CANADIAN PACIFIC RAILWAY

"NORTH SHORE LINE"

C. H. RIFF

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PLACE VIGER STATION

C. H. RIFF

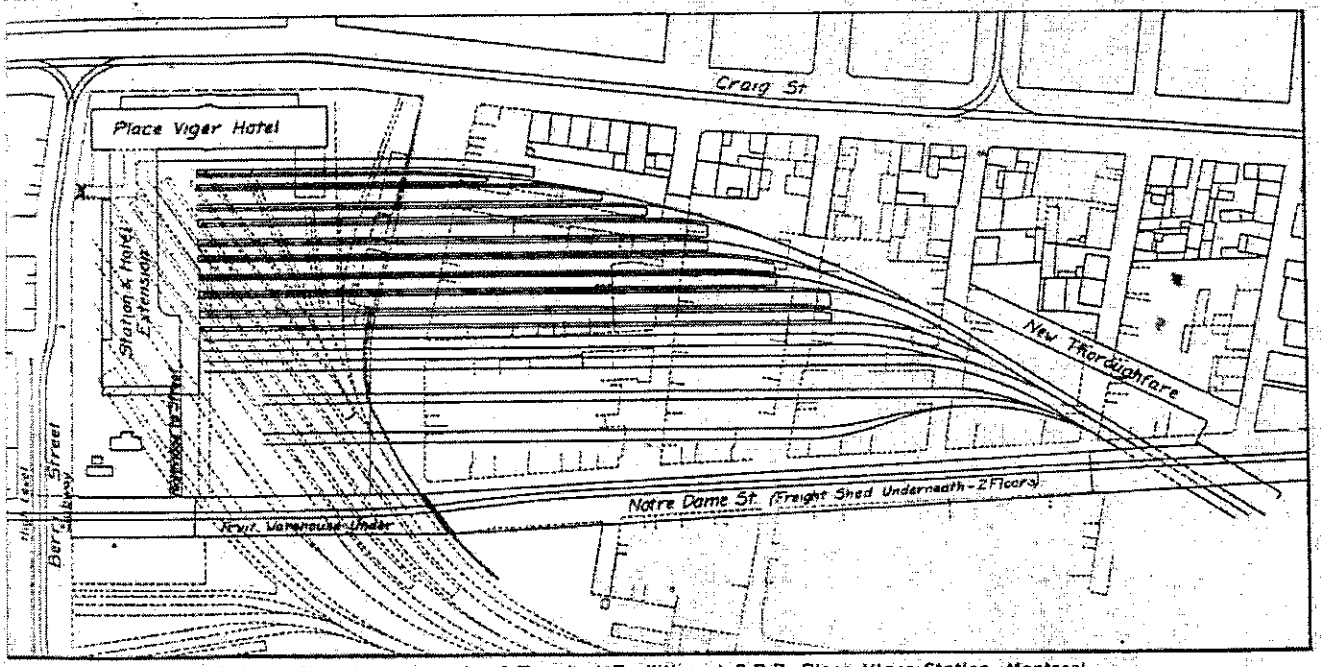
Remodelling of the C.P.R. Place Viger Station and Yards, Montreal.

Most of the work of remodelling the C.P.R. Place Viger station and yards with a view to increasing their capacity and making them more convenient, has been completed, and the new arrangement in the immediate proximity of the station is shown in the accompanying plan. The new arrangement of the terminals and trackage is shown solid, and the old arrangement, now replaced, is shown dotted.

Formerly, the tracks entering the terminals from the right along the water front, branched off at an angle of about 45 degs. into the station yard, this arrangement taking up a great deal of ground without the best utilization of the space occupied. The station tracks were likewise not at all convenient to the waiting room. The freight shed space to the south, below Notre Dame street, was also very much cramped, and was not utilized to the best advantage, from the fact that most of the tracks were short spurs.

When the excavation had been completed, tracks were laid from the east end of the yard towards the then existing tracks, from which the traffic was then diverted. The old tracks being removed, the new ones were extended to the station building extension, which projects south from the old combined station and hotel. The station is now entirely separate from the old building, which is used solely for hotel purposes.

In the passenger terminals there are 10 tracks, with 10 platforms, accommodating 80 cars. A four track car storage yard provides for 48 more. Between the car storage tracks and the Notre Dame street bridge there are four freight tracks with a capacity of 83 cars, used for team freight. Under the bridge there is located a long 2 story shed for freight and fruit. This shed is served by a roadway on the north side and trackage on the south, which becomes a part of the new freight yard with terminal sheds at present under construction to the south of the bridge. This 2 floor shed under the bridge is used for bonded freight. It is 800 ft. long, and has windows and continuous sliding doors on the track side, and 20 separate sliding doors on the team side. The sides are galvanized iron, supported on a steel frame. The fruit shed at the west end of this freight shed is built under the old portion of the bridge, and is heated, so that fruit shipments can be properly handled both winter and summer.



Old and New Arrangements of Terminal Facilities at C.P.R. Place Viger Station, Montreal.

The plan of enlargement made a radical change in the terminals, it being determined that the best arrangement under the circumstances would be to bring the tracks in parallel to Notre Dame and Craig streets, for which purpose considerable property surrounding the yards had to be purchased, the extent of this land absorption being indicated by the dotted blocks in the illustration.

Notre Dame street originally ran along the crest of a rise in the ground parallel to the shore line, between the shore line and Craig street. In the old arrangement, the tracks came through from the shore line to the Craig street level by cutting through this mound, and carrying the highway across on a bridge. The new arrangement necessitated the reduction of the ground level over the whole area of the new terminals, to the level of the former trackage, so that Notre Dame street is now carried across the lowered yards on a viaduct, beneath which are freight sheds. Notre Dame street was temporarily diverted while the excavation work was being pushed forward. The street on the viaduct is at practically the same level as before.

The freight yards to the south of the bridge, which are now nearing completion, will contain long freight sheds parallel to the street, occupying the ground right down to the Harbor Commissioners' property, the whole yards occupying a space nearly three times as great as that portion shown in the illustration above Notre Dame street.

W. J. Chapman, formerly assistant timekeeper at the C.P.R. freight sheds, Fort William, Ont., has been charged with the theft of $1,017.51, by means of irregularities in the pay rolls. He was arrested in San Francisco.

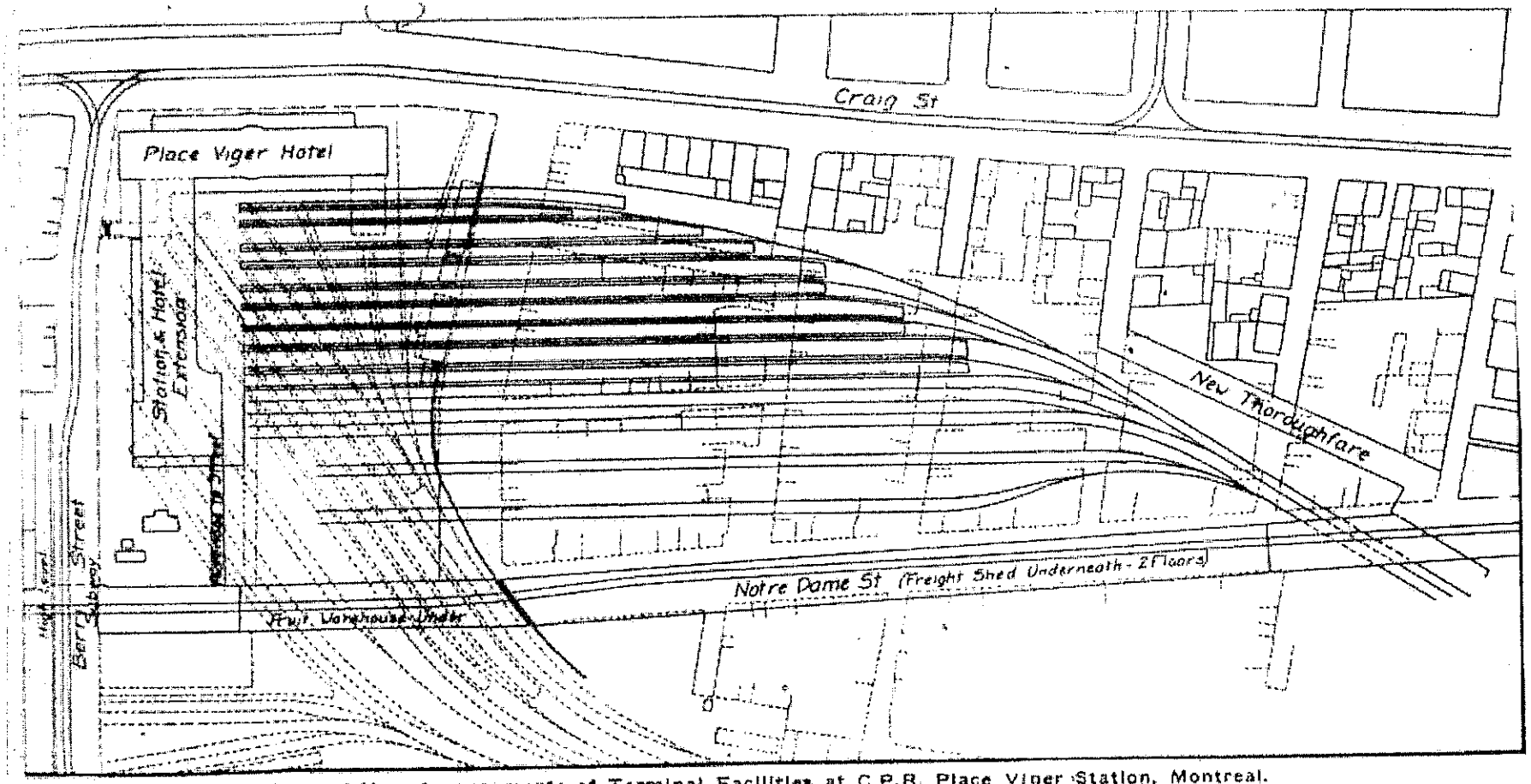
H. W. D. Armstrong, M. Can. Soc. C.E., Chief Engineer, Fredericton and Grand Lake Ry., Fredericton, N.B., writes,— "I must congratulate you upon the increasing volume and value of the Canadian Railway and Marine World."

The Diesel Locomotive.

In a recent address before the American Society of Mechanical Engineers, wherein he described the progress being made with the acceptance of the Diesel engine as a standard means of developing power, Dr. Rudolph Diesel, the inventor of this type of internal combustion engine, described a locomotive constructed the early part of this year in Germany in which the Diesel engine is the motive power. The locomotive in outward appearance closely resembles an all-steel car, and weighs 85 tons. The wheel arrangement is of the 4-4-4 type, two Diesel engines set at an angle of about 45 degs. at the centre of the car driving on to a jackshaft between the two pair of drivers, this jackshaft being the crankshaft of the engine. Connecting rods from the jackshaft drive the driving wheels. Between these two inclined cylinders, there are two scavenging air pumps driven from the same shaft. Two horizontal air cylinders on the floor in front are driven from two small vertical Diesel engines, this compressed air being used to increase the power of the engine by increasing the area of the indicator diagram, the process being new. The air is stored in cylinders near the other end of the car, where are also located the cooling water tanks. A large muffler in the top of the car subdues the blast of the exhaust.

Dr. Diesel gave what in his opinion are some of the reasons for the slow adoption of the Diesel engine in America. The causes assigned include cheap coal, cheap engines, lack of capital, and generally good profits without undue thought concerning economy. These reasons stand out prominently in comparison with Europe with its world competition.

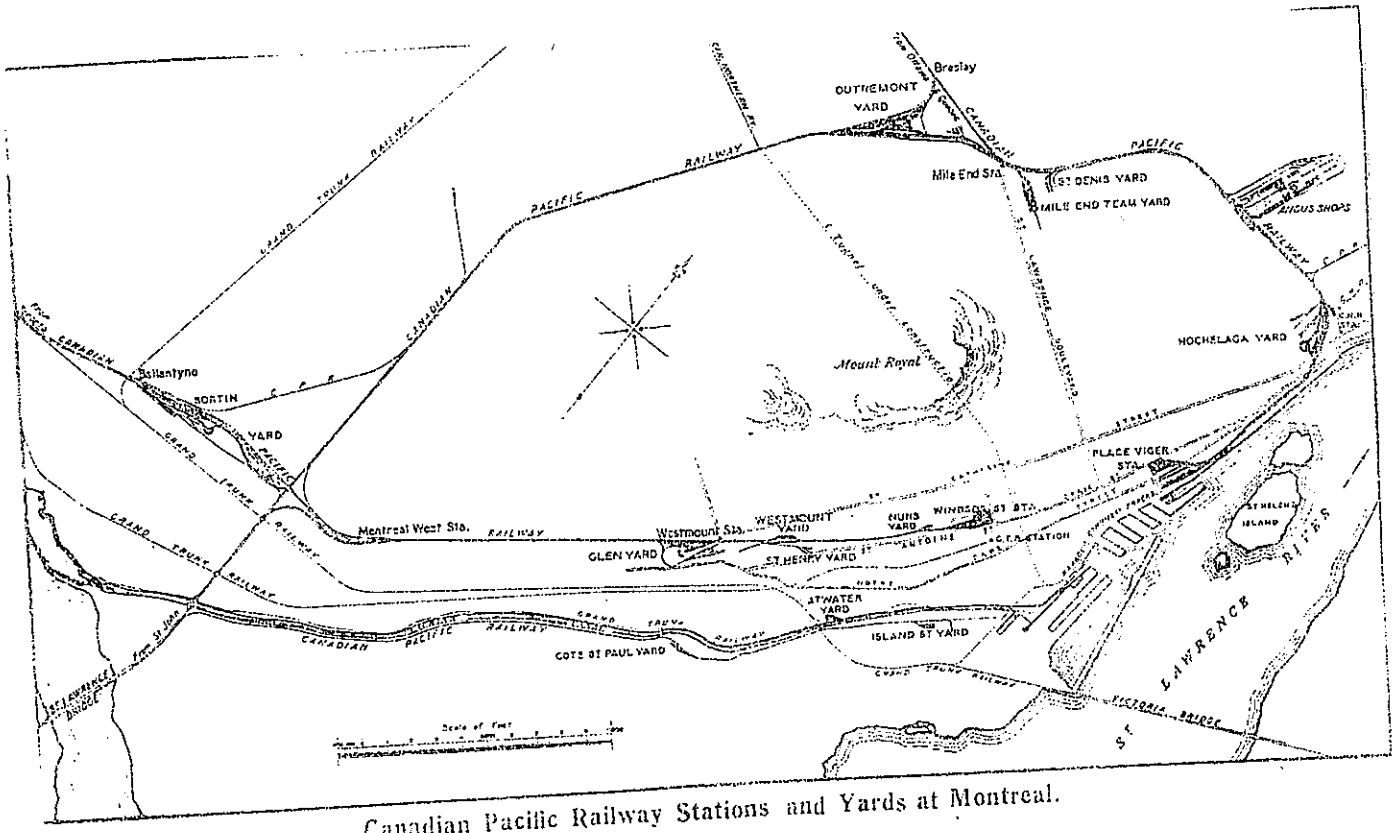
An obstacle to the use of the internal combustion engine for hauling trains has been the impossibility of accelerating the train from standstill with an engine of normal size and of maintaining any considerable overload at any speed. A petroleum electric locomotive is now proposed, in which the prime mover is an internal combustion engine, using crude oil, kept continuously running to drive an electric generator, which in turn delivers electrical energy to four 220 h.p. polyphase motors.



Old and New Arrangements of Terminal Facilities at C.P.R. Place Viger Station, Montreal.

CANADIAN PACIFIC

MONTREAL TERMINAL C. H. RIFF



Canadian Pacific Railway Stations and Yards at Montreal.

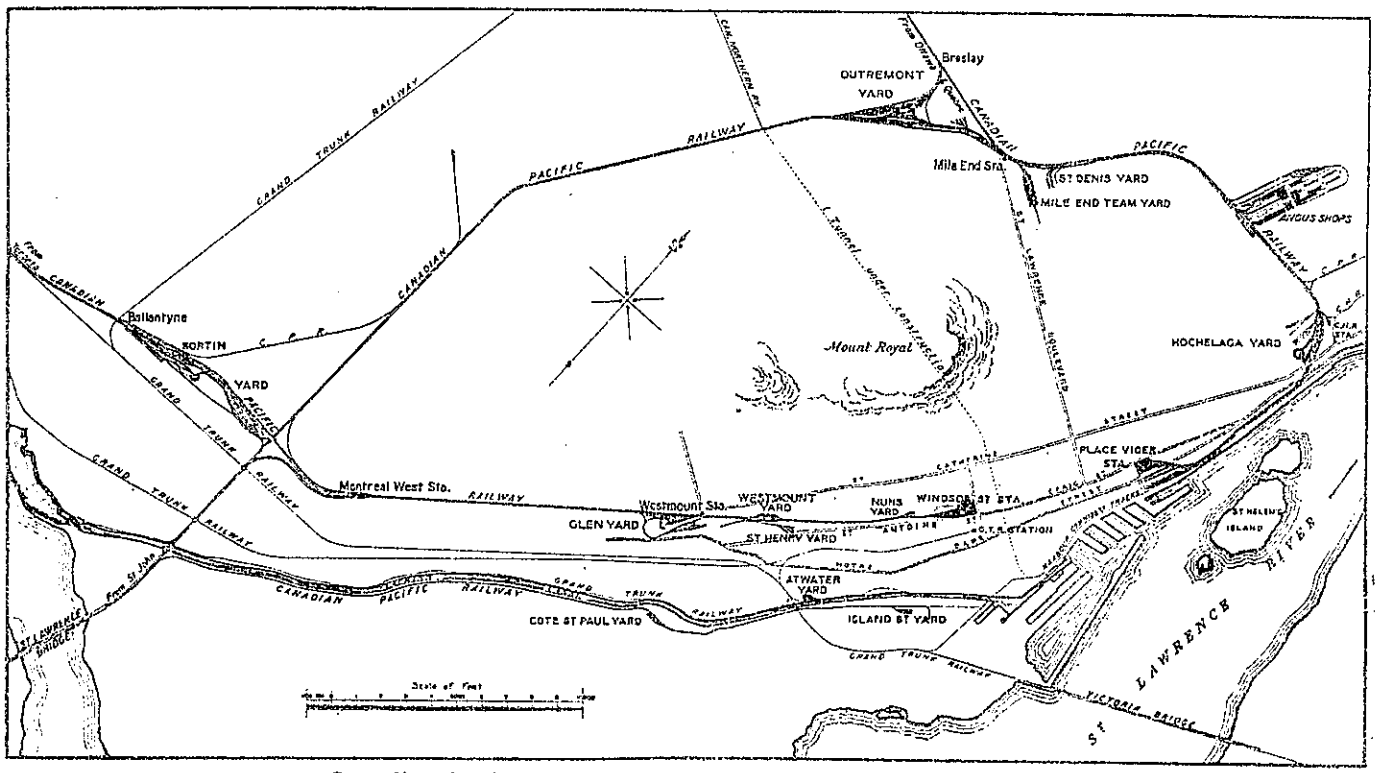
A NOTABLE GROUP OF RAILWAY TERMINALS

ILLUSTRATING BY DIAGRAM AND BRIEF DESCRIPTION THE OUTSTANDING FEATURES OF THE CANADIAN PACIFIC RAILWAY TERMINALS AT QUEBEC, MONTREAL, WINNIPEG AND VANCOUVER.

THE efficiency of a modern railway terminal is not manifested in bells and bustle. To perfect a terminal organization and management, efficient as well under ordinary conditions as when subjected to tests involving maximum demands and extreme conditions, is the greatest problem for the executive head of a busy transcontinental. Nowhere in the complexity of the business world is there greater justification for employing methods which have back of them principles harmonizing with the results of scientific study and research, toned down by the best skill that training and experience can command. Such a terminal must be the acme of organization, but it must first be well located and well arranged. A terminal system cannot be here to-day and there to-morrow to comply with the vicissitudes of restless traffic.

The Canadian Pacific Railway has stragetically cated its more important terminals at St. John, Quebec, Montreal, Toronto, Fort William, Winnipeg and Vancouver. In a single year (1913) this railway earned nearly $90,000,000 from freight, and $35,500,000 from passenger traffic. Or, the standard of its terminal organizations is perhaps better illustrated by the manner in which it met the exacting demands created by the complete disorganization of business in 1914 and the necessity of economy arising out of depression and war. The rapidity and uniformity with which the company, in a few months, reduced maintenance and transportation expenses over its 12,900 miles of track, is one of the most remarkable evidences of terminal organization and management.

Thus, while a would-be but belated traveller may occasionally deign to recast, in a twinkle, the whole system, there is much to be learned from a study of the terminals that handle the major portion of Canada's long-haul traffic. Only a few will be referred to here: The eastern terminals at Montreal and Quebec, the terminal at Vancouver, where transcontinental trains connect with coastal and trans-Pacific steamers, and the Winnipeg



Canadian Pacific Railway Stations and Yards at Montreal.

yards, through which rolls an enormous volume of traffic between eastern and western Canada.

C.P.R. Terminal at Montreal.

As the accompanying plan indicates, the tracks of the Canadian Pacific Railway very nearly surround the city of Montreal with main lines radiating to the north, west and south. The line to the north leads to Quebec, the Laurentian Mountains and Ottawa; the line to the west leads to Toronto and is at the same time the short line to Ottawa. The line to the south, which crosses the St. Lawrence River on the new double track bridge, leads to all points east and south on the C.P.R. on the southerly side of the St. Lawrence River.

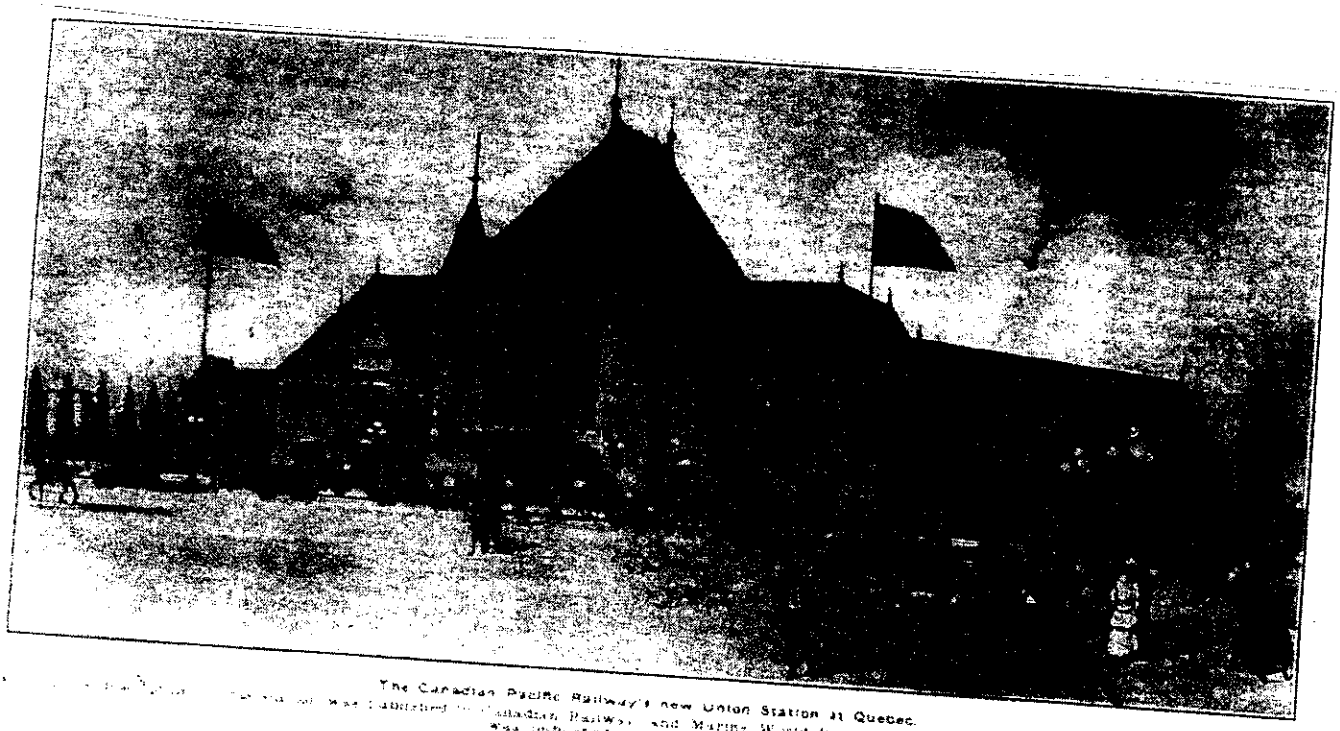
Passenger trains for the east, south and west run from the Windsor Street station with stops in Montreal at Westmount and Montreal West. Trains for the north run from Place Viger with a stop at Mile End. The

CANADIAN PACIFIC RAILWAY

-NORTH SHORE-

QUEBEC TERMINAL

C. H. RIFF



The Canadian Pacific Railway's new Union Station at Quebec.

[illegible] was published in the Canadian Railway and Marine World for September and a ground plan showing the location was published in the Railway Age.

...e New Canadian Pacific Railway Station at Quebec.

...e foundation stone of the new station ...h the C. P. R. is building at Quebec as a ...n station, was laid by the Mayor of the ... Aug. 12. The C. P. R. was represented ... L. Wanklyn, General Executive As... and other officials, the Lieutenant ...rnor and the Premier representing the ...ince.

...e plans show a building designed in a ...rn adaptation of the chateaux of the ...e, France, which is calculated to add to ...architectural features of the city. The ...ding, which is being erected at the cor... of St. Paul and Henderson streets, will ...s a frontage a large open paved plaza, ...oximately 300 x 200 ft., flanked on either ... by broad sidewalks leading to the main ...ance. Between the sidewalks and the ...ding will be large spaces which will be ...ted with Lombardy poplars and blue ...ce and other shrubs. The main building ...be of Argenteuil granite, Deschambault ...stone, and Citadel brick, with high slop... roof of copper. The main entrance, ...h will be from St. Paul St., will be 25 ...wide. Above it will be a window about ...t. in height, of metal sash, divided into ...n sections. At the crown of the arch ...appear the arms of seven of the historic ...es of Quebec, viz., Montmagny, who was ...first Governor of Canada, from 1636 to ...; DeTracy, Viceroy of Canada, 1665; ...; Governor of Canada, 1726 to ...; ...dun, one of the French Generals ...in ...Quebec when the English conquer... Canada in 1759; Wolfe, the general who ...the English to victory on the Plains of ...aham in 1759, and died on the battlefield; ...ronac, Governor of Canada, 1672; Talon, ...Intendant of New France, 1665 to 1672.

...main facade of the building will be ...inated by a central tower with turrets ...he angles, at the bases of which will be ...ouches, bearing in one case the fleur de ... of France, and at the other the Tudor ..., the thistle and the shamrock of the ...ted Kingdom of Great Britain and Ire...d. High upon the roof will be an orna...tal clock with a dial 8 ft. in diameter, ...which will appear the city's arms.

...he building will be L shaped, the central ...k 175 ft. long, and wing 200 ft. long.

...t the entrance will be a lobby approx...tely 45 x 65 ft. and 60 ft. high, to be en...ly of tapestry brick with ornamental ...k in faience tile. The room will be ...ted from the St. Paul St. side and also ...n the roof, the spaces in the roof being ...d with ceiling lights. The central ceil... light will contain a cartoon in leaded ...s showing the Dominion of Canada, with ...thousands of miles of the C. P. R. domin...g the industrial and prairie sections ...ked in distinct colorings. The ceiling of ... dome will be constructed entirely of ...nce tile with ornamental patterns ara...que in blue, red and gold. The main ...nce of the big lobby will also be in fai... ... and will carry a series of ...to ...ymbolic of the C. P. R., viz., its ...el sy...m, railways and steamships. The ...in floor will be divided into ticket offices, ...gage room, parcel room, Customs offices, ...nsfer, telegraph and news stand. From ...vestibule a marble staircase will lead to ...offices on the first floor which will be occupied by the C. P. R., and space will also be provided for the accommodation of the National Transcontinental Railway. The main concourse will be 65 ft. by 125 ft. and 40 ft. high, constructed of tapestry brick with faience insertings in color. All of the ornamental work in this room will carry the characteristic ornaments of the French Chateaux and Dolphin and Tridents interspersed with the Tudor rose. Opening off the concourse will be the station agent's room and the usual conveniences. Train gates will separate the concourse from the train shed which will be on the same low principle as Windsor St. station in Montreal. There will be 11 tracks and the platforms will be well lighted. In the concourse near the train gates will be installed train indicators electrically illuminated.

The power house will be situated on the St. Paul St. side of the building. It will contain the necessary equipment to supply main station and the freight shed across the tracks towards the river.

The building was designed by M. H. E Prindel, architect, Montreal, and the construction is being supervised by D. H. Mapes Engineer of Building Construction, C. P. R. and T. E. Vidette for the contractors, the Downing Cook Co. This description is abridged from the Quebec Chronicle.

National Transcontinental Railway Operation.

The operation of the National Transcontinental Railway by the Dominion Government is raising some questions affecting its connection with the Intercolonial Ry. The first of these is at Moncton, where for several miles the two lines run side by side westerly. It is reported that in order to facilitate traffic, and to reduce cost of maintenance it is proposed to build about a mile of line to connect the two tracks, and to run all the traffic over one of the lines.

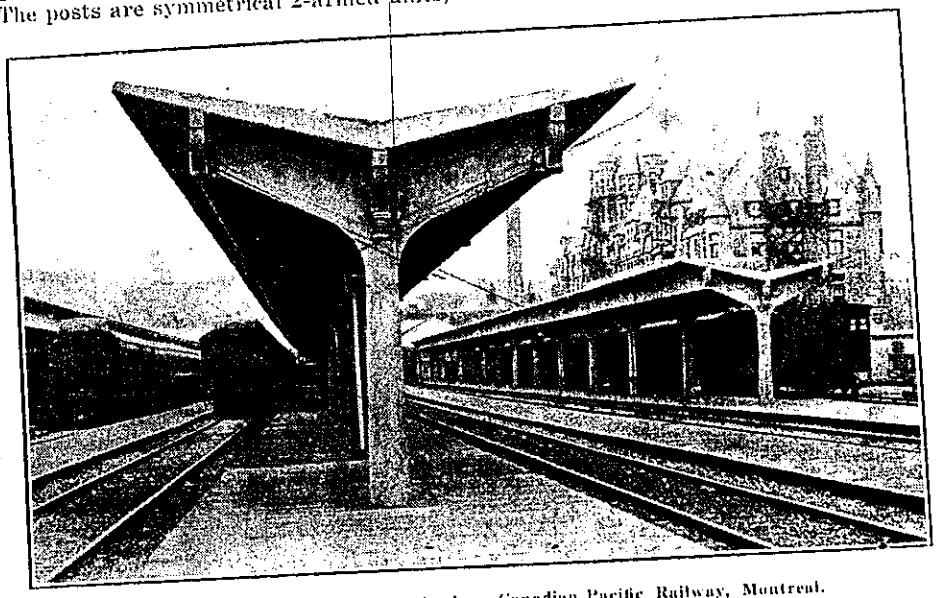
The second matter affects St. John, N. B., and was discussed with the Minister of Railways on the occasion of his recent visit there. The Minister is reported to have said that the Department's engineers were studying the problem of better transportation connection with St. John, in connection with the operation of the N. T. R., and the engineers seemed to favor an entrance to the city by the western side of the harbor. When the matter had been further considered, F. P. Gutelius, General Manager, would discuss the matter with the Board of Trade and the City Council. (Aug., pg. 307.)

Rogers Pass Tunnel Contractors' Suit.—In the original hearing of the action brought by McIlwee Brothers, against Foley, Welch and Stewart, general contractors for the construction of the five mile tunnel on the C. P. R. at Rogers Pass, B. C., for $527,000, the court awarded just over $30,000 damages. The plaintiffs appealed and judgment was given by the British Columbia Court of Appeal, Aug. 10, under which the plaintiffs become entitled to practically the full amount claimed. It is expected that Foley, Welch and Stewart will carry the case to the Supreme Court of Canada.

...ember 1915

Umbrella Roofs at C.P.R. Stations at [illegible]

The C.P.R. has completed recently umbrella roofs over four of its passenger platforms at Place Viger Station, Montreal, three being each 496 ft. long and one 403 ft. long. The baggage platforms which occur between each passenger platform are not covered. The umbrella roofs consist of reinforced concrete throughout. The posts are symmetrical 2-armed units,



Umbrella Roofs, Place Viger Station, Canadian Pacific Railway, Montreal.

on which are supported reinforced concrete purlins, which in turn support the reinforced concrete roof slabs, which are waterproofed with the usual membrane and asphalt covering. This unit system of construction, constitutes a very interesting, and what is believed to be, an original method of construction.

The actual method of construction was as follows: The pedestals were first built in their proper locations, an oblong pocket 1 ft. x 1 ft. 10 in. being left in them for the reception of the posts, which were intended to be manufactured as units, and later to be inserted and grouted into the pockets. It was found, however, in some cases, more economical to erect the reinforcement as units in the pockets, clamp the forms around them, and then, when all adjustments had been made, to pour the concrete from a travelling crane platform. After the forms had been removed, the structural steel slings were put in place. In the meantime the purlins had been cast as units in the yard and they were erected from the same traveller. This having been accomplished, the reinforced concrete roof slabs were laid as if they were ordinary mill construction wood work. All reinforcement of the posts and purlins consisted of rails, bent where necessary, and securely attached to one another. This construction lent itself readily to a systematic and speedy erection. It allowed the work to be proceeded with without interfering with passenger traffic on the platforms, or with train operation on the tracks.

When the skeleton was erected the roof slabs were lifted up into place from the deck of a flat car by a light travelling crane. These roof slabs are of special construction known as Siegwart beams, a Belgian design. They are 4 x 12½ in. wide. They were specially manufactured with one end closed and all lower edges had a ½in. chamfer, which gives the impression of a series of V joints 12½ in. apart. This served to break up the surface and gives a very pleasing effect from below.

Where down pipes occur in the roof, the Siegwart beams were made of shorter length and trap castings were cast into a small section of solid concrete poured on the work. The rain water pipes are of Toncan metal and are located at every second panel, 62 ft. c. to c., and connect with the existing drainage system in the yard.

The roof covering consists of a membrane, composed of 5 ply roofing felt, laid in pitch, with a continuous galvanized iron reinforcing piece along the edge of the roof; the function of this reinforcing piece being to keep the membrane in contact with the end of the roof slab and prevent a tendency to curl up. In addition to this it provides a uniform drip edge which extends ¾ ins. below the lower surface of the slab. Details of the manner in which the first layer of roofing material was folded back and attached to the upper side of the membrane are clearly shewn on the plans. The upper surface of the membrane is protected against abrasion by snow shovelling, by a layer of asphalt.

The surface finish of the whole work was done immediately the forms were taken off, by rubbing down with sand and wooden floats. The structural steel hangers were manufactured previously in a structural shop, and after erection they were painted to match the general color of the concrete.

The wiring for the whole structure is laid in standard conduit work, with the necessary outlet boxes. The conduits pass through pre-cast holes in the posts, and two lights per panel are attached to fixtures on the lower side of the centre purlins. This gives ample light at night, and the fact that the outer edges of the roof slabs are 18 in. above the top of cars, provides ample light during the day, even when both tracks adjacent to a platform are occupied by trains.

Similar work was carried out at the Union Station, Quebec, in substantially the same manner as described above for Place Viger, with a few exceptions, one of which was that a few of the posts were poured on their sides, and were lifted up later and grouted into the pockets already referred to in the pedestals. Generally, however, the posts were cast in a vertical position, after the reinforcement had been put together and stood up in its final vertical position. This method was found more convenient, from the point of view of maintenance of traffic on platforms. The roof slabs are of mill construction 3 in. thick timber instead of Siegwart beams as at Place Viger.

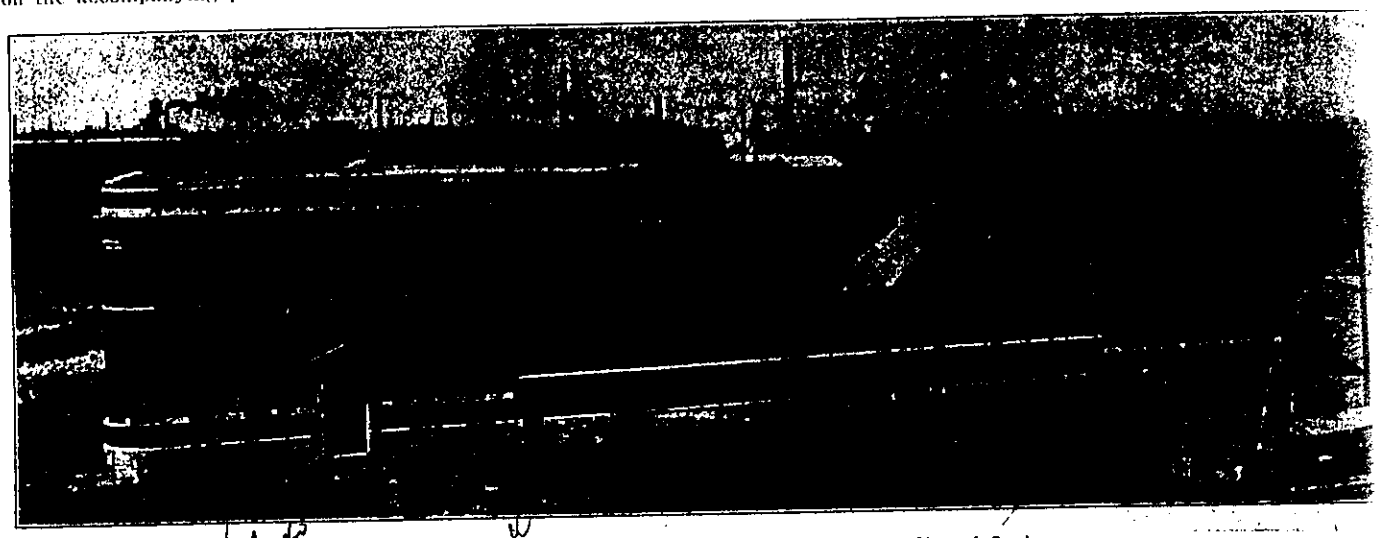
The accompanying illustrations show the general appearance of the finished work, including the connection of the new platform covers with the existing midway space at Place Viger station. This consists of 1½ in. mortar work, floated on expanded metal reinforcement attached to the existing structural steel work, which gives a pleasing appearance, as can be seen from the illustrations, from both inside and outside of the midway.

Umbrella Roofs, Place Viger Station, Canadian Pacific Railway, Montreal.

The work at both Montreal and Quebec was executed under the supervision of M. R. Fairbairn, Assistant Chief Engineer, the designs being made by P. B. [illegible]ley, Engineer of Bridges, and the work was carried out by J. E. Beatty, Division Engineer. The Atlas Construction Co. were the contractors for the Montreal work, and the Byers Construction for the Quebec work.

Canadian Pacific Railway Terminal Improvements at Quebec.

The entire remodelling and extension of the C.P.R. passenger and freight facilities on the Palais grounds at Quebec became necessary some little time ago on account of the normal growth of business, and to their proposed use by both the C.P.R. and the National Transcontinental Ry. as a union terminal. The work which is shown on the accompanying plan was started during the summer of 1914, and is being carried out in such a manner as to keep all facilities in full service. The construction of the new freight facilities released the old ones; these were demolished to make room for the new passenger station, and when that is completed the existing station will be removed to permit of the construction of the passenger car yard. It is intended to have the work all completed by the summer of 1917.



Canadian Pacific Railway Freight Terminals in the City of Quebec.
The building to the left, at the rear of the office building, is the inbound freight shed; the building to the right is the outbound freight she

The track leading to the Louise Embankment and the Empress Wharves is to be relocated some 400 ft. to the north, partly on ground reclaimed from the St. Charles River. This will give a more direct route to the waterfront, and also permit of constructing the new team yard in such a position that teams need not cross the heavy train movement to and from the wharves. This team yard, of about 105 cars capacity, will also be built on the reclaimed ground, and will stub-end toward the extension of Ramsay St. The common working and set off tracks for this yard and the wharf tracks will be built between the two and connect with the main tracks well to the west, in order to reduce to a minimum the interference of freight movements with the throat of the passenger station yard.

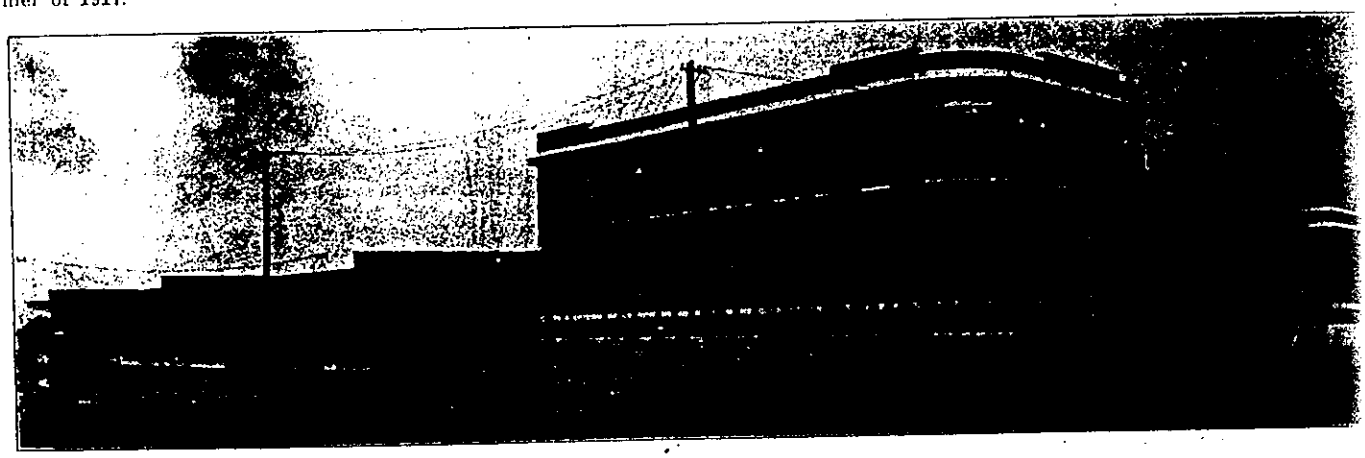
The new freight sheds are complete and in service. The outbound shed is 30 ft. wide and 360 ft. long, and the inbound shed proper is 50 ft. wide and 460 ft. long, the balance of its length being given over to a 2-story office building. Each shed is served by three tracks, the outbound having a capacity of 27 cars, and the inbound a capacity of 39 cars, while a trucking platform between the two sets of tracks permits of their ready use for less than car lot transfer purposes. The sheds are so located that they may at any time in the future be increased in length as more capacity is required.

The new passenger station, which is under construction, is located on the site of the old freight sheds. The ticket offices, baggage checking counters, and similar public facilities will be located in the portion of the building fronting on the proposed plaza. The waiting rooms and accessories will be in the north wing, and the baggage, mail and express facilities in west wing.

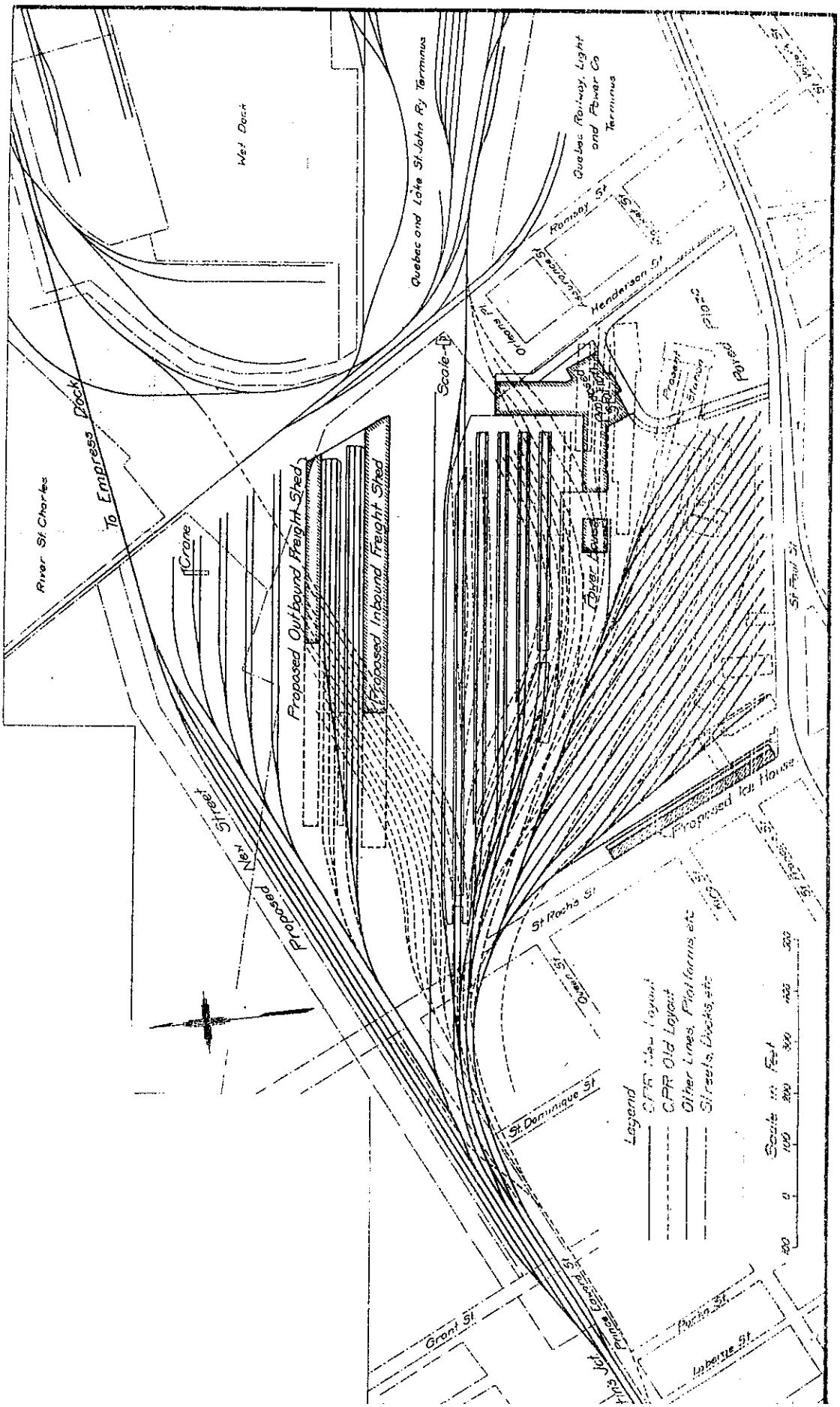
The station yard will include for present eight stub end tracks, varying capacity from 7 to 10 cars and a locomot and three through tracks varying fr twelve to fourteen cars and an eng The through tracks are provided for ha ling pilgrimage trains which run throug St. Anne de Beaupre, and for such trai may at some future time run through t National Transcontinental Cham Market Station by this route.

The tracks are arranged in pairs at centres, with 18 ft. combination bag and passenger platforms between pairs southerly track will be reserved for ling car load baggage and express bus Space has been left for future addi tracks between the present stub track the baggage wing of the station, a tween the through tracks and the sheds.

The passenger car yard stub end ward St. Paul St. will have a capa 130 cars. Its construction has not y started, as it will be on the site present station and station yard. Th ing of this yard, the station and yard and the freight sheds will all b led from a central power house loca



Canadian Pacific Railway Freight Terminals in the City of Quebec.
The building to the left is the inbound freight shed, the office building is in the centre of the illustration, and part of the outbound freight shown at the right.


Wet Dock
Quebec and Lake St. John Ry Terminus
Quebec Railway, Light and Power Co Terminus
Ramsay St
Henderson St
Scale
Passenger Station
Power House
River St Charles
To Empress Dock
Crane
Proposed Outbound Freight Shed
Proposed Inbound Freight Shed
Proposed New Street
Proposed Ice House
St Roch's St
St Dominique St
Grant St
Legend
CPR New Layout
CPR Old Layout
Other Lines, Platforms etc
Streets, Docks, etc
Scale in Feet
0 100 200 300 400 500
Canadian Pacific Railway Passenger and Freight Terminals in the City of Quebec

CANADIAN PACIFIC RAILWAY

-NORTH SHORE-

WOLFE'S COVE TUNNEL

C. H. RIFF

The Canadian Engineer

A Weekly Paper for Civil Engineers and Contractors

C.P.R. Quebec Tunnel Signal Syste

All Signals Controlled and Switches Operated Electrically From Tower at Cadorna

By E. S. TAYLOR
Signal Engineer, Canadian Pacific Railway, Montreal

BENEATH the historic Plains of Abraham, where Wolfe and Montcalm met in 1759 in a battle which cost them both their lives and won Canada for Britain, a mile-long tunnel has just been completed by the Canadian Pacific Railway, as a direct link between its main line and the new berthing-place of its great white empresses, at Wolfe's Cove, where the British general landed his forces.

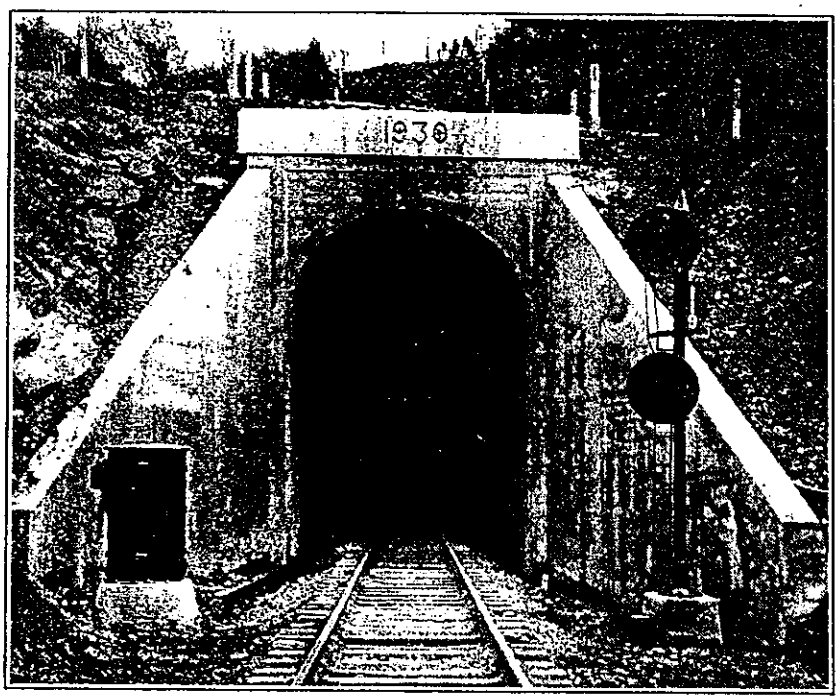
The new dock, which is part of the five-year program of the Quebec Harbor Commission, was built primarily for the new 42,500-ton "Empress of Britain," the biggest and fastest ship plying between ports of the British Empire, and will be used by all liners of similar tonnage calling at the port.

This new project with its facilities to handle boat trains and its tunnel connection to the main line, called for a signal system which would speed train operation and provide proper protection to all train moves.

The Canadian Pacific operates a single track line from the west which enters Quebec on the north and terminates in the heart of the city near the mouth of the St. Charles River. The single track line of the Canadian National Railway joins the Canadian Pacific on the outskirts of the city in such a way as to form a double track to and past the tunnel connection. These tracks also serve the Quebec Central Railway into the city. Over these main tracks pass most of the traffic into and out of Quebec so that it is reasonably heavy, consisting of 40 or more scheduled trains a day exclusive of the special boat trains for passengers and freight through the tunnel.

One of the interesting features of this new project is a unique and modern signal system for the safety and guidance of trains into and out of Quebec, and also for those which use the tunnel.

One operator seated before a control machine as used in a G.R.S. centralized traffic control system, located in a tower at Cadorna, controls all the signals in the territory operates the switches by electrical power. This machi two kinds of controls; one in the form of small levers operate the track switches to the normal or reverse po according to the route to be taken by the train; the ot in the form of rotary controllers, or buttons, which turned, operate proper signals fo train to proceed. machine has a ca of 24 switch l although only eig used for the p facilities. The r der are left for development. The 20 rotary cont for the signals.



NORTH PORTAL OF TUNNEL

The electrica cuits are so de that it is necessa all track switches route set up for a to be in their p positions and se locked by elec means and all co ing signals must "Stop" before the is given the p indication or tol means of the sig "go."

In addition control machine i vided with an i nated track dia containing a seri miniature red and amber lights used to show that the switches when operated are responding to the movemen their respective levers and also to show the position o train as it travels over the route from one location to an

Each power-operated track switch has a dual co one through the operator's control lever; the other by m of a manual lever when it is necessary to operate the switch by hand. These power machines, known as "G Model 5D," which operate by means of an electric positively lock up the track switch before a signal c given to a train or before the train passes over it. T are 11 such electrically-operated track switches.

The signals consist of one to three units depending the information to be conveyed to the engineman. Each displays, through a single, but powerful lens, three dif