposes. The line which now terminates on the south side of the Elbow River is to be carried across the river to the hall by the time the alterations are completed. The work of remodeling the hall is estimated to cost \$10,000 and is expected to be completed early in October. M. H. MacLeod, General Manager and Chief Engineer is reported to have advised residents of Red Deer, Alta., that the Red Deer River bridge will be completed at once so as to permit the extension of the Brazeau line into the place this year. The grading has been completed and it was reported Aug. 4 that men were putting in the culverts along the eight miles of grade. A large quantity of timber for the bridge is also reported to have been delivered on the site.

Work is reported to have been started on the building of a new machine shop and store building in the yards at Edmonton, Alta. The machine shop will be a one story building, 61 x 118 ft. and is estimated to cost \$20,000 while the store building will be two stories high, 80 x 48 ft. and is estimated to cost \$5,700. The foundations for both buildings will be of concrete and the superstructures of brick.

A press report states that the early extension of the line at present terminating at Sangudo—known as the Peace River Branch—to White Court, 40 miles is being contemplated.

**Canadian Northern Pacific Ry.**—A press report states that a contract has been let for the building of the projected branch line from Kamloops to Kelowna, B.C.

M. H. MacLeod, General Manager and Chief Engineer, had an interview with the New Westminster City Council Aug. 7, respecting the right of way in the city to the proposed terminal west of the C.P.R. station.

M. H. MacLeod, General Manager and Chief Engineer, met the Vancouver City Council Aug. 2 to discuss matters connected with the station building, on

### Canadian Pacific Ry. Construction, Betterments, Etc.

**Montreal Terminal.**—The Board of Railway Commissioners has amended the plans for the proposed tunnel under the C.P.R. tracks at Melrose Ave., Notre Dame de Grace so that it will be 5 ft. wide and 8 ft. high instead of 4 ft. wide and 7 ft. high. The estimated cost of the work under the amended plan is \$5,200.

**Saskatchewan Division.** Rapid progress is reported to have been made to

the approach work is being completed, and everything is being got ready for the regular operation of trains through it.

A Vancouver press report states that a contract has been let to W. D. Grant for the carrying out of a comprehensive dredging scheme at the waterfront there, between sheds 3 and 7. This area includes the berth in front of the station shed, and the berths immediately east of that part now used by the Pacific



North Toronto Station, Canadian Pacific Railway.

The illustration published in Canadian Railway and Marine World for July, in connection with the arrival on the opening of North Toronto station, was made, as stated, from the architect's drawing, and did not show the butterfly roofs over the platforms. The above illustration, made from a photograph, shows the station as completed, together with the butterfly roofs. Under the Yonge St. subway, to the left of the illustration, are shown the tracks which are being built to extend the Toronto Railway from its present terminus on Yonge St. just south of the C.P.R. crossing, to the city's old north limits, between Woodlawn and Farnham Avenues, where the Toronto & York Radial Ry.'s Metropolitan Division presently terminates. There will, however, be no physical connection, as the city of Toronto would not consent to it and also because the two electric railways have different gauges.

date with the construction of the seven-mile extension from Vantage to Assiniboine. A press report says the line will be ready for operation by Nov. 1.

**British Columbia Division.**—The company is reported to be utilizing the rock spread over the valley by the slide of Turtle Mountain at Frank, B.C., some years ago, to fill in washouts, and to reduce the gradient on the new line which was built over the slide, and so do away with the necessity of using a further locomotive to take trains over.

A press report from Montreal, Aug. 10, stated that the Duke of Connaught had, at the request of Baron Shaughnessy, authorized the company to name the double track tunnel at Rogers Pass, B.C., which he formally opened July 17 and named the Selkirk, to be called the Connaught tunnel. The permanent tracks are being laid through the tunnel,

Coast Steamship Co.'s steamers. The area will, it is said, be dredged so as to give a depth of 33 ft. and the estimated cost of the work is given as \$200,000. It is reported that this work is being undertaken in preparation for the erection of additional docks to which reference was made in our July issue, pg. 285. D. C. Coleman, Assistant General Manager, Western Lines, was reported to have said on Aug. 5 that work would be started almost immediately on building of another pier for trans-Pacific traffic. The pier it is said will be a double decked one, about 850 ft. long, extending out to the harbor line, and is estimated to cost \$1,500,000. Up to Aug. 14, no definite official announcement had been made, but it was expected some statement would be made by F. W. Peters, General Superintendent British Columbia Division, on his return from the east. (Aug., pg. 330.)

## Double Tracking the Canadian Pacific Railway from Leaside to North Toronto.

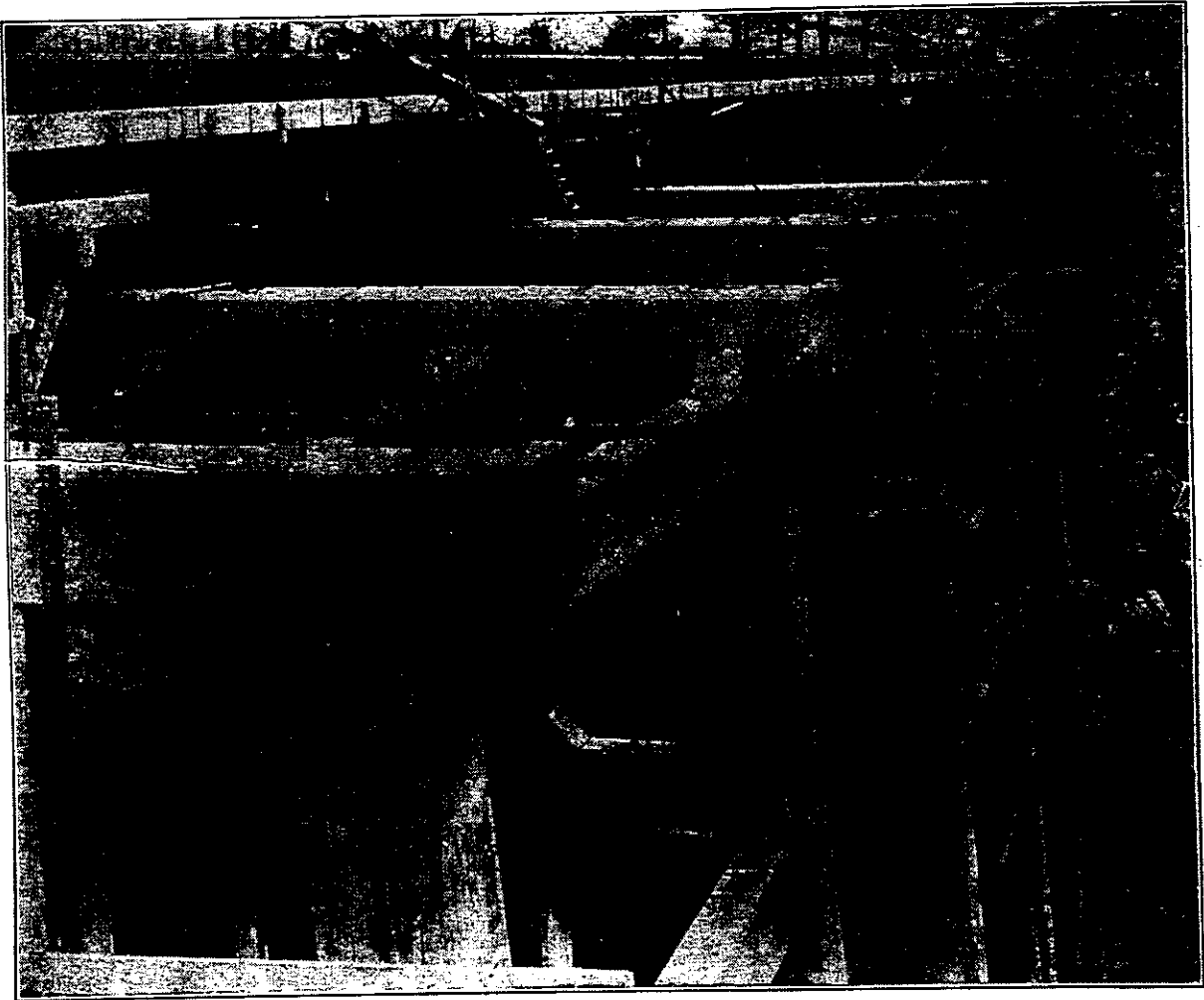
Present and prospective large increase in traffic have made it necessary to complete the double tracking of the C.P.R.'s North Toronto line at once. The rapid expansion of the City of Toronto to the north, and the recent completion of a handsome, modern passenger station at North Toronto have greatly increased the passenger traffic of this line, which also handles the heavy freight traffic between the east and the Buffalo and Detroit gateways. The two miles of single track between the double track east of Leaside

concrete and is to be completed and ready for the heavy winter traffic which commences with the close of navigation on the Great Lakes.

The bridge over the Reservoir ravine is known as 1.8 North Toronto Subdivision, and consists of a 3-track structure, located, with its south track approximately on the site of the existing main line, which will be used as a new switching lead, the other two tracks being used for eastbound and westbound traffic. The structure is 386 ft. long and 88 ft. high.

same plane with the other, but at approximately the points of contraflexure; in this feature the structure is unusual.

The bents consist of four posts, of which the two outer ones are battered, and the interior ones are vertical. They are in turn supported on substantial piers which are continuous transversely across the bridge. The floor slabs, as above stated, are all pre-cast and are placed on the transverse caps of the towers by derricks. The deck will then be waterproofed in the usual manner, with a membrane



Reservoir Ravine Bridge, North Toronto, Canadian Pacific Railway.

Jct., and west of North Toronto is a very busy piece of line at present and the increased traffic in immediate prospect necessitates prompt relief.

No material changes in grade or alignment are being made, as the new work will run to 0.4% for the former, and 3' for the latter. The grading is comparatively light, and this, together with all track work is being handled by the company's forces. It has, however, been necessary to replace two single track steel viaducts, the one over the Toronto Belt Line by a 2-track, and the one over Reservoir Park ravine by a 3-track structure. This is being done in reinforced

supported on two abutments and five towers, which in turn support pre-cast T-beam floor spans of such design that when laid alongside one another, they form a complete deck to carry the ballast and track work. A narrow sidewalk for railway employees only is provided on each side, protected by a pipe hand-rail, attached to reinforced concrete posts.

The towers are of unusual design, in that no diagonal bracing is used; but instead thereof, a system of horizontal struts, to reduce the stresses in the columns from the longitudinal and transverse horizontal forces. The immediate eight struts of one system are not in the

and a protective layer of asphalt, after which the ballast and ordinary track ties will be laid.

In order to maintain traffic and build the new bridge on the correct line, it was found necessary to build a temporary trestle on the north side of the structure, and entirely remove the old steel work. This allowed the use of the most economical length of concrete spans and also ensured that the new concrete would not be disturbed by the vibrations due to traffic passing on the old bridge.

The nature of the reinforcement in the towers is not different from modern practice. It consists of vertical rods located

in the rectangular post sections. These rods are securely tied across to opposite rods, at close intervals, by units composed of rods previously bent to suitable shapes.

The towers were poured story by story and splices in reinforcing bars were located immediately above the horizontal struts. The length of the horizontal girder slabs was dictated by the size of the reinforcing bars, the maximum size of which was 1 5/16 in. diam., bent up in the usual manner to take care of shear. All ends of the rods were bent in hook form to give mechanical bond. Each of the finished slabs weighs approximately 57 tons, and this, as well as the size of the rods, was the controlling feature in deciding span lengths.

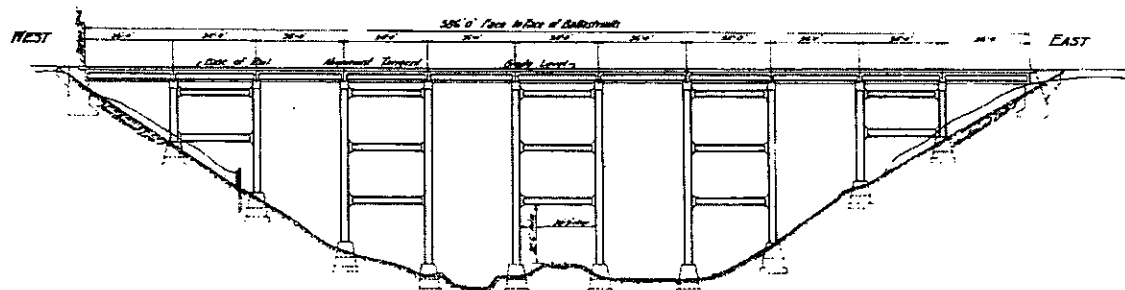
The bridge over the Toronto Belt Line Ry. is known as 0.9 North Toronto Sub-

supervision of J. M. R. Fairbairn, Assistant Chief Engineer, the designs being made by P. B. Motley, Engineer of Bridges, and the work was carried out under J. H. Barber, Engineer in Charge. The contractors of bridge 1.8 were Wells and Gray, Ltd., and for bridge 0.9 the Dominion Construction Co.

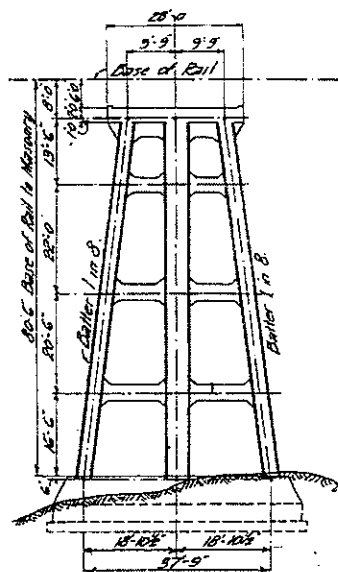
### The Railway Situation in Hamilton.

The Hamilton, Ont., City Council on Sept. 12 approved of proposal C, in the report of W. F. Tye, M.Can.Soc.C.E., and J. E. N. Cauchon, A.M.Can.Soc.C.E., on the railway situation in that city, as published in Canadian Railway and Marine World, Sept., 1917, pg. 342, and transmitted it to the Board of Railway Commissions as representing the city's

pose, this having been confirmed by W. F. Tye, as the result of a special examination of the locality. The number of cars switched in Kinnear yard increased from 8,066 in 1906 to 17,764 in 1914, and to 34,363 in 1916, and it is evident the company's facilities there are inadequate. The board, therefore, had no alternative but to grant the application, unless an arrangement between the company and the city could be arrived at. The Chief Commissioner had suggested previously that, instead of an expropriation order being made, the city should allow the company to occupy the land for five years, without any provision for renewal, and at the end of that time the city and the railways might be in a position to finance the ultimate solution of the Hamilton railway problem in whatever form it might take. The city, however, did not



Bridge over Toronto Belt Line Railway Ravine, on double track work, Canadian Pacific Railway, between Leaside and North Toronto.



Bent No. 7 of C.P.R. bridge over Toronto Belt Line Railway Ravine, Toronto.

division, and is similar in general elevation to the Reservoir ravine bridge as well as in length and height. It has the same number of towers and abutments. It supports, however, only two tracks, instead of three. The bents consist of three posts, two outer-battered and one inner-vertical, and being a 2-track structure, the width is correspondingly narrower. There will be two narrow sidewalks for railway employees, protected by reinforced concrete posts and rail fence of same general character as other bridge.

Both works were executed under the

views, and petitioned the board to adopt the recommendations, and to permit no new railway entrance into the city, and no extensions, additions, or changes in existing railway works there, unless they were in accordance with proposal C, and that the railways be asked to adopt the measures recommended in it. The application was heard at Hamilton, Oct. 22, together with an application by the Toronto, Hamilton & Buffalo Ry., for authority to take over, without the city's consent, certain undeveloped city land, 120 ft. wide, immediately south of the railway, from Sherman St. on the west, to Gage St. on the east, to enable the company to enlarge its Kinnear yard, so as to provide additional tracks for freight traffic.

The Chief Commissioner, Sir Henry Drayton, in giving judgment, Dec. 12, pointed out that the Tye-Cauchon report proposes to remove the T. H. & B. R. from the south district of Hamilton, and place it with the G.T.R. in the north. The T. H. & B. R.'s location was originally in the north end, but was changed to the south as a result of civic action, a city bonus bylaw affirmed by the ratepayers definitely approving of the present location. The bylaw having been ratified by the Dominion Parliament, and the Ontario Legislature, the Supreme Court of Canada held that the board had no jurisdiction to order a diversion of the T. H. & B. R. from its present site, to the north. The Chief Commissioner therefore decided that the board had no jurisdiction whatever to make an order adopting and carrying into effect the Tye-Cauchon recommendations and that the city's application must be refused.

The Chief Commissioner also held that it had been established that the proposed enlargement of the T. H. & B. R.'s Kinnear yard was both feasible and convenient, and that the board's Chief Operating Officer had reported the land the company asked for as being necessary for its pur-

act on the suggestion.

The Chief Commissioner announced that the formal order granting the T. H. & B. R.'s application would be held for seven days, viz., to Dec. 19, to give the city an opportunity of saying whether it would lease the land to the company for 5 years or whether it would prefer an expropriation order to go. In conclusion the Chief Commissioner said: "Mr. Tye is a railway engineer of eminence and of national standing. Full, fair and complete consideration ought to be given to the railway solution that he has endorsed. Everybody admits the present situation to be bad; the railway's remedy is to raise its tracks; Mr. Tye's remedy is to remove them altogether; but the parties interested, that is the different railways and the city, should, as I see it, refer the whole question to their respective engineers, with its instructions to work one with the other in an honest attempt to arrive at the best solution of what admittedly is a serious and difficult question."

Subsequently, on the request of the chairman of the Hamilton City Council's railway committee, the issuing of the order was further delayed until the city council's meeting, which was fixed for Dec. 26, and of the result of which we have no advice at the time of writing.

**Railway Lands Patented.**—Letters patent were issued during November, in respect of Dominion railway lands in Manitoba, Saskatchewan, Alberta and British Columbia, as follows:—

	Acres.
Calgary and Edmonton Ry. ....	3,491.00
Canadian Northern Ry. ....	7,207.47
Central Canada Ry. ....	151.51
Edmonton, Dunvegan & British Columbia Ry. ....	4.31
Grand Trunk Pacific Ry. ....	160.00
Qu'Appelle, Long Lake and Saskatchewan Rd. and Steamboat Co. ....	1,202.00
<b>Total</b> .....	<b>12,215.59</b>



## The Canadian Pacific Railway's Second Track Work between Leaside Jct. and North Toronto.

Present and prospective large increase in traffic made it necessary to complete the double tracking of the C.P.R.'s North Toronto line this year. The rapid expansion of the City of Toronto to the north, and the completion last year of a

side one another, they form a complete deck to carry the ballast and track work. A narrow sidewalk for railway employees only is provided on each side, protected by a pipe hand-rail, attached to reinforced concrete posts.

8 struts of one system are not in the same plane with the other, but at approximately the points of contraflexure; in this feature the structure is unusual.

The bents consist of 4 posts, of which the 2 outer ones are battered, and the interior ones are vertical. They are in turn supported on substantial piers which are continuous transversely across the bridge. The floor slabs, as above stated, were all pre-cast and were placed on the transverse caps of the towers by derricks. The deck was waterproofed in the usual manner, with a membrane and a protective layer of asphalt, after which the ballast and ordinary track ties were laid.

In order to maintain traffic and build the new bridge on the correct line, it was found necessary to build a temporary trestle on the north side of the structure, and entirely remove the old steel work. This allowed the use to the most economical length of concrete spans and also ensured that the new concrete would not be disturbed by the vibrations due to traffic passing on the old bridge.

The nature of the reinforcement in the towers is not different from modern practice. It consists of vertical rods located in the rectangular post sections. These rods are securely tied across to opposite rods, at close intervals, by units composed of rods previously bent to suitable shapes. The towers were poured story by story and splices in reinforcing bars were located immediately above the horizontal struts. The length of the horizontal girder slabs was dictated by the size of the reinforcing bars, the maximum size of which was 1 5/16 in. diam., bent up in the usual manner to take care of shear. All ends of the rods were bent in hook



Canadian Pacific Ry. bridge over Toronto Belt Line Ry. ravine, between Leaside Jct. and North Toronto.

handsome, modern passenger station at North Toronto have greatly increased the passenger traffic of this line, which also handles the heavy freight traffic between the east and the Buffalo and Detroit gateways. The two miles of single track between the double track east of Leaside Jct., and west of North Toronto was a very busy piece of line and the increased traffic in immediate prospect necessitated prompt relief.

In building the second track which has been completed recently, no material changes in grade or alignment were made, as the new work runs to 0.4% for the former, and 3° for the latter. The grading was comparatively light, and this, together with all track work, was handled by the company's forces. It was, however, necessary to replace two single track steel viaducts, the one over the Toronto Belt Line by a 2-track, and the one over Reservoir Park ravine by a 3-track structure. This has been done in reinforced concrete and is now completed and ready for the heavy winter traffic which commences with the close of navigation on the Great Lakes.

The bridge over the Reservoir ravine is known as 1.8 North Toronto Subdivision, and consists of a 3-track structure, located with its south track approximately on the site of the existing main line, which is being used as a new switching lead, the other two tracks being used for east-bound and westbound traffic. The structure is 326 ft. long and 88 ft. high, supported on 2 abutments and 5 towers, which in turn support pre-cast T-beam floor spans of such design that, laid along-



Canadian Pacific Ry. bridge over Toronto Belt Line Ry. ravine, between Leaside Jct. and North Toronto, looking west.

The towers are of unusual design, in that no diagonal bracing is used; but instead thereof, a system of horizontal struts, to reduce the stresses in the columns from the longitudinal and transverse horizontal forces. The immediate

form to give mechanical bond. Each of the finished slabs weighs approximately 57 tons, and this, as well as the size of the rods, was the controlling feature in deciding span lengths.

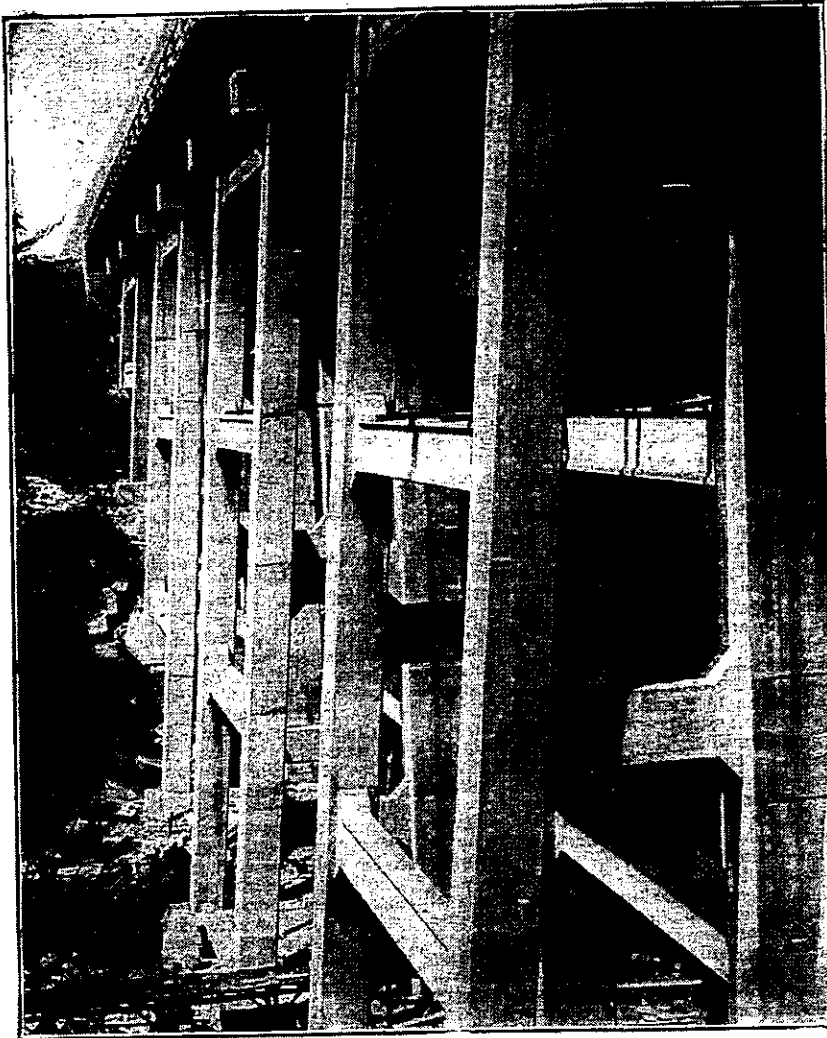
The bridge over the Toronto Belt Line



Ry. is known as 0.9 North Toronto Sub-division, and is similar in general elevation to the Reservoir ravine bridge as well as in length and height. It has the same number of towers and abutments.

Both bridges were designed to carry the heaviest locomotives in existence, with a considerable margin of safety, and are epoch-making in bridge engineering inasmuch as they have demonstrated that

attempted; the spans of these two structures are each from 35 to 37 ft. long. These spans were made possible by the employment of unit construction, by which each span was designed as two T beams, which were laid side by side on the previously built reinforced concrete, after being manufactured near the work towers. The towers are really reinforced concrete structures constructed in the usual manner by means of wooden forms built around a steel reinforcement, which was assembled previously and securely wired together. When all was in readiness, the concrete was poured by means

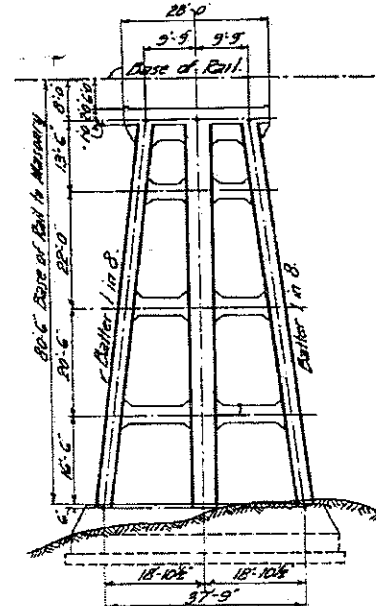


Canadian Pacific Ry. bridge over Reservoir Park ravine, near North Toronto station.

It supports, however, only 2 tracks, instead of 3. The bents consist of 3 posts, 2 outer-battered and 1 inner-vertical, and being a 2-track structure, the width is

reinforced concrete can take the place of steel for a very large number of permanent bridges.

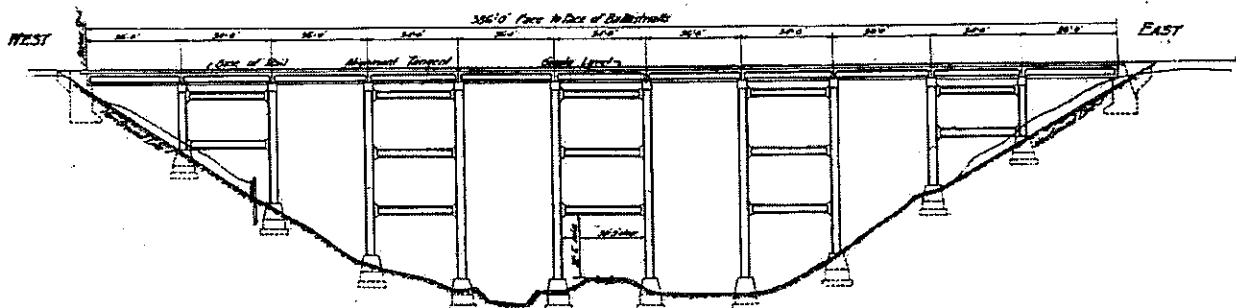
The length of the individual spans and



Bent No. 7 of Canadian Pacific Ry. bridge over Toronto Belt Line Ry. ravine.

of long spouts which led in several directions from the main mixing tower. The pouring of the concrete was maintained as continuously as possible until a whole tower was completed. This work was done during the winter, when the temperature was below freezing; it was performed inside of what was virtually a building erected to maintain a suitable temperature around the newly deposited concrete until it was out of danger of being damaged by frost.

The method employed in the erection of the reinforced concrete spans is specially interesting. Each slab, as a unit, weighed 55 tons, which was the limit load



Canadian Pacific Ry. bridge over Toronto Belt Line Ry. ravine, between Leaside Jct. and North Toronto.

correspondingly narrower. There are 2 narrow sidewalks for railway employees, protected by reinforced concrete posts and rail fence of same general character as the other bridge.

the details of their construction are claimed to be unprecedented in the engineering world. It is said that previous to this no reinforced concrete beam with a length of more than 25 ft. had been

that could be handled by the C.P.R. 100-ton standard wrecking cranes. The crane engaged handled no less than 110 slabs, each 55 tons in weight, or in all something like 6,000 tons, and all this was

done without a single mishap to either men or material. Another remarkable feature is that both structures were built without interruption from the beginning of June, 1917, to the beginning of July, 1918, which was a shorter period than would have been required to manufacture and erect similar structures in steel. Passenger and freight traffic was continued without interruption during the progress of the work.

Both works were executed under the supervision of J. M. R. Fairbairn, Assistant Chief Engineer, Eastern Lines, now Chief Engineer of the entire C.P.R. system, the designs being made by P. B. Motley, Engineer of Bridges, and the work was carried out under J. H. Barber, Engineer in Charge. The contractors of bridge 1.8 were Wells and Gray, Ltd., and for bridge 0.9 the Dominion Construction Co. The two steel trestles were removed by James Finley, structural contractor, Tweed, Ont. The temporary trestle over the reservoir ravine was erected by C.P.R. forces.

Work was started on the temporary trestles and grading, July 16, 1917, and the second track was put in operation July 4, 1918.

the depot commissariat, all the food for 180,000 men, bread, flour, fish, wine, etc. It takes 6,000 head of cattle a month to feed the troops; 30 cars a day are required to transport supplies of all sorts, but of this the censor will not let us say.

All of the above relates only to the transportation of the French troops, but what of the English effort for Italy? The French railways during the same time furnished the transport for men, ammunition, food, etc., etc. We are not acquainted with the military organization of our allies, but they performed the same feat. It was by thousands that their men went to Italy, and the French railways transported them and their equipment. The feeding alone of such an enormous number of allied troops in Italy, as well as the horses, and the continuous supply of ammunition, is a problem in itself. Then there are the returning trains with the wounded. All these great movements have been carried on quietly, smoothly, and without interfering with the daily requirements of the civilian population of France. Few know of the real hard work done by our railways and the difficulties they must overcome, often at a few hours' notice.

## Wonderful Movements of Troops by French Railway.

Although the events to which it referred occurred last year, the following article reproduced from a French revue, "Readings for Everyone," cannot fail to be of interest now. We are indebted to F. E. Gautier, Purchasing Agent, C.N.R., Winnipeg, for the translation:—

A French revue, "Readings for Everyone," publishes in its edition of the 15th Dec., 1917, a remarkable article entitled "Our soldiers in Italy," and the effort of France to transport almost at a moment's notice, several divisions of French and English troops from the western battle front to that in Italy.

Here is a summary of the article:—On a certain morning a stroke from the blue struck Paris:—"Italy is in danger, the Italian armies are retreating from the positions they had gained in Austria." The allies decided quietly to go to the help of Italy. It was on Oct. 23 that the German-Austrian attack began. Four days later the French and English Governments were advised of the gravity of the situation. The English Ambassador in Paris received instructions to offer Great Britain's fullest co-operation. The General in Chief of the French armies, the managers and chief engineers of the railways were summoned to Paris by telegraph. A meeting was held at 4 p.m. and by 6 o'clock the whole plan of assistance had been formulated. The military general staff instructed the division commanders and issued orders as to the immediate mobilization of different units.

The railway managers were asked: "Can you in 24 hours assemble sufficient material so as to throw 120,000 men over the Alps?" and the answer was: "If necessary, we will do it in 18 hours." They were told to go ahead, and in 20 minutes the orders were issued to the different railways.

They were then asked "Could you double the effort?" They replied "Yes, if we get the co-operation of the Orleans Ry. and that of the Eastern System, so as not to paralyze the economic conditions of life in the country."

It then became necessary to carry out the decision arrived at, and to assemble during the night an enormous number of trains and to bring them to the points on the western battle front, and then to carry the troops, at express speed, to the Italian front, Lake La Garda and the Val Sugana, the two points most in danger.

On Oct. 22, at 6.30 a.m., the train movement began; the engineers had assembled in the office of the chief engineer; the time tables were established, a statement made out of all the cars and locomotives available; then the wires were kept hot. Twelve thousand railway carriages and 500 high speed locomotives were on their way two hours later, for the northeastern

frontier, at full speed. Everything in the way of traffic not absolutely necessary, was cancelled; every station master received definite instructions; every locomotive house, every department, knew exactly the minute at which the services of the men and the material would be required, so that 24 hours after the first meeting of the war council, 12,000 cars were practically behind the battle front in France.

Now what about the military side of the situation? The units were fighting or in battle array, while the trains were spreading northeast to embark them. It is not wise to speak of the military organizations at the front, but this can be said: as soon as a train arrived, the staff sergeants went to work and with a piece of chalk indicated very clearly, on each carriage, where each regiment, each company or section belonged; there were 40 cars to a train; this train carried a battalion, one battery of 75's, a half battery of heavy artillery, with the necessary ammunition for men and guns, and a squadron of aviators.

On the evening of Oct. 28, the general staff had instructed the army staffs as to which divisions were to leave. Locomotives and still more locomotives, with their trains of carriages, began to arrive, so that at 4 p.m. thirty-eight complete trains were on six large side tracks which had been built in the meantime. Long before the arrival of the trains, every man had his orders as to what he was to carry on his journey to Italy; the work of the non-commissioned officers was admirable. The temporary station was ablaze with electric reflectors. The first battalions started for the trains, and so perfect were the arrangements that every man stood in front of the particular carriage he was to occupy. Then at a bugle call all got on board, then a whistle from the locomotive, and amidst a thunder of "Au Revoir," "Good-bye," "We are off to the land of the sun," the trains pulled out. Battalions followed battalions at 10 minutes interval; then came the field kitchens, the rapid firing gun sections, the grenade companies, the ambulance waggons and corps, the army service waggons and staff. The trains keep going and going; then it was the turn of the artillery, the big guns, the little ones, the 75's, the 155's, the 210's, the larger ones on their railway truck, just as they left the factories. These trains required from two to three locomotives. Then came the full commissary department corps with the food. The night was well advanced when the last red light, on the last train, disappeared in the darkness. The speed was 35 kilometres an hour. The first train reached its destination on Nov. 2 on the Italian battle front at Asiago. Two trains carried the material necessary for

## An Appreciation of J. E. Quick.

The Eastern Canadian Passenger Association unanimously adopted the following resolution at its last meeting:—Whereas J. E. Quick, after 47 years continuous service with the lines of the Grand Trunk Ry. System, has retired from service as General Baggage Agent, under the company's pension rule, now be it resolved, that this association express to Mr. Quick its most sincere regret at the severance of business ties that have existed for many years, and the equally sincere hope and wish that he may be spared for many years to come to enjoy the fruits of his labor. Mr. Quick's instinctive gentility, unvarying courtesy and kindly disposition have endeared him in the hearts of all who have been associated with him, either in a business or social way; his dealings with his fellow men have always been along the lines of justice and right and devoid of any taint of selfishness or self aggrandizement and his judgment of the soundest. His withdrawal from the field in which he has so long been a leader and active worker will be keenly felt by those who know his sterling worth, ability, and willingness at all times to put his shoulder to the wheel, or reach out a hand to assist any in distress or need of help.

**Automatic Train Stops.**—The Board of Railway Commissioners issued the following circular Aug. 13:—In view of the frequency of accidents, as shown by reports made to the board from time to time, indicating that some grave consideration should now be given by Canadian railways to the question of the advisability of adopting an effective automatic train stop device, the board, in full realization of the necessities of the situation brought to its attention, desires an expression of the views of each railway company under its jurisdiction upon the subject after full consideration and investigation has been given by the railways. It is suggested that the Canadian Pacific, Grand Trunk, Michigan Central, Canadian Northern, St. Lawrence & Adirondack, Grand Trunk Pacific, and Toronto, Hamilton & Buffalo Railways should appoint a special committee to consider the matter, a report as to progress to be made to the board within 90 days.

# Canadian Railway and Marine World

March, 1919

## Design and Construction of Reinforced Concrete Viaducts on North Toronto Subdivision, Canadian Pacific Railway.

By B. O. Eriksen and H. S. Deubelbeiss.

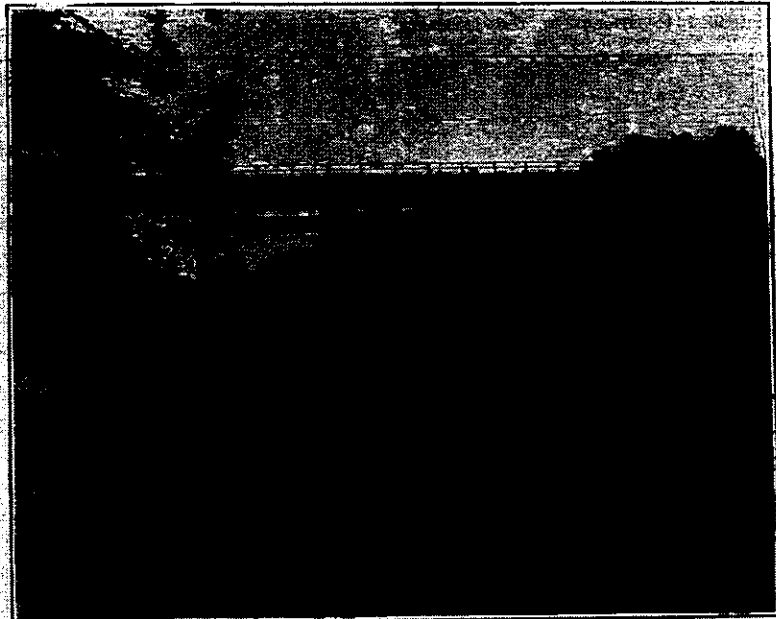
**General Description and Design.**—The greatly increasing freight traffic and a still greater prospective increase in passenger traffic, due to the agreement between the C.P.R. and the Canadian Northern Ry., whereby the latter acquired running rights over the C.P.R. from Leaside Jct. to North Toronto station, necessitated the double tracking of the line between these two stations. While this line is only about two miles long, several reinforced concrete culverts required extensions, and two important bridges, one at mileage 0.9 from Leaside Jct. and the other at mileage 1.8 therefrom, had to be rebuilt. The existing single track steel viaducts at these two points not being adequate for the present heavy rolling stock, and still less for future requirements, had to be rebuilt, so that these bridges would not limit the use of heavier motive power on this important link. Bridge 1.8, being located at the limit of the North Toronto yard, required an extra track for switching, so as not to interfere too much with the main line traffic.

Estimates for both bridges were made for building them in either steel or reinforced concrete. The higher cost of steel viaducts, and the uncertainty of the delivery of structural steel, were the deciding factors in the choice of reinforced concrete trestles as built and here described.

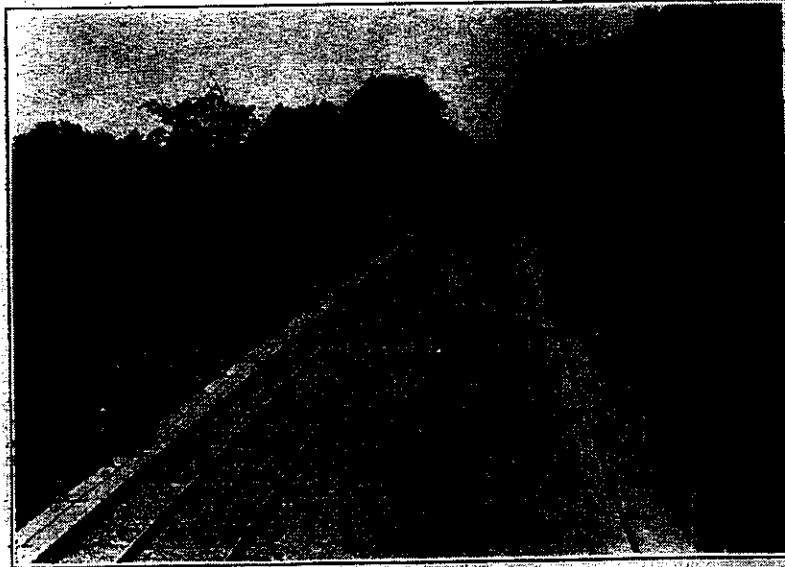
While no designs were prepared for concrete arches at these points, the possibility of building them was considered. The limited right of way at the bridge sites, however, and the necessity of

problem. The designs adopted, where all slabs were pre-moulded, and the bulk of the concrete could be cast in forms on the

without difficulty. These considerations justified the dropping of further studies of reinforced concrete arches, and the



Bridge over Toronto Belt Line Ry. Ravine, North Toronto Subdivision, C.P.R.



Bridge over Toronto Belt Line Ry. Ravine, North Toronto Subdivision, C.P.R.

building temporary trestles within these limits, made the maintenance of traffic in building arch structures a most difficult

ground, promised a much speedier and safer construction, and permitted the carrying of traffic within our right of way

adoption of designs of which the principal dimensions are shown in fig. 1.

Continuous piers have been used instead of individual pedestals, as is customary for steel viaducts. These, together with the very stiff caps, made each bent as one unit. The columns are thoroughly bonded to the piers, by the recesses and the rods in tops of same, which correspond to the reinforcing rods in the columns.

In designing the columns, rectangular and octagonal sections were considered. The rectangular section was adopted, as the most suitable to resist the great bending moment that the columns would be subject to. The columns are reinforced with longitudinal rods anchored into the concrete by  $\frac{3}{4}$  in. diameter bands. On account of the unusual size of these columns, these bands were made in sections, so that intermediate bars would be thoroughly anchored into the body of the columns. These bands were not considered to act as hooping, owing to their rectangular shape. The tower bracing consists of struts, reinforced to resist the bending moments due to their own weight, and the various horizontal forces acting on the tower. In order to improve the appearance, and reduce the weight, the vertical forces of the longitudinal struts were given a 8 in. recess. The longitudinal and transverse struts are arranged alternately. At all intermediate

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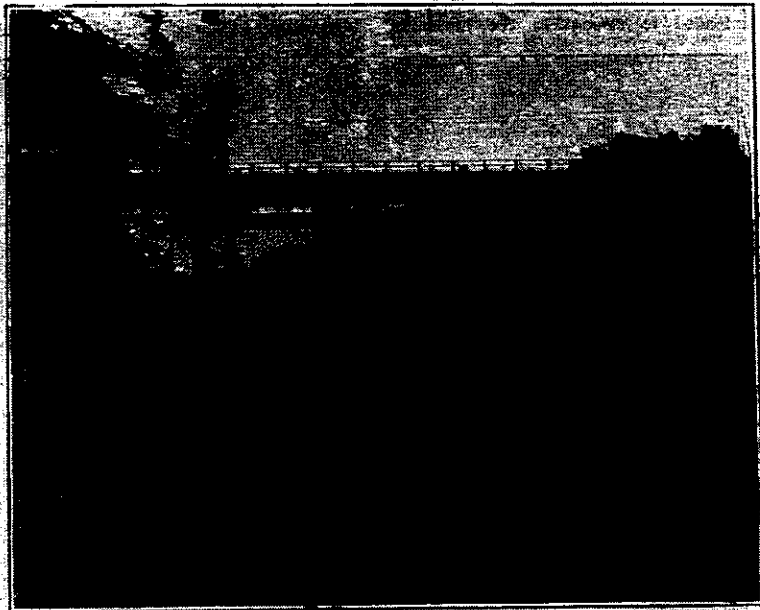
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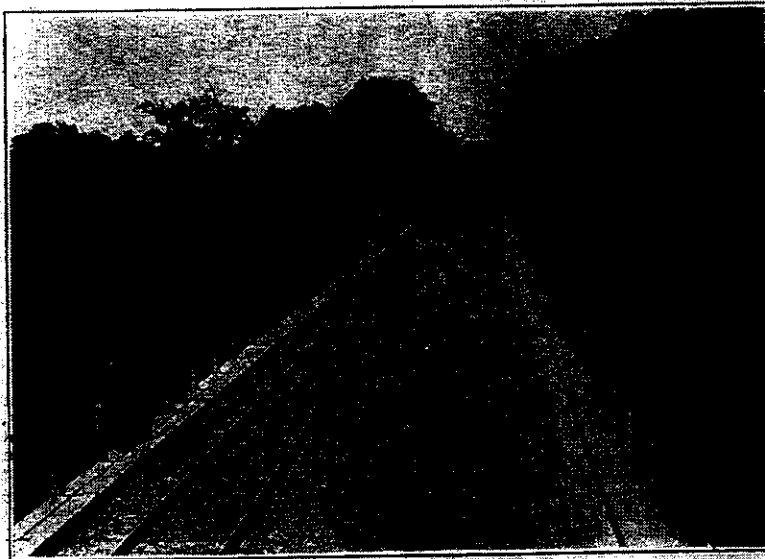
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In designing the columns, rectangular and octagonal sections were considered. The rectangular section was adopted, as the most suitable to resist the great bending moment that the columns would be subject to. The columns are reinforced with longitudinal rods anchored into the concrete by  $\frac{3}{4}$  in. diameter bands. On account of the unusual size of these columns, these bands were made in sections, so that intermediate bars would be thoroughly anchored into the body of the columns. These bands were not considered to act as hooping, owing to their rectangular shape. The tower bracing consists of struts, reinforced to resist the bending moments due to their own weight, and the various horizontal forces acting on the tower. In order to improve the appearance, and reduce the weight, the vertical forces of the longitudinal struts were given a 3 in. recess. The longitudinal and transverse struts are arranged alternately. At all intermediate

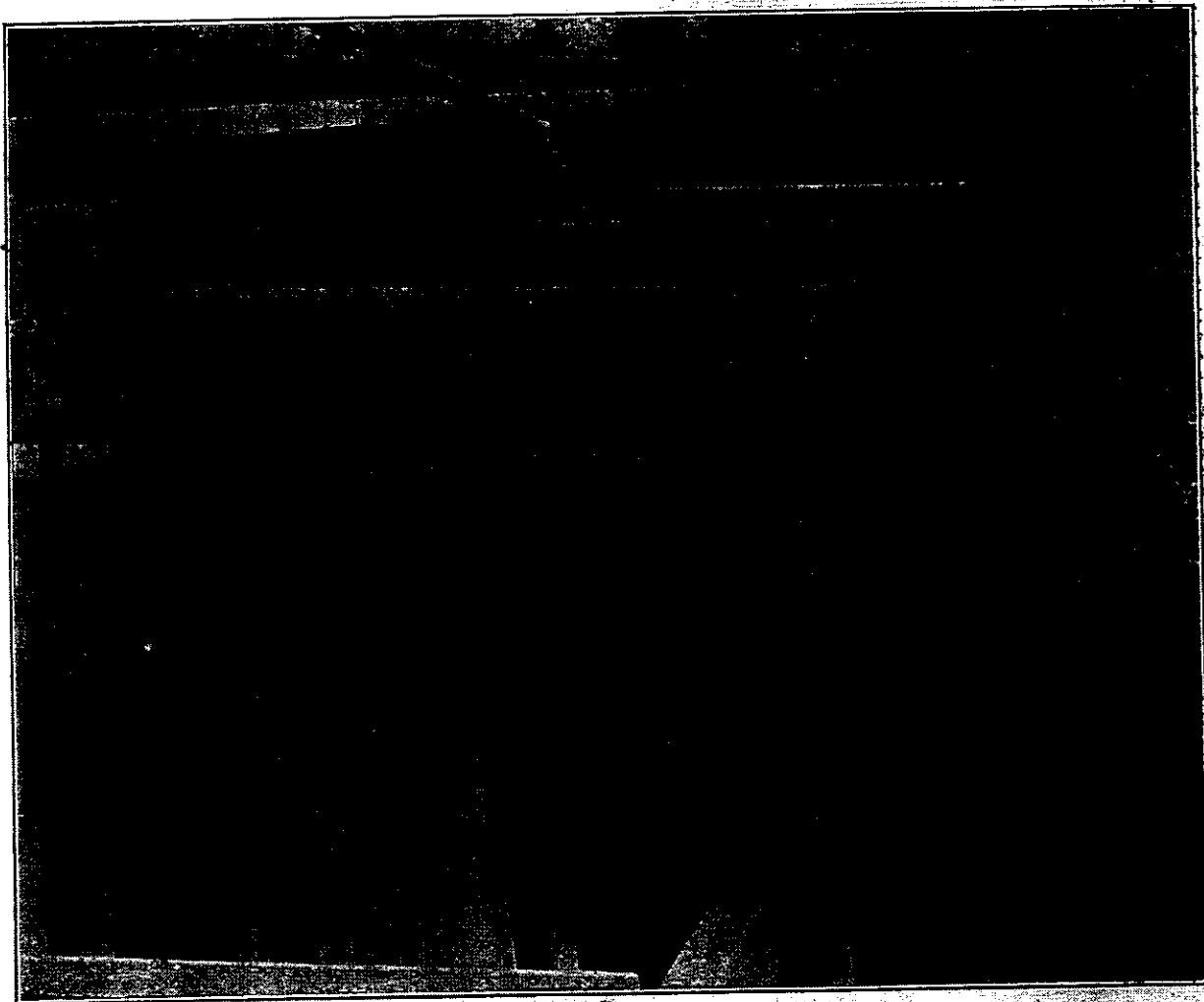
points, bending moments, due to transverse forces, will then be practically zero, where the moments caused by the longitudinal forces are maximum. Sliding surfaces for the main slabs are provided by  $\frac{1}{4}$  in. steel bearing plates on caps of the bents; the plates are held in position by  $1\frac{1}{2}$  in. dowels. As these plates are continuous over the caps of the bents, they strengthen the caps against stresses produced by longitudinal forces on the bridge.

Each track is supported by two pre-moulded simple T beams. The end brackets on these slabs do not bear on the caps, but are kept clear by the steel bearing plates which they overhang. They are intended to strengthen the horizontal

The sidewalks are composed of pre-moulded T shaped slabs, supported on brackets projecting out from the main slabs. The flanges of the sidewalk slabs fit into a horizontal groove in the coping blocks, which are heavy enough to counteract any tendency of the T beams to overturn. One-inch dowels hold these slabs in position on the brackets. The hand-railing consists of pre-moulded concrete posts, and three rows of 2 in. pipe.

The bridges are designed to carry Cooper's E-50 loading, with an impact allowance of .90 — 300/300 L.L., where L.L. = live load and L. = loaded distance in feet. Where stresses are produced by the loading of more than one track, L. is multiplied by the number of tracks.

Bending moments in columns, due to dead load of struts, were included in calculations. While this is usually neglected in steel structures, it became necessary here, owing to the great weight of the struts. These latter moments, and also the moments due to traction, were calculated by the elastic theory—the equations being solved by the area moment method. Fig. 2 indicates how these equations were developed. The application of this theory, however, for the calculation of moments, due to transverse forces, became extremely involved, owing to the shape of the bents. For this reason, points of inflection were assumed as shown in fig. 1. Comparison between results obtained by similar assumptions, in



Construction of Reservoir Ravine Bridge, North Toronto Subdivision, C.P.R.

flanges and improve the appearance of the structure. The top surfaces of the slabs have a smooth finish, and are sloped towards drain pipes, placed along coping blocks and between the tracks.

The ballast is held in position by the coping blocks, which were pre-moulded in sections and anchored to the slabs by 1 in. dowels. After the erection of the slabs and coping blocks, the surfaces in contact with the ballast were waterproofed with a membrane type of waterproofing. This was laid continuously from abutment to abutment, the gaps between slabs being reinforced by additional layers of felt and mastic.

The design is in accordance with the Specification for Reinforced Concrete of the Engineering Institute of Canada.

In addition to dead load, live load and impact, the towers had to be designed to resist stresses due to traction and wind. A traction force equal to 9% of the wheel load was assumed to act at the rail level. This coefficient of traction was derived from diagram in Mr. Blumenthal's paper on Traction Stresses (Can. Soc.C.E. Transactions, Vol. 24, Part 2). A wind load of 30 lbs. a sq. ft. on exposed surfaces of train and slabs, and a similar load on  $1\frac{1}{2}$  times the vertical projection of towers was assumed.

the case of longitudinal forces, with those obtained by the use of the elastic theory, showed that the method adopted would give results sufficiently accurate for the purpose. Stresses in columns, including bending moments when one span only was fully loaded, were calculated, but found to be below maximum shown on stress sheet.

Traffic was maintained on both bridges on temporary wooden trestles, erected on the north side of the old main line track. This was contemplated from the very first for bridge 18, as the spans of the existing bridge were so arranged, that to build a concrete trestle and keep clear of existing

steelwork would be impracticable. At bridge 0.9, however, it was found that if the new bridge was laid out with 34 ft. tower and 36 ft. intermediate spans, there would be no interference with existing steelwork, and traffic could be maintained on the old bridge. This arrangement of spans was, therefore, adopted for both bridges. However, when excavation was started, it was found that the condition of existing masonry would not permit excavation for new piers to be carried down to the required depth, without endangering the safety of traffic. It was, therefore, considered advisable to build a temporary wooden trestle for this bridge also,

load was piled separately; there being a space of at least one foot all around each pile. The various materials were wheeled in barrows to the mixers. Stone and sand were measured by barrow loads. One bag of packed cement was considered 1 cu. ft. Water barrels were filled from the city line, through 2 in. pipes, and the water was measured with pails. At each end of the bridge, a 75 ft. hoisting tower was erected, from which concrete was conveyed to the various piers and towers by spouting. At the slab yard, the concrete was wheeled in buggies along a trestle, built on a level with the tops of forms, and dumped directly into the forms.

and derrick. The crushed stone dropped through the floor of the platform to an inclined screen, which screened out all particles  $\frac{1}{4}$  in. and less. The stone was then delivered from the crusher to an elevated stone bin, with an inclined bottom, located directly above the hopper of the mixer, which was set up on a foundation about 4 ft. above the ground. The flow of the stone, from stone bin to hopper, was regulated by a steel plate gate, and the hopper was graduated to receive the correct quantities of stone. The screenings from the crusher were used mixed with the sand. The sand was stored on plank platforms as at bridge 1.8, and delivered from there to the elevated bin adjacent to the stone bin and handled in the same way as the stone. The cement was stored in a shed of similar construction to those at bridge 1.8 and was delivered to the mixer by the derrick. No hoisting tower was used at this bridge, for conveying the concrete. It was wheeled in dump cars, running on a narrow gauge track, on a trestle constructed at the track level along the bridge. The concrete was dumped into hoppers at various points along the deck of the trestle and delivered from there to piers



Bridge over Reservoir Park Ravine, North Toronto Subdivision, C.P.R.

rather than attempt to support masonry pedestals on these steep side hills.

**Plant at Bridge 1.8.**—A plant for storage and mixing was installed at each end of the bridge, and one at the slab yard, about a quarter of a mile east of the bridge. The stone and sand were piled in the open about 25 ft. from the mixer. They were stored on plank bottoms, to prevent admixture of earth. The cement was stored in three sheds, having capacities of five carloads each. They were built of dressed lumber, and dressed with ready roofing paper. The floors were kept about 3 in. clear of the ground, in order to make the sheds damp-proof. Each car-

**Plant at Bridge 0.9.**—At this bridge only two storage and mixing plants were installed; one at the west end of the bridge and one at the slab yard, half a mile east of the bridge. At the slab yard, materials were stored and handled in the same manner as at bridge 1.8. The plant at the bridge site, however, was entirely different; the stone received here was too large and had to be crushed and screened to 1 in. size. Between the storage pile and the mixer, a gyratory crusher—belt connected to a gasoline engine—was mounted on a platform about 10 ft. high. This crusher was fed from the storage pile, by a 1-yard grab bucket

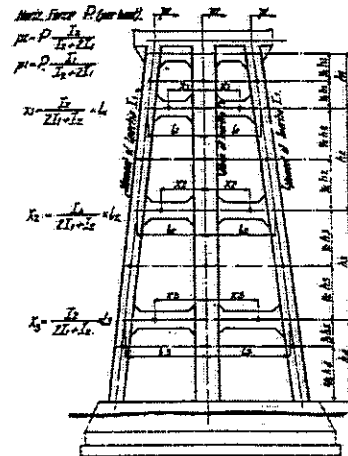


Fig. 1. Bridges on North Toronto Subdivision, C.P.R. Dimensions of towers.

and towers by metal chutes connected to the hoppers.

**Materials.**—The stone used was partly trap rock and partly hard limestone, ranging in size from 1 in. down to  $\frac{1}{4}$  in.

The sand was a natural bank and of a granitic composition, well graded from  $\frac{1}{4}$  in. down.

Two brands of cement were used, Pyramid brand, manufactured by the St. Marys Cement Co., and Canada brand, manufactured by the Canada Cement Co. They were fairly slow setting cements; averaging about 3 hours for initial set, and about 5½ hours for final set. While the cement was being unloaded from the cars, one bag in every 50 was opened and a small sample taken from it. These small samples were mixed into one composite sample for each car. (One car contained an average of 760 bags.) These samples were then forwarded to the testing laboratory in Montreal, shipped in air tight lever top tins, which ensured that cement did not air slack in transit. Each carload of cement was stored separately in sheds, given a number corresponding to number of sample and held until the inspector was notified that the test had



proved satisfactory. All cement used was in conformity with the C.P.R. Cement Specification, 1912.

The forms were treated with one application of petrolatum and neutral oil, mixed in the proportion of one of petrolatum to two of neutral oil, or until a creamy consistency existed. After the forms were fabricated, all holes and large cracks were filled with putty, all knots and putty fillings were then shellaced. The above mixture was then applied on inside of forms, with a whitewash brush; the neutral oil penetrated about  $\frac{1}{4}$  in. into the wood, leaving a thin waxy film of petrolatum on the surface. The forms, thus treated, did not warp, as wind and moisture did not cause the grain of the wood to rise. A number of the forms were used as often as eight times, and all

6 in. clear of the surface of concrete, a layer of straw was then packed around the centre form, and the whole covered with tarpaulins. The sidewalk slabs and coping blocks were protected in a similar manner to the main slabs. The hand-rail posts were cast in a shed heated by a stove.

Bents were housed in from top to bottom with  $\frac{1}{2}$  in. tongued and grooved boards. This housing was built about 3 ft. away from the forms and steam pipes were run into this space. As an auxiliary to the steam heat, a battery of 4 coke burning salamanders were placed on the ground. With these precautions, concrete was poured at a temperature as low as 10° F., and the space around the forms could be kept at a temperature of about 50° F. Heat was maintained for

tons a sq. ft.

Piers.—Concrete in the piers was poured in 3 consecutive runs as follows: The footing course was poured in the open excavation. Before this had a chance to set, large boulders and stones from the old pedestals, broken up to one man size, were imbedded in the top surface in 3 rows and about 3 ft. apart; thus a good bond was obtained with the next course. After the footing course had taken its final set and forms were erected for the pier proper, the surface was thoroughly scraped and slushed with water, until all signs of laitance had been removed. The concrete was now poured for the vertical portion of pier. After the top surface of same had been treated in the same way as the footing course, concrete was finally poured for the batter course of the pier.

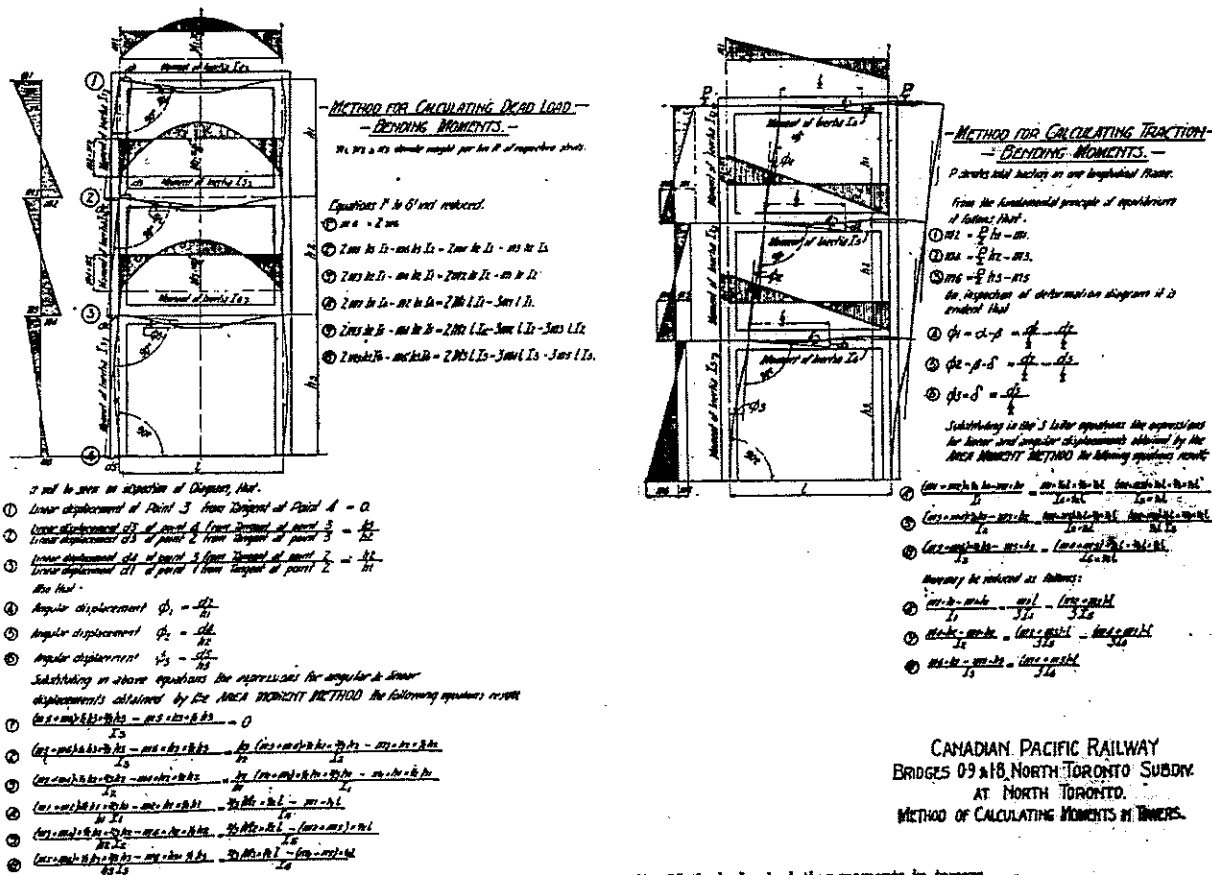


Fig. 2. Bridges on North Toronto Subdivision, C.P.R. Method of calculating moments in towers.

that was necessary, after each stripping, was to dust or sweep them off with an old rag or broom.

Heating.—In November, when the temperature dropped to 40° F., heating of the materials was commenced. A live steam jet was introduced into each water barrel, which kept the water nearly to the boiling point while the mixer was running. Sand and stone were heated by perforated steam pipes, placed under sand and stone piles. For the very cold weather, the steam was kept on night and day. The temperature of the concrete as it left the mixer was about 55° to 60° during the very coldest weather. For the main track slabs, concrete was poured in as low a temperature as 25° F. After pouring of concrete, the tops of slabs were covered with tar paper, kept about

at least three days after pouring was completed.

The longitudinal struts were also housed in, and a steam line run along each side near the bottom of the housing. The bottoms of the housings for struts were packed with straw; the tops were covered with tar paper clear of concrete, on this was placed a packing of straw and the whole covered with tarpaulins.

Excavation was started during the middle of Aug., 1917. The soil encountered was generally a hard blue clay; in some cases coarse sand. Before any concrete was placed, each foundation was subjected to a loading test at both ends. An ordinary table having four 3 x 3 in. legs was used for this purpose; the table was loaded with cement bags filled with sand, the total load corresponding to 4

For recesses of columns, templates in the shape of a box, with proper number of holes spaced to receive the anchor rods, were placed and fastened in position to the forms of the batter course. After the last batch of concrete was poured, the anchor rods were inserted in the holes, and driven to the right depth in the wet concrete. The forms of the piers were stripped after two days and the exposed surfaces rubbed with carborundum stones.

Details of towers are shown in fig. 3, and illustrations show clearly the details of forms. In erecting the forms, great care was taken not to have any parts braced to, nor allow any to come in contact with the trestle carrying traffic, so as to avoid disturbance of concrete while it was setting. The concrete was poured from strut to strut, the brackets at the end of

CANADIAN PACIFIC RAILWAY  
BRIDGES 09 AND 18, NORTH TORONTO SUBDIVISION  
AT NORTH TORONTO.  
METHOD OF CALCULATING MOMENTS IN TOWERS.

each strut forming hoppers to receive concrete. At every construction joint, trap doors had been arranged in the column forms, in order to permit removal of all laitance and thoroughly to clean the surface before any new concrete was poured. The concrete in the column forms was spaded by long handled spades, and the outsides of the forms were beaten with wooden mallets, to free any air. A good smooth surface, with very few air pockets, resulted therefrom. The column forms were stripped after 4 or 5 days in warm weather, and after a week or 10 days in cold weather. The strut sides were stripped after 7 days in warm weather and after 2 weeks in cold weather. The bottoms of the struts were not stripped until absolutely necessary, and never before 3 weeks in warm weather and 4 weeks in freezing weather. All surfaces of towers were rubbed down with carborundum stones.

Details of slabs are shown in fig. 4 and details of forms in fig. 5. Forms were made collapsible. A new bottom, however, was made for each slab. After assembling of forms, one end was left open until all reinforcing bars were properly placed and wired together. Bars were supported on pre-moulded dovetailed concrete blocks 1 1/2 in. thick, which made suspending wires unnecessary, thus avoiding obstructions to levelling off top surface of slabs. On slabs, only the exposed surfaces of outer slabs were rubbed down with carborundum stones.

Erection of main slabs of bridge 0.9 was started on Feb. 22 and completed on April 10, 1918. On bridge 1.8 erection started April 11 and the last slab was placed on June 1, 1918. The longest slab weighs 56 tons.

As the 100-ton wrecking crane did not have the reach required for placing these heavy slabs, a special scheme of erection had to be devised. This is shown in fig. 6 and illustrations. At the slab yard, one end of the slab was lifted on to a freight car truck, the other end suspended from the crane. The slab was thus pushed ahead by the crane on to the bridge. Two timber trusses, specially constructed for the purpose, were placed far enough apart to permit the slab to be lowered down to the bents. The end of slab resting on the track was then hitched to a trolley, which was running on rails on top chord of trusses. The derrick was then moved ahead, until the slab had reached the position for lowering down to rollers on caps. After the slab was on rollers, it was moved sideways on them to its final position. When all slabs of one span were erected, the erection trusses were moved forward by the crane to the next span and same operation repeated.

The actual cost per cubic yard of concrete in the various parts of the structure at bridge 1.8, North Toronto, was as follows, per cu. yd.:

Piers.	Per cu. yd.
Forms, including labor, overhead and contractor's commission .....	\$1.85
Concrete—Materials .....	3.94
Freight on sand, stone and cement .....	0.87
Labor .....	1.61
Incidentals, overhead and commission .....	0.98
Steel .....	1.07
	\$9.32
Abutments.	
Forms, including labor, overhead and commission .....	\$4.38
Concrete—Materials .....	3.70
Freight on sand, stone and cement .....	0.78
Labor .....	3.28
Heating .....	1.25
Drainage and waterproofing .....	5.14

Incidentals, overhead and commission .....	1.39
Steel .....	2.14
	\$17.79
Towers.	
Forms, material, labor, overhead and commission .....	\$12.32
Concrete—Materials .....	4.53
Freight on sand, stone and cement .....	1.00
Labor .....	5.75
Heating .....	4.19
Incidentals, overhead expense and commission .....	2.85
Steel .....	14.12
	\$45.54
Slabs.	
Forms, material, labor, preparing of slab yard, incidentals, overhead and commission .....	\$9.15
Concrete—Materials .....	5.67
Freight on sand, stone and cement .....	0.97

Wages.	
Carpenters .....	\$0.51 an hour.
Carpenter's helpers .....	.40 an hour.
Laborers .....	.37 1/2 an hour.
Engineers on mixers .....	.54 an hour.
Concrete finishers .....	.41 an hour.

The work was carried out under the direction of J. M. R. Fairbairn, Chief Engineer; P. B. Motley being Engineer of Bridges. J. H. Barber was engineer in charge of construction, with A. H. Munson as assistant; while the necessary investigations, calculations and details were worked out by the writers. The contractors for bridge 1.8 were Wells & Grey, Ltd., and for bridge 0.9 the Dominion Construction Co., both of Toronto.

The foregoing paper was read before the Engineering Institute of Canada recently.

Regarding the item, heating of towers,

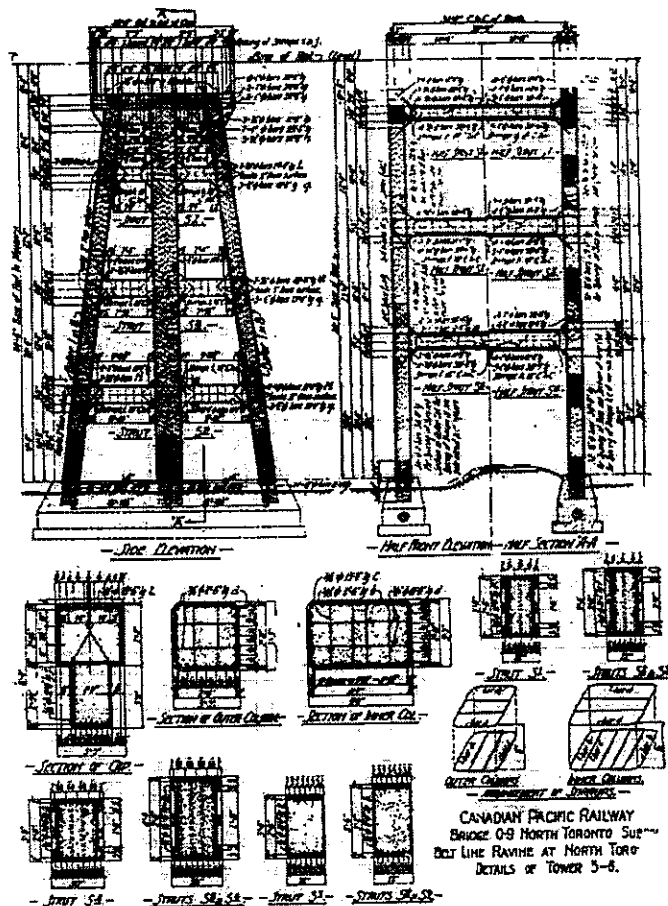


Fig. 3. Bridge 0.9, Toronto Belt Line Ry. Bayview, North Toronto Subdivision, C.P.R. Details of tower 3-4

Heating .....	0.20
Labor .....	3.11
Incidentals, overhead and commission .....	1.55
Steel .....	13.45
	\$4.10
Cost of erection of slabs, per cu. yd. ....	7.18
	\$41.23

The average cost of materials used and the average rates of wages were as follows:

Materials.	
Lumber .....	\$38.50 per M.
Stone .....	\$0.983 per ton.
Sand .....	\$6.235 per ton.
Cement (including bags) .....	\$2.90 per bbl.

the average cost of \$4.19 is shown. As, however, only about three-fifths of the towers required heating, the actual cost per cu. yd. was approximately \$7.

Additional illustrations will be found on pages 114, 115 and 116.

**Montreal Central Terminal Co.**—A meeting of shareholders has been called to be held in Montreal, Mar. 4, to elect directors, to authorize the construction of the projected tunnel and terminals in Montreal, and to authorize the issue of mortgage bonds.



## Birthdays of Transportation Men in March.

Many happy returns of the day to:—  
W. G. Annable, General Passenger Agent, Canadian Pacific Ocean Services, Ltd., Montreal, born at Ottawa, Mar. 3, 1875.

John Archibald, Locomotive Foreman, C.P.R., Coquitlam, B.C., born at Edinburgh, Scotland, Mar. 13, 1872.

Jas. Balkwill, Division Superintendent, Canadian Division, Michigan Central Rd., St. Thomas, Ont., born in Southwold Tp., Ont., Mar. 8, 1870.

Sir George Bury, ex Vice President, C.P.R., Montreal, born there, Mar. 6, 1866.

Allan Cameron, Superintendent, Land Branch, Department of Natural Resources, C.P.R., Calgary, Alta., born near Owen Sound, Ont., Mar. 14, 1864.

Creek, Mich., Mar. 27, 1893.

C. T. Delamere, acting Engineer of Construction, Eastern Lines, C. P. R., Montreal, born at Brainerd, Minn., Mar. 18, 1881.

H. G. Dring, General Passenger Agent, C.P.R., London, Eng., born at Easton, Northamptonshire, Eng., Mar. 3, 1881.

Patrick Dubee, Secretary-Treasurer, Montreal Tramways Co., Montreal, born there, Mar. 4, 1876.

Frederick Elliott, President Victoria Navigation Co., Ltd., Thurso, Que., born at Montreal, Mar. 8, 1858.

M. P. Fennell, Jr., Secretary-Treasurer and Comptroller, Montreal Harbor Commissioners, Montreal, born there, Mar. 13, 1885.

Way, Canadian National Rys., Toronto, born at Truro, N.S., Mar. 14, 1870.

J. I. Hobson, Treasurer, Canada Steamship Lines, Ltd., Montreal, born at Guelph, Ont., Mar. 30, 1872.

N. J. Holden, President, The Holden Co., Ltd., Montreal, born at Nobleton, Ont., Mar. 22, 1866.

A. R. Holtby, Master of Bridges and Buildings, Mountain Division, Grand Trunk Pacific Ry., Prince Rupert, B.C., born at Rawdon, Que., Mar. 23, 1859.

Frank Lee, Engineer, Maintenance of Way, Eastern Lines, C.P.R., Montreal, born at Chicago, Ill., Mar. 7, 1873.

J. M. McKay, Superintendent, Saskatchewan Division, Saskatchewan District, C.P.R., Saskatoon, born at Tiverton, Ont.,

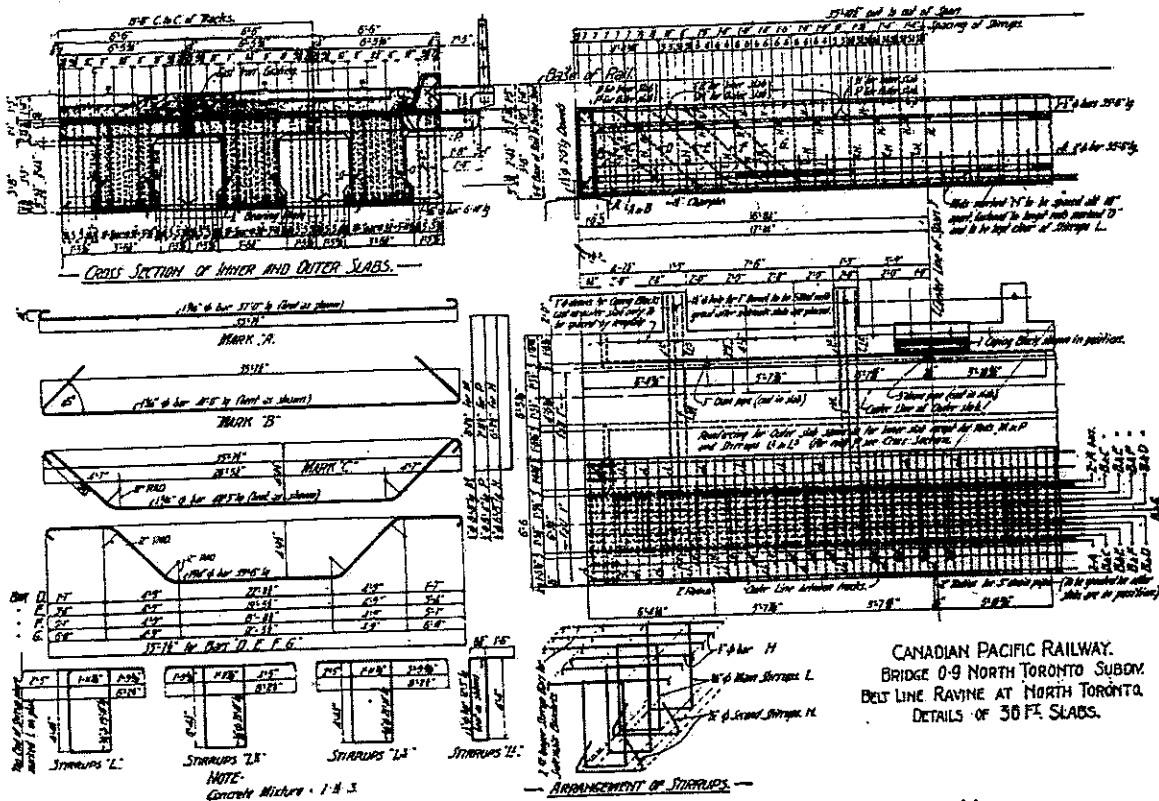


Fig. 4. Bridge 0-9, Toronto Belt Line Ry. Ravine, North Toronto Subdivision, C.P.R. Details of 36 ft. slabs.

H. S. Carmichael, Passenger and Freight Manager, Canadian Pacific Ocean Services, Ltd., London, Eng., born at Glasgow, Scotland, Mar. 7, 1874.

F. G. J. Comeau, District Freight Agent, C.P.R., Halifax, N.S., born at Meteghan River, N.S., Mar. 10, 1859.

W. A. Cooper, Manager, Sleeping, Dining and Parlor Cars and News Service, C.P.R., and member of Government Food Consumption Control Committee, Montreal, born there, Mar. 22, 1871.

A. E. Cox, General Storekeeper, Canadian National Rys., Winnipeg, born at Huddersfield, Eng., Mar. 12, 1863.

Senator N. Curry, Chairman, Canadian Car & Foundry Co., Montreal, born in King's County, N.S., Mar. 26, 1851.

C. C. Curtis, Manager, Cape Breton Electric Co., Sydney, N.S., born at Battle

W. R. Fitzmaurice, Superintendent, Division 2, Maritime District, Canadian National Rys., Campbellton, N.B., born at Bedford, N.S., Mar. 19, 1870.

C. Forester, Superintendent, London Division, Ontario Lines, G.T.R., London, born at Wanstead, Ont., Mar. 5, 1876.

R. A. Gamble, General Yardmaster, Winnipeg Terminals, C.P.R., born at Dublin, Ireland, Mar. 1, 1876.

J. Halstead, Division Freight Agent, C.P.R., Calgary, Alta., born at Bracebridge, Ont., Mar. 2, 1877.

E. M. Hannaford, Assistant Chief Engineer, Montreal Tramways Co., Montreal, born there, Mar. 22, 1865.

C. A. Hayes, Vice President, Traffic, Canadian National Rys., Toronto, born at West Springfield, Mass., Mar. 10, 1865.

H. T. Hazen, Engineer, Maintenance of

Mar. 13, 1868.

Brigadier-General H. H. McLean, K.C., M.P., ex-President, St. John Ry., St. John, N.B., born at Fredericton, N.B., Mar. 22, 1855.

M. Magiff, Superintendent of Car Service and Telegraphs, Central Vermont Ry., St. Albans, Vt., born at Planks Point, N.Y., Mar. 24, 1852.

Sir Donald D. Mann, ex Vice President, Canadian Northern Ry., Toronto, born at Acton, Ont., Mar. 23, 1853.

H. H. Melanson, Passenger Traffic Manager, Canadian National Rys., Toronto, born at Scodouc, N.B., Mar. 9, 1872.

J. V. Murphy, General Agent, C.P.R., Portland, Ore., born at Bowmanville, Ont., Mar. 5, 1885.

Peter Paton, ex Purchasing Agent, Canada Steamship Lines, Ltd., Montreal, now

President. Mackenzie, Milne & Co., Ltd., Sarnia, Ont., born at New Lovell, Ont., Mar. 13, 1868.

F. W. Peters, General Superintendent, British Columbia District, C.P.R., Vancouver, born at St. John, N.B., Mar. 25, 1860.

J. W. Pugaley, Secretary, Department of Railways and Canals, Ottawa, Ont., born at Amherst, N.S., Mar. 12, 1861.

C. J. Smith, Manager and Secretary, Montreal Warehousing Co., Montreal, born at Hamilton, Ont., Mar. 10, 1862.

W. Y. Soper, Vice President, Ottawa Electric Ry. Co., Ottawa, Ont., born at Oldtown, Me., Mar. 9, 1854.

E. F. L. Sturdee, General Agent, Passenger Department, C.P.R., Boston, Mass., born at St. John, N.B., Mar. 29, 1876.

G. W. Vaux, ex-General Agent, Passenger Department, Union Pacific Rd., Chicago, now General Manager, Zeigler Coal Co., Zeigler, Ill., born at Montreal, Mar. 21, 1866.

A. D. Watt, District Master Mechanic, Grand Trunk Pacific Ry., Prince George, B.C., born at St. Louis, Que., Mar. 5, 1874.

A. T. Weldon, Assistant Freight Traffic Manager, Canadian National Ry., Moncton, N.B., born at Dorchester, N.B., Mar. 6, 1876.

D. O. Wood, Assistant Export and Import Agent, C.P.R., Toronto, born at Kleinburg, Ont., Mar. 16, 1864.

H. K. York, Car Foreman, C.P.R., Alyth, Alta., born at Victoria Corner, Carleton Co., N.B., Mar. 20, 1881.

### European Railway Development and Plans.

The experiences of the war have revived interest in Great Britain, as well as in other parts of Europe, in a number of transportation projects which have been prominently before the public at different times during the last half century. The operation of a train ferry service between Richborough and Southampton, on the English side of the English Channel, and Calais, Dunkirk and Dieppe, on the French side, showed the advantage of having a means by which freight and passenger cars could be transferred between the two countries, but it also emphasized the discomforts of the cross-channel passage. The experience directed attention to the projected tunnel from Dover to Calais, so warmly advocated by the late Sir Edward Watkin, formerly chairman Southeastern Ry. of England, and also a director of the Grand Trunk Ry., the preliminary construction operations on which were stopped many years ago by the British Government. Present-day advocates of the tunnel claim that its construction would be a further link in the chain binding the British and French peoples together. This project is linked up with a plan which it is reported is being perfected in Paris, for the operation of a through passenger train service from Paris to Athens, a route which, it is stated, will ultimately be developed into one to Bagdad, on the Euphrates River. With the channel tunnel completed, the route would be from England to Bagdad.

Another continental suggestion is the boring of a tunnel underneath the Strait of Gibraltar. A railway from the African portal would link up the French and Spanish colonies there with the Cape to Cairo projection, and so give through rail connection to South Africa.

Within the borders of the British Isles there is another project revived, viz., that of a tunnel between Ireland and Scotland; others who advocate a tunnel between

Rosslare, Wexford County, Ireland, and Fishguard, Wales; while there are even some bolder engineering spirits than the rest, who propose to reconstruct the traditional St. Patrick's Causeway between center Wales and Ireland.

Finally, within the borders of England itself attention is being directed to the building of light railways to open up remote areas, or connect with the regular lines small towns lying off the main routes. A number of light railways were built in England and Ireland as long ago as the middle seventies, but none of them were ever really successful and most of them were finally, after a period of bankruptcy, absorbed by the trunk lines with which they connected. Subsequently an association for the promotion of the construction of light railways was formed,

### Government Control of Railways in Great Britain.

Lord Claude Hamilton, presiding at a meeting of the East London Ry. Co. in London, Eng., Feb. 2, is reported to have said that a deputation of the chairmen of the eleven great railway companies of England had waited upon Right Hon. Andrew Bonar Law, the government spokesman, to elicit, if possible, the government's intention regarding railways at the close of the war. The delegation learned, according to Lord Claude, that the government considered itself absolutely pledged that government control of railways would continue for two full years after the declaration of peace. Mr. Law also informed the deputation that

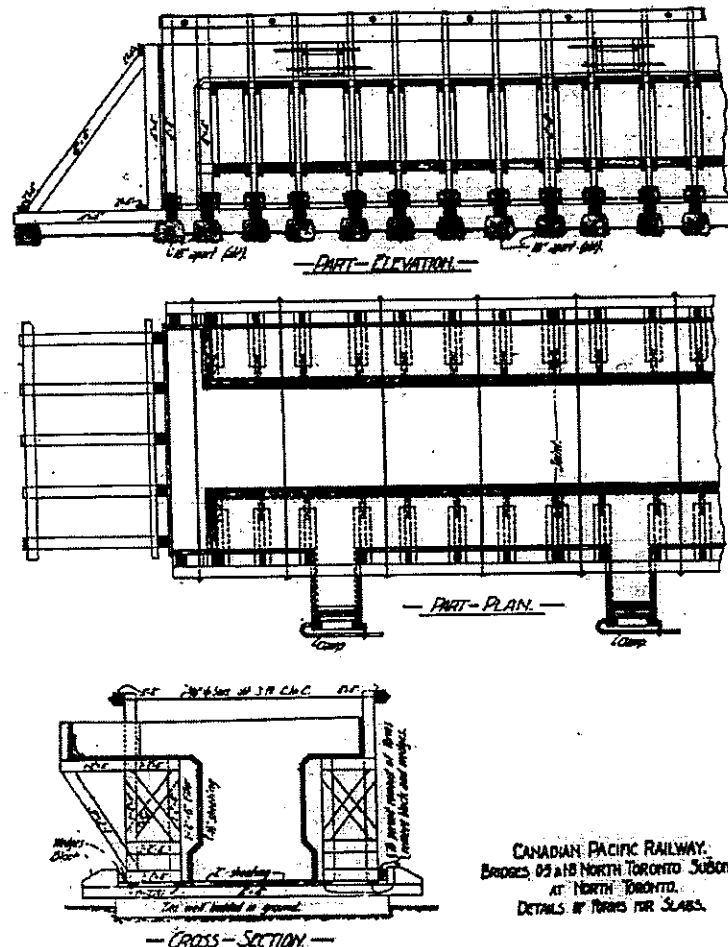


Fig. 5. Bridges 9.9 and 1.8, North Toronto Subdivision, C.P.R. Details of forms for slabs.

which had for several years as its head the late Sir Charles Rivers Wilson, at one time President Grand Trunk Ry. The work now proposed to be done is to be under the charge of the Minister of Reconstruction, the capital cost of the railways being met partly by the British Government and partly by the county authorities. The first line being built under the new plans is in Yorkshire.

Employees of the various express companies operating in Canada, are organizing themselves for a better service campaign, with the object of inducing better care in checking and handling of material, and of securing greater co-operation with other shipping agencies and the public.

the question of the future management of the railways was receiving the closest attention of the government, but that no final decision on the subject had been reached.

Sir George McLaren Brown, European General Manager, C.P.R., is reported to have said in an interview in Montreal recently that he thought there would be government regulation of railways in Great Britain conformable to the authority of the Board of Trade, but not incompatible with private ownership. The railways had done splendidly during the war. Not only had they aided France with rails and rolling stock, but they had done more business in spite of that depletion during the war, than in years prior to it.

## Orders by Board of Railway Commissioners for Canada.

Beginning with June, 1904, Canadian Railway and Marine World has published in each issue summaries of orders passed by the Board of Railway Commissioners, so that subscribers who have read the paper have a continuous record of the Board's proceedings. No other paper has done this.

27996. Jan. 8.—Authorizing C.P.R. to operate over street crossings in Peterborough, Ont., subject to conditions as to speed, ringing of locomotive bells, etc.

27997. Jan. 7.—Authorizing Dominion Foundries & Steel, Ltd., to build private crossing over Toronto, Hamilton & Buffalo Ry. Grassell spur.

27998. Jan. 7.—Relieving C.P.R. from providing further protection at crossing near milepost 81, Macleod Subdivision, Alta.

27999. Jan. 9.—Approving plan of changes in additional protection at west connection of interlocking plant at crossing of G.T.R. spur by Campbellford, Lake Ontario & Western Ry. (C.P.R.), Cobourg, Ont.

28000. Jan. 8.—Approving agreement between Bell Telephone Co., Dec. 19, 1912, and Ravenscliff Telephone Co., Muskoka District, Ont.

28011. Jan. 14.—Authorizing Canadian Northern Saskatchewan Ry. to cross highway between n.w. ¼ Sec. 55, Tp. 28, and s.w. ¼ Sec. 2, Tp. 26, west 3rd meridian.

28012. Jan. 9.—Ordering G.T.R. forthwith to appoint night and day watchmen at crossing of Kipling Ave., New Toronto, Ont., to attend exclusively to that crossing.

28013. Jan. 14.—Authorizing C.P.R. to build spur for Kaslo Concentrating Co., Kaslo Subdivision, B.C.

28014. Jan. 14.—Authorizing Canadian Northern Ontario Ry. to build spur for Nepean Sandstone Quarries, Ltd., at Rock Farm, Nepean Tp., Ont.

28015. Jan. 14.—Authorizing C.P.R. to build spur for C. Cunningham, Kaslo Subdivision, B.C.

28016. Jan. 14.—Approving revised location of Grand Trunk Pacific Branch Lines Co.'s station at Lynden, Sask.

28017. Jan. 10.—Authorizing Canadian Northern Ry. to remove siding serving the Sandstone Brick Co. at Prince Albert, Sask.

Highways Department to build highway crossing over C.P.R. north of Sec. 17, Tp. 8, Range 11, west 3rd meridian.

28038. Jan. 15.—Authorizing Canadian Northern Ry. to cross highway between n.w. ¼ of Sec. 2 and s.w. ¼ of Sec. 11, Tp. 28, Range 29, near Alsaak, Sask.

28039. Jan. 16.—Authorizing C.P.R. to build second track to connect station tracks with locomotive house tracks across Laliberte and Bridge Sts., Quebec, Que.

28040. Jan. 15.—Authorizing Canadian Northern Ry. to build spur for Jack Pine Fuel Co. in n.e. ¼ of Sec. 50, Tp. 28, Range 19, west 4th meridian, Alta.

28041. Jan. 18.—Ordering G.T.R. to build new station at St. Agapit, Que.

28042. Jan. 17.—Relieving C.P.R. from providing further protection at crossing near Welsh, Ont.

28043. Jan. 16.—Ordering that maintenance of transfer track between the Canadian Northern Ry. and C.P.R. at Baintree, Sask., be paid, half by each company.

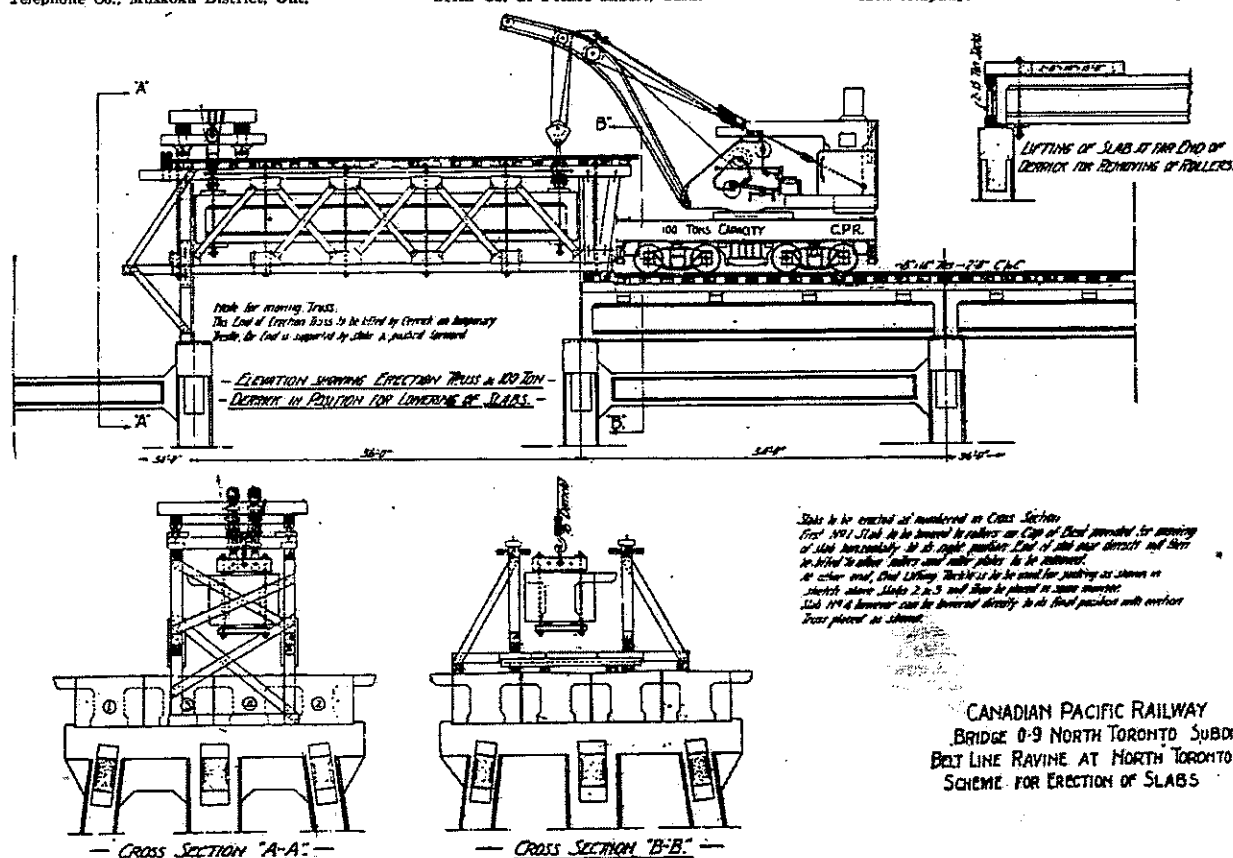


Fig. 6. Bridge 0-9, Toronto Belt Line Ry. Ravine, North Toronto Subdivision, C.P.R. Scheme for erection of slabs.

28001. Jan. 8.—Authorizing Canadian Northern Ry. to cross highway between Secs. 9 and 10, Tp. 54, Range 23, west 4th meridian, Alta.

28002. Jan. 9.—Authorizing Canadian Northern Ontario Ry. to build spur for Bate, McMahon & Co. near Todmorden, Gloucester Tp., Ont.

28003. Jan. 8.—Authorizing C.P.R. to build spur for Melchers Gin & Spirits Distilling Co., Berthier Parish, Que.

28004. Jan. 7.—Approving Michigan Central Rd. plan showing additional appliances at crossing by G.T.R. at Canfield, Ont., necessitated by building of westbound passing track and crossover track.

28005. Jan. 14.—Approving C.P.R. plan of reconstruction of interlocking plant at crossing with G.T.R., Komoka, Ont.

28006 to 28009. Jan. 14.—Approving Bell Telephone agreements with Fordwich Rural Telephone Co., Dec. 27, 1912, Huron and Perth Counties, Ont.; One Telephone Co., Dec. 23, 1912, Simcoe County, Ont.; Korsh Base Line Telephone Co., Dec. 31, 1912, Algoma District, Ont.; Springbank Telephone Co., Dec. 27, 1912, Huron and Wellington Counties, Ont.

28010. Jan. 12.—Approving location and plans of Squamish & Nanaimo Ry. station at Camdy, Vancouver Island, B.C.

28018. Jan. 15.—Authorizing Saskatchewan Highways Department to build highway crossing over C.P.R. and surveyed road in south half of Sec. 35, Tp. 31, Range 22, west 2nd meridian.

28019, 28020. Jan. 15.—Authorizing Canadian Northern Saskatchewan Ry. to cross highways between Secs. 26 and 28, and Secs. 14 and 15, Tp. 24, Range 8, west 3rd meridian.

28021. Jan. 15.—Authorizing Saskatchewan Highways Department to carry highway across C.P.R. on surveyed road north of Sec. 2, Tp. 33, Range 22, west 2nd meridian.

28022, 28023. Jan. 18.—Authorizing G.T.R. to rebuild bridges carrying its tracks across small stream at two points, Markham Tp., Ont.

28024. Jan. 17.—Authorizing City of Edmonton, Alta., to build highway across the Edmonton, Yukon & Pacific Ry., carrying Connors Road across track to connect with Strathcona Road.

28025. Jan. 17.—Authorizing Crowmest, Southern Ry. to remove spur serving Adolph Lumber Co., near Mott, B.C.

28026 to 28028. Jan. 15.—Authorizing Canadian Northern Saskatchewan Ry. to cross 11 highways at points in Saskatchewan.

28027. Jan. 15.—Authorizing Saskatchewan

28044. Jan. 22.—Approving British Columbia Electric Ry. standard freight mileage tariff C.R.G. 132, effective Feb. 1.

28045. Jan. 21.—Dismissing complaint of Universal Importing Co., Montreal, against refusal of C.P.R. to divert carload of beams ex. a.s. Chicago Maru from Victoria Wharf, to New York.

28046. Jan. 21.—Dismissing complaint of John Barrett, Montreal, that C.P.R. refuses to sell monthly commutation books containing less than 55 tickets between Montreal and Hudson Heights, Que.

28047. Jan. 22.—Authorizing Toronto, Hamilton & Buffalo Ry. to build spur for Monarch Metal Co., Hamilton, Ont.

28048. Jan. 17.—Ordering Canadian Northern Ry. to establish mixed train service with baggage and express to run daily, except Sunday, between Yarker and Napanee, Ont.

28049. Jan. 21.—Ordering C.P.R. to improve facilities for loading grain at elevators at Readlyn, Sask.

28050. Jan. 22.—Authorizing Canadian Northern Ry. to remove its station agent at Nutana, Sask., and to close agency there.

28051. Jan. 22.—Authorizing G.T.R. to remove spur serving A. H. Waite, One Tp., Ont.

CANADIAN PACIFIC RAILWAY  
BRIDGE 0-9 NORTH TORONTO SUBDIV  
BELT LINE RAVINE AT NORTH TORONTO  
SCHEME FOR ERECTION OF SLABS

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**Toronto-Toronto Junction Double Track.**

A gang of men are at work grading for a double track from between Toronto, Toronto Junction, and Weston, Ont. The work will include a new bridge at Black Creek.

June 1904

### **Toronto-Toronto Junction Double Track.**

—The double-tracking of the line between Toronto and Toronto Junction has been completed and ballasting is in progress. Nothing had been done beyond Toronto Junction June 25, but it is understood that the work is to be gone on with not only on the Owen Sound line as far as Weston or Kleinburg, but also on the Windsor and Detroit line as far as Streetsville. (June, 193.)

July 1904

**New Siding at Toronto.**—The C.P.R. has filed a plan at the city hall providing for the laying of a single track along the east bank of the Don River, from Winchester St. bridge to north of the G.T.R. tracks below Eastern avenue. The new track is described as an industrial single track, intended to give the C.P.R. access to Ashbridge's Bay, and enabling it to give a direct service to the factories located in that vicinity.

November 1904

**West Toronto Improvements.**—We are advised that the following buildings are under construction or will be erected this year at West Toronto: Extension to erecting and machine shops, 128 ft. by 139 ft. 5 in.; of concrete, brick and steel construction. Office building for car checkers, etc., 30 by 50 ft., one story brick building. Enlargement of 8-stall locomotive house, by the addition of an additional three stalls, each 80 ft. long, concrete and steel construction. Locomotive foreman's office, 24 by 24 ft., one story wooden building.

October 1909

Toronto Sidings. - The C.P.R., as lessee and exercising the franchises of the Ontario and Quebec Ry. is making application to the Board of Railway Commissioners for authority to construct a branch line of railway along the east side of the Don River to Ashbridge's Bay, Toronto

February 1910



Improvements in Toronto.—Very extensive purchases of land have been made in Toronto, along King St., and down to the railway tracks, in the interests of the railways, and particularly of the C.P.R. The latest property acquired is stated to be the Lieutenant-Governor's residence on the corner of Simcoe and King Streets. The object of all these purchases is said to be to enable the company to transfer its freight sheds and yards from south of the tracks to the north, in view of the construction of the viaduct along the water front. It is stated that the company has secured nearly all the property extending from King St. to Front Street, and between Simcoe St. and Spadina Ave. (or Brock St.). To secure some of the lands not at present acquired expropriation proceedings will be necessary.

MARCH 19/0

NORTH TORONTO TRACKS.—The plans have been made by property owners at different points along the route of the old Marie and Quebec Ry. through North Toronto, to the plan of the viaduct which the C.P.R. proposes to construct in order to do away with level crossings. Bingham St. property owners ask that the street be depressed to run into the Yonge St. subway, as Dufferin St. runs into the Queen St. subway, so that the residents of the district served will not have to take a circuitous route to reach the cars. Avenue Road property owners also protest against the company's plans, and ask that alternative plans for depressing the present street grades at Avenue Road and Yonge St. be prepared and considered.

North Parkdale Station.—The new station building at North Parkdale, now being built, will be one story with walls on a concrete foundation, with slate roof. It will have a coverage along the track of 100 ft. 8 in., with a depth of 32 ft. At each end of the building there will be a covered area 25 ft. by 25 ft. The waiting rooms will be 15 ft. by 11 ft. 4 in. from which is taken a space 16 by 18½ ft. for the office. Adjoining the waiting room is a baggage room 20 by 20 ft., and next to that an express room of similar dimensions. Pro-

vision is made for lavatory accommodation off the waiting room. The waiting room and office will be 15 ft high, finished in brick to a height of 5 ft., and plastered above that height. Provision is made for a basement under the entire building, but at present the basement will only be provided under the baggage and express rooms. The contractors are Wells and Gray, Toronto.

August 1910

## Toronto Viaduct and Yonge St. Bridge.

The Judicial Committee of the Privy Council has granted the C.P.R. special leave to appeal from the judgments of the Ontario Court of Appeal and the Supreme Court of Canada, in the matters of the orders: (1) To construct a bridge to carry Yonge St., Toronto, over its tracks, and (2) To construct a viaduct to carry its tracks along the Toronto water front, with suitable openings for streets running north and south. The circumstances of the case were described as follows.—Both the C.P.R. and G.T.R. pass through Toronto. The G.T.R. runs along the southerly part of the Esplanade—a highway 100 ft. in width extending from east to west—which was originally constructed parallel to the shore in the waters of the harbor. The C.P.R. was constructed at a later date immediately to the south of the Esplanade on an embankment contiguous and parallel thereto. In 1904 the two railways were ordered by the Railway Committee of the Privy Council of Canada to construct a bridge carrying Yonge St. over both railways, so as to connect it with the wharves which abut on the lake. The estimated cost was about \$500,000. The companies brought actions against the City of Toronto to quash that order, on the ground of want of jurisdiction. The Ontario High Court dismissed those actions, and on appeal the Ontario Court of Appeal affirmed the High Court's decision. The C.P.R. did not appeal against those judgments because the City of Toronto announced its intention of not enforcing the order, but of applying for the adoption of some other scheme. Later on the City applied to the Board of Railway Commissioners (the successors of the Railway Committee) for the elevation of all the railways along the Toronto water front upon a viaduct, with suitable openings for access to the streets running north and south. On June 9, 1909, the Board ordered that the railways should be elevated on that viaduct. The cost was estimated to exceed \$5,000,000. The Supreme Court of Canada in a second suit decided that the Board had jurisdiction to make that order. From these judgments the petitioner applied for special leave to appeal.

For the petitioner, it was stated that not only was there an enormous sum involved, but there were several important questions of law, one being whether special statutes of the Dominion and Provincial Legislatures, which ratified an agreement made in 1892 between Toronto and the C.P.R. and G.T.R., did not operate to oust the jurisdiction of the Board of Railway Commissioners. In granting the petition, Lord Macnaghten said that having regard to the important interests at stake, the committee would do all it could to expedite the hearing.

September 1910

**Toronto Viaduct-Yonge St. Bridge.**—  
The Imperial Privy Council has granted special leave to the C.P.R. to appeal against the orders of the Board of Railway Commissioners as to the building of a viaduct along the water front in Toronto, and a bridge to carry Yonge St. over the tracks at the foot of Yonge St.

**Toronto Westerly Second Track.**—  
Some gangs of men have been started grading westerly from Lambton station to the Humber River, south of the existing track, and an engineering party is at work taking levels and putting in stakes for a second track from the west bank of the river to Islington, where the

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newly completed line to Mimico starts. The existing second track from Toronto ends east of Lambton station.

**Islington-Mimico Line.**— Tracklaying has been completed on this short branch line connecting the Toronto-Windsor line with the G.T.R. at Mimico.

September 1910

**Toronto Improvements.**—Vice President McNicoll, in an interview at Toronto, Sept. 13, said he was working on plans for a greater freight terminal in Toronto, but they had not taken definite shape. A few days previously he was quoted as saying that the company had made plans for Toronto and would shortly be making a proposition to the city council. These plans might include warehouses, new lines, new yards, freight sheds, stations and all things dealing with terminal matters. His own opinion was that the present site of the union station will become an undesirable one for a passenger station, and that with the development of the city north-erly, he would not be surprised if, in course of time, the big station of the city will be located in the north.

Men started work Sept. 1, in the preparation of new freight terminals at North Toronto. The foundations for a freight shed have been completed and the brickwork is being proceeded with. Three new sidings have been laid, and other work is to be done.

**West Toronto Yards.**—Officials of the company and the York township council arranged, Aug. 30, for the protection of three level crossings. Two 30 ft. subways are to be put in, one at Elizabeth St., and one at the Scarlett Plains, while an 8 ft. subway is to be put in at Jane St. This latter subway is to be widened to 30 ft., at the cost of the municipality when desired. J. Osborne, General Superintendent, stated that the company would ask the council for some concessions at a later date in connection with the Toronto yards.

**Lambton-Islington Second Track.**—Steel has been laid on the second track which has been built from Lambton station to near the entrance to the golf club house, at which point there is to be a change in the alignment, as the grading to the Humber river, and to near Islington station is being done on the north side of the existing tracks. Beyond Islington station, to the new line to Mimico, the grading is being done on the south side of the present tracks. The bridge and building department has a gang enlarging the culverts on the present line to accommodate the second track. The present second track from

October 1910

Toronto westerly ends at the eastern end of Lambton station, which building will have to be moved before connection can be made with the second track now being laid west of there.

**Islington-Mimico Branch.**—The branch line from west of Islington, to Mimico, Ont., has been ballasted, and the connection with the G.T.R. has been made. Land has been acquired to make a connection at the Islington end, so that trains may be run from the branch either east or west.