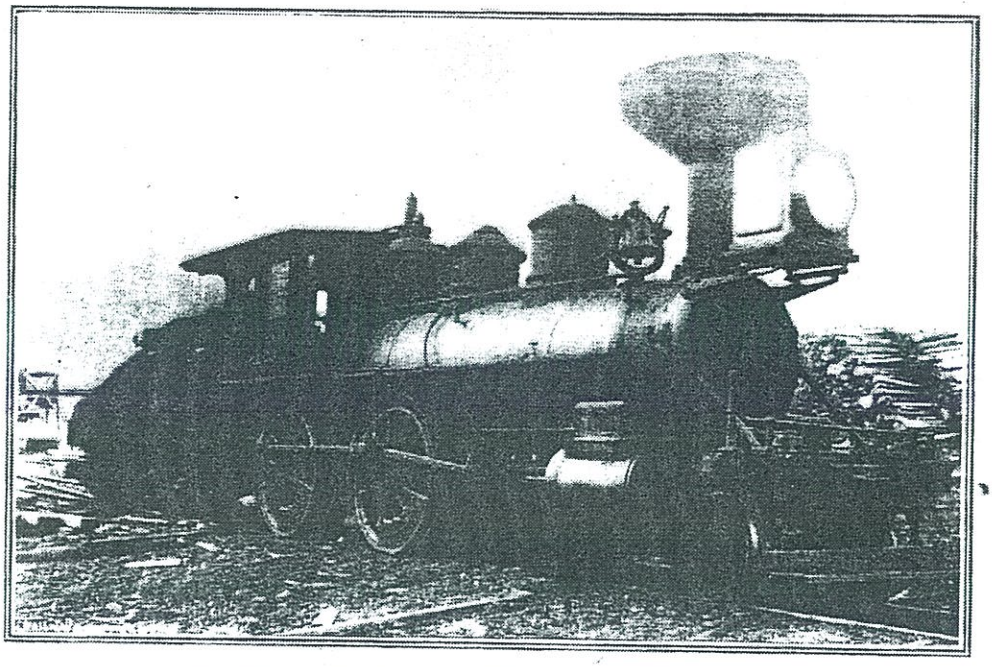
CANADIAN PACIFIC RAILWAY

C. H. RIFF



LATEST PHOTOGRAPH OF THE FIRST LOCOMOTIVE USED ON THE C. P. R. MAIN LINE IN MANITOBA.

The First Manitoba Locomotive.

F. W. Jones, formerly Assistant to the Manager C.P.R. Western Lines at Winnipeg, and now Secretary of the Columbia River Lumber Co. at Golden, B.C., writes: "Referring to the article on early transportation in Manitoba, in your Feb. issue. For the information of those interested in the history of transportation in the Northwest, I am sending you the latest photograph of the first locomotive to arrive in Manitoba, the history of which was given in your article, up to the time it was re-christened the Countess of Dufferin. It was afterwards numbered 131 by the C.P.R. In the course of events it was turned into a coal burner; handled main line traffic on the C.P.R. for a number of years; was afterwards in service on the Manitoba branches; was then transferred to switching service at Canmore; was loaned to the municipality of Deloraine for pumping service in connection with a test well at that point, and was finally sold by the C.P.R. to M. Carlin for use by the Golden Lumber Co., and came into the hands of the Columbia River Lumber Co. when it took over that business. In its latter days this locomotive, instead of going to the scrap heap when it became too light for C.P.R. service, is running regularly, where the climate and the water are good, on a railway which, if not as long as the C.P.R. is just as wide, where the work is easy, and where it runs through one of the prettiest villages in North America, in the valley between the main range of the Rockies and the Sel-

CANADIAN PACIFIC RAILWAY

COAL CHUTE GUELPH JCT. SUTTON, P.Q.

Fifty-Ton Single Track Coaling Stations, Canadian Pacific Railway.

A number of small capacity coaling stations have been built on the C.P.R. at intermediate points, so that locomotives delayed by adverse weather or other conditions may be recoaled between terminals. The accompanying cross section shows the general outline and construction quite clearly. The structure consists of an elevated coal pocket, supported by a framework of timber, and the conveyor and necessary machinery are housed in the roof of the structure; provision being made for stopping motor on either side of the coal car at track level.

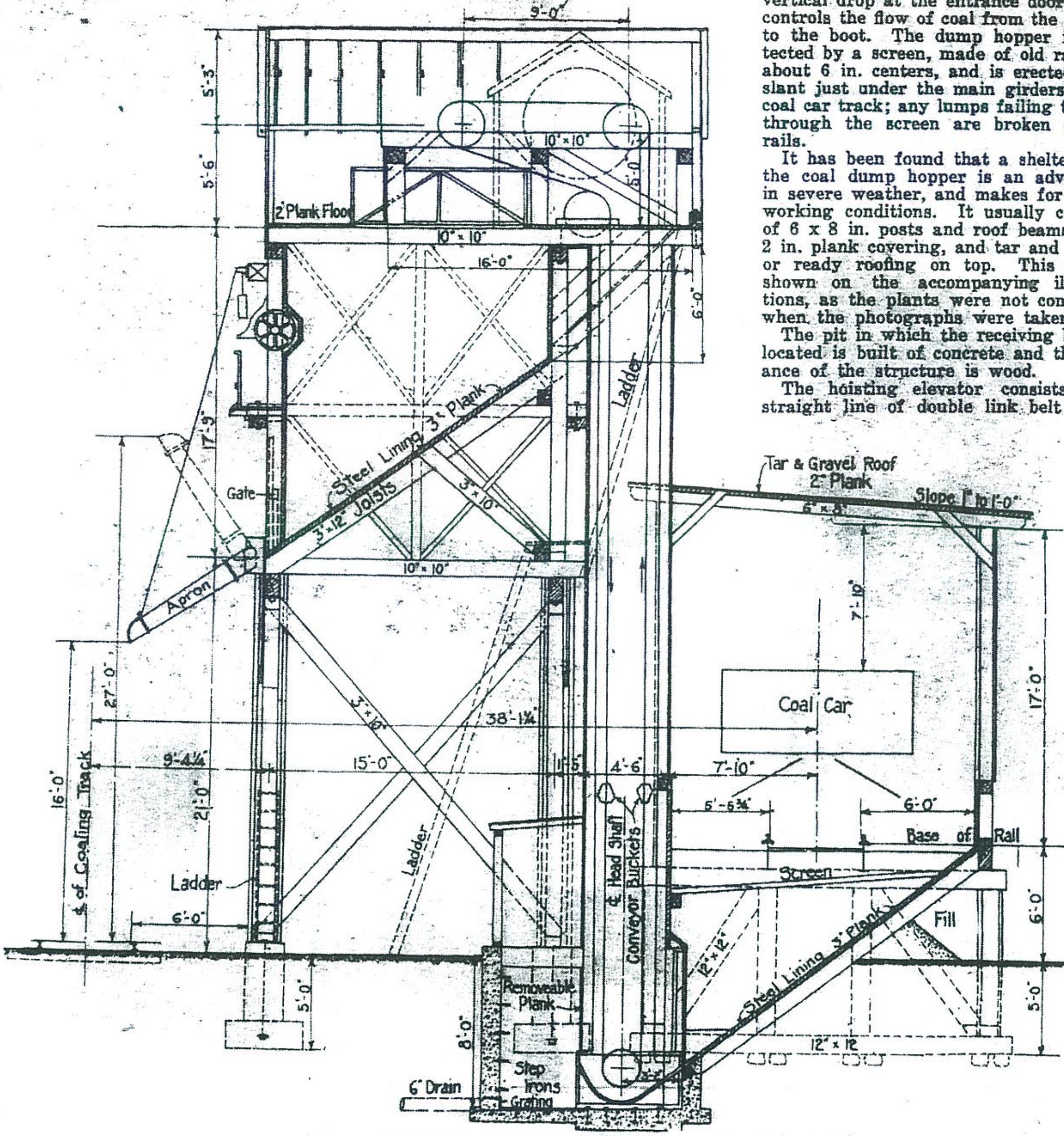
Where electric power is not available, a gasoline engine is used, and the house is located at ground level. The capacity of the plant is 50 to 60 tons, and this, with the storage in the hopper, allows coal moving to the boot under adverse weather conditions. It was found that a hopper large enough to take a full car, would require too much height and depth, to get a steady flow of coal, and was too costly to be considered for this size of plant.

As a further aid to feeding coal to the boot, the sides of the hopper are given a vertical drop at the entrance door, which controls the flow of coal from the hopper to the boot. The dump hopper is protected by a screen, made of old rails, at about 6 in. centers, and is erected on a slant just under the main girders of the coal car track; any lumps failing to pass through the screen are broken on the rails.

It has been found that a shelter over the coal dump hopper is an advantage in severe weather, and makes for better working conditions. It usually consists of 6 x 8 in. posts and roof beams, with 2 in. plank covering, and tar and gravel or ready roofing on top. This is not shown on the accompanying illustrations, as the plants were not completed when the photographs were taken.

The pit in which the receiving boot is located is built of concrete and the balance of the structure is wood.

The hoisting elevator consists of a straight line of double link belt chain,



Single Track Coaling Plant, for Intermediate Points, Canadian Pacific Railway.

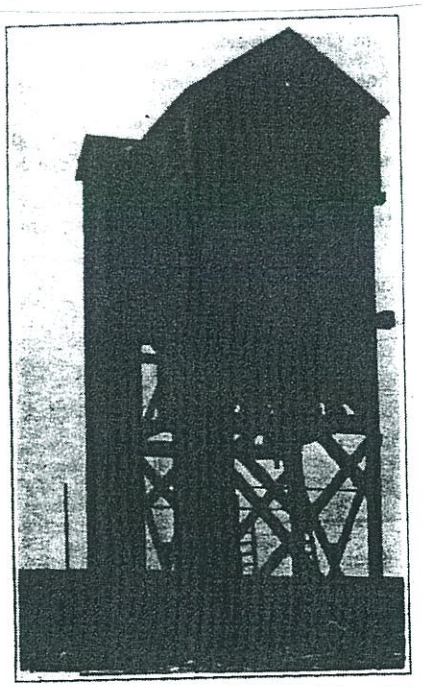
...ched at inter-

pocket is roofed over, and has sufficient housing overhead to accommodate the shafts, gears, sheaves and operating machinery. The pocket was first built with one apron, and coal chute door, for supplying the locomotive, but later this was changed to provide two outlets.

To facilitate repairs, and the proper maintenance of the door and apron mechanism, a light gallery, with rail, is placed on front of the coal chutes just above the drop doors.

A number of these coaling plants have been built by Williams & Wilson, Montreal, who have supplied the two photographs reproduced herewith, illustrating plants built at Guelph, Ont., and Sutton, Que., this company making a specialty of this class of work, and having developed to a high point of efficiency many of the details, such as steel boots, aprons, operating machinery, cut off gates and the like.

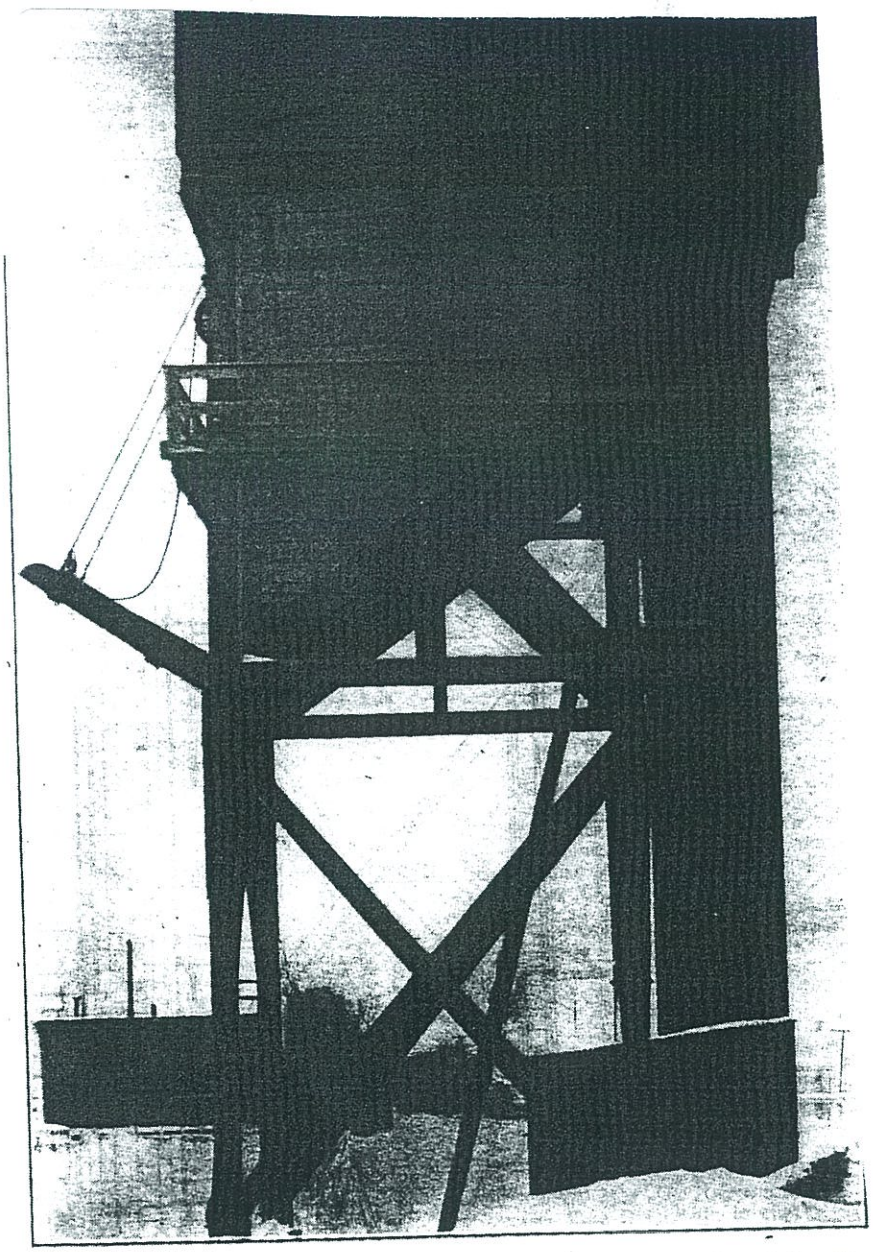
It is well known that coaling plants



Fifty-ton, Single Track, Gasoline Drive, Coal Handling Plant, Canadian Pacific Railway, Guelph, Ont.

in general are subject to very rough usage, and adverse weather conditions, and for these reasons it is necessary, if the best results are to be obtained, that the operating mechanim be made extra strong, especially in regard to chain and buckets, as well as gears, sheaves and shafting, and that these, whenever possible, be made interchangeable for all plants, in order to keep down the number of parts to be carried in stock and to facilitate repairs.

Canadian Railway and Marine World is indebted for the foregoing information to J. W. Orrock, Principal Assistant Engineer, C.P.R., Montreal, to whom credit should also be given for the design.



Fifty-ton, Single Track, Electric Drive, Coal Handling Plant, Canadian Pacific Railway, Sutton, Que.

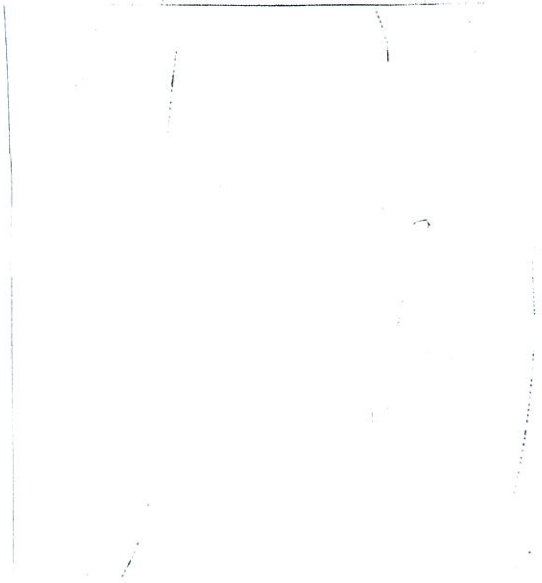
CANADIAN PACIFIC WINDSOR STATION TRAINSHED

Trainshed at Windsor St. Station, Montreal, Canadian Pacific Railway.

The new Windsor St. station in Montreal, which the C. P. R. has had in course of construction for the past four years, is now practically completed. Several progress articles on the work have appeared in these columns from time to time, and a description of the terminal yards in connection with the station was published in our Nov., 1913, issue, followed in the December issue by an article on the power interlocking and signalling arrangements, both of which treated the trainshed area in a general way.

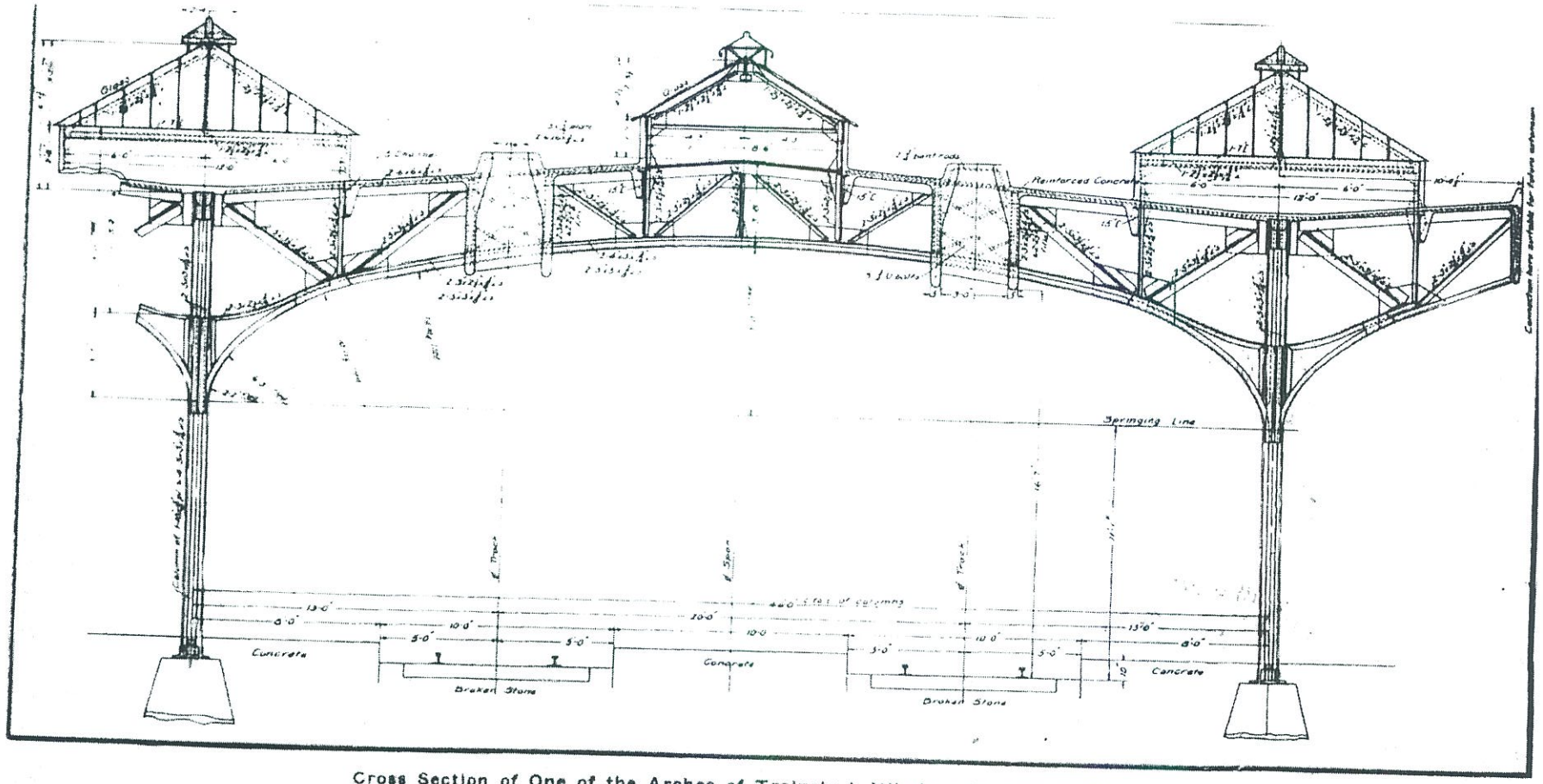
In the remodelling of the station, a difficult problem was presented. The original station on this site was built for the Ontario and Quebec Ry., before its absorption by the C. P. R., about the time the latter completed its transcontinental line. The first station was built along Osborne and Windsor Streets, on the very brow of a comparatively steep hill. The station being small, to meet the then existing traffic, had ample accommodation on the narrow strip between the street and the hill descent, but as the traffic increased, the problem was presented of extending the station in the only possible direction, viz., to the south, on fills made on the side of the slope. Extensions up to the last one, were not very difficult, as the fill required was not very great, but this last addition, extending the trainshed capacity to 11 tracks, required heavy fill work along the downhill side. Under a portion of this extension, there have been built vault and third class waiting room accommodation, but the major portion is on a fill, retained by a concrete embankment wall.

The track arrangement in the station is unusual, all the tracks being entered from a ladder from the west, the ladder leaving the northerly of the tracks, branching off to each of the other tracks, so that the tracks diminish in length from the north to four tracks, 2 to 5 inclusive, have trainshed roofs extending 1,003 ft., with the next two, 6 and 7, 807 ft. long, and the next two pairs, 8 and 9, and 10 and 11, cut off at 534 and 450 ft. respectively. This, including cantilever arrangement of trainshed ends. The northerly, or express track, has single arch, supported on the express building wall, and rows of columns between it and the adjoining tracks, which is only 450 ft. long, the greater portion of the track being open. The next



Interior of Trainshed, Windsor Street Station, Montreal, Looking from Station End.

different in the details of design, as a comparison of existing design with the one under consideration will show. An interesting instance of the usual design is that of the G. T. R. central station at Ottawa, which was described in Canadian Railway and Marine World for Nov., 1911. In contradistinction to the former practice of either having a high arched or plain span roof, high above the tracks, to be clear of the injurious effects of the locomotive fumes, or



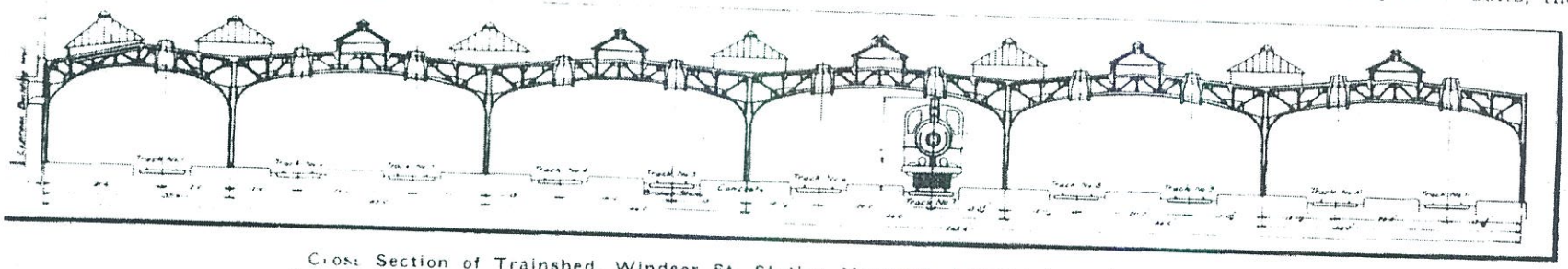
Cross Section of One of the Arches of Trainshed, Windsor St. Station, Montreal.

the south, the track capacity varying for train lengths from 5 to 14 cars, the northerly track having a length in the clear of 1,400 ft.

The tracks cutting off in this manner from the ladder, have made necessary a staggered lever umbrellas over outside platforms, gives a total covered trainshed area of 5 acres, or a train capacity, making due allowance for locomotive length, of about 120 cars.

The usual Bush trainshed is somewhat else the umbrella type of overhanging platforms, which are more or less common in stations of small size, the Bush trainshed is a series of short span arches, usually made to span two tracks, and supported on rows of columns, of low construction, a duct

in the roof directly over the smoke stack taking care of the locomotive exhaust, the blast passing directly to the outside through this duct. This low roof, short span construction is said to make possible the elimination of half the weight of steel usually involved in a large balloon roofed shed, and in addition, has the advantage of being easily extended in either direction from the very nature of its unit construction.



Cross Section of Trainshed, Windsor St. Station Montreal, Looking towards the Station.

A plan and cross section of the complete trainshed are given herewith, as well as a detailed cross sectional view of one of the arches, which is typical of the lot. To one familiar with the usual Bush shed, this will present some features from which it differs. Usually, the two tracks in each arch are side by side, with the usual clearance between. In this instance, the tracks are separated with an intervening trucking platform, bringing the track centres further apart, and in consequence raising the elevation of the under side of the roof spans. The more general Bush shed practice is to make the roof spans in the form of shaped plate girders, of a somewhat shallower construction than in this instance, which, added to the lesser height due to the tracks being closer together, makes the usual design seem lower set. These two features of the Windsor St. shed design give a more open effect, the roof being considerably higher. In this case, the roof spans are made up of formed lattice girders.

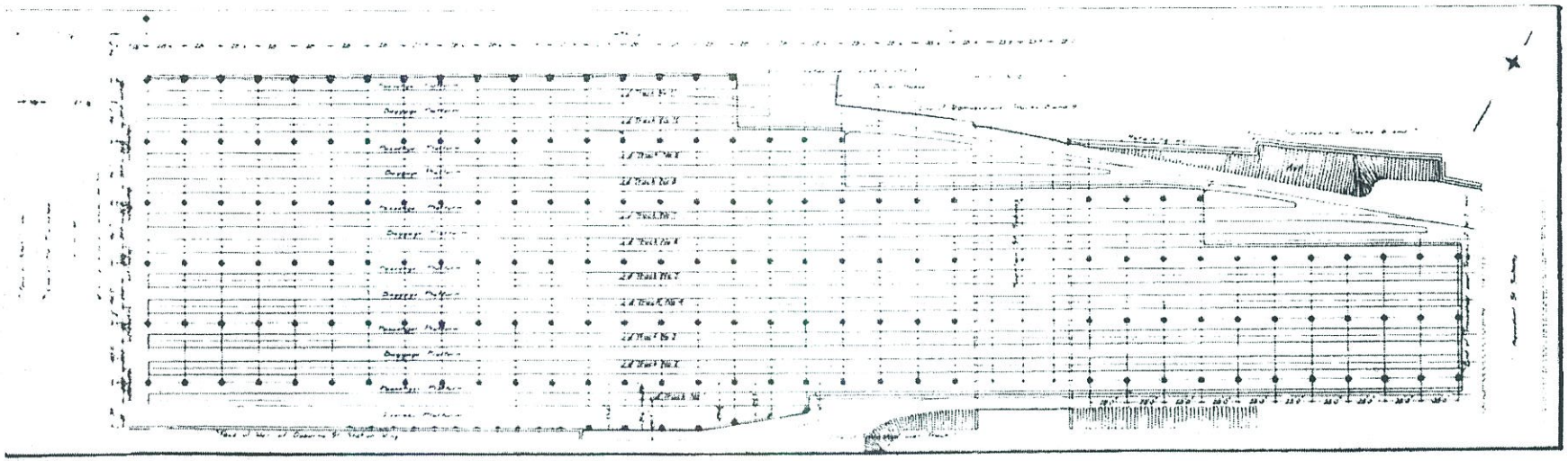
All the spans are 46 ft., with the exception of those over track 1, and tracks 2 and [illegible], the latter central portion of which is practically parallel with the upper member of the truss. Between columns, the structure is tied together with a four pannelled truss of similar design, 4 ft. deep, composed of parallel top and bottom members except at the columns, where the lower member is a two centre curve, the curves for these trusses and the cross trusses all rising from the springing line, which is 11 ft. 1 in. above the base of rail.

Down the centre line of the arched trusses, there are peaked roof skylights, 8½ ft. wide, extending the length of the shed. This skylight has 1¾ ft. walls, and is 4 ft. 2½ ins. free from the injurious effect of the locomotive exhaust fumes, which in the usual high arch roof have such a disastrous effect on the life of the shed. Where the duct crosses the arch trusses, the latter is also encased in reinforced concrete, which is tied in place by 8 embedded ¾ in. U bolts, the lower edge of this joint being higher than that of the duct sides, and rounded, so that the gases will not escape under the edges of the latter into the shed.

The roof proper is of reinforced concrete, 3 ins. thick. This is carried on the longitudinal column trusses, the duct trusses, and

difficulties.

The spans are built up of angles principally, of the usual light roof construction, ft. wide, and 48 ft. long, extend over every two sections along the rows of columns. These are similarly glazed, and have the gether at every second joint. The walls of the skylights are also made of reinforced



Plan of Trainshed, Windsor Street Station, Montreal.

the girder having a depth of 3 ft. 8 ins. at the centre, increasing to 5 ft. 2 ins. over the columns. The upper edge of the truss is straight, sloping from a central height above base of rail of 21¾ ft., to a 19 ft. 10 ins. over the columns. The inner edge of the truss is a seven centred curve, the same monitor peak elevation as the central skylights.

The smoke duct framings are lattice girders, made up of angles, and are 3¼ ft. deep, one each side of the track centre line. They are completely encased in reinforced concrete, which keeps all the steel work concrete.

The design of the roof is quite different from the usual Bush type. In the latter, the roof is flatter, with the skylights approximately parallel with the roof surface, and raised about 12 ins. above that surface. In this design the walls of the upper por-

tion of the smoke duct taper inwards to a width of 18 ins., similar to the Canadian Northern Ry's Winnipeg shed, and Central Rd. of New Jersey shed at Jersey City. This arrangement has several advantages. With the flat skylight, heavy snowfalls are more liable to cover the whole roof surface, the skylight becoming covered with snow so as to render the interior lighting poor. With the raised skylights, it is believed that the snow in drifting over the roof will deposit itself in the spaces between the skylights, leaving the latter clear, and free of snow. With the straight side smoke duct, the snow when drifting badly, has a greater tendency to drift down through into the shed interior. By reducing the upper opening of the slot by one-half, this tendency is reduced by the same amount. The snow holding capacity of this roof is considerably greater than with the usual design, but where it is deemed advisable, the surplus snow may be shovelled down from the roof through the slot, into flat cars on the tracks below.

The platform arrangement differs from the usual design, as already mentioned. The tracks under each arch are spaced at 20 ft. centres, with an intervening 10 ft. platform. This latter is used for baggage and express traffic, leaving clear the 16 ft. platform on the other side along the row of columns, clear for passenger traffic exclusively. This has already been found to be a great advantage in handling the traffic expeditiously, and while this arrangement requires a slightly wider span to allow for this extra platform, it is considered worth while. The platforms are of concrete, while the roadbed is of broken stone. In the building of the shed, it was found necessary to slightly lower the latter temporarily to allow for the smoke duct concrete moulds, thereby allowing the work to be carried forward after the erection of the steel work, without interruption to traffic.

A very important advantage in this type of shed is the manner in which it can be erected without interrupting the traffic seriously. From the very nature of its unit construction, it is possible to put up the shed over two tracks at a time, so that only these two tracks need be taken out of service at a time. Instead of requiring a great amount of false work to support the steel while being erected, as in the high arch type, in this scheme the whole span can be completed at the works, shipped to the shed on a flat car, and lifted into place by a wrecking crane. Thus, from an erection viewpoint, the design has marked advantages.

From the maintenance standpoint, it is decidedly better than the high arch type. In the latter, all the gases being exhausted into the shed, the steel, unless constantly painted, is attacked by the acids in the exhaust. Authorities place the life of such a shed at not more than 20 years. In the Bush shed, all the gases are taken outside clear of the shed, so that the interior steel work requires no more than usual attention. In addition, there are no dirty skylights, and the in-

panel, located in the station master's office.

The design of these trainsheds was developed under the supervision of P. B. Mot-

ley, M. P. R., t on whi

CANADIAN PACIFIC RAILWAY

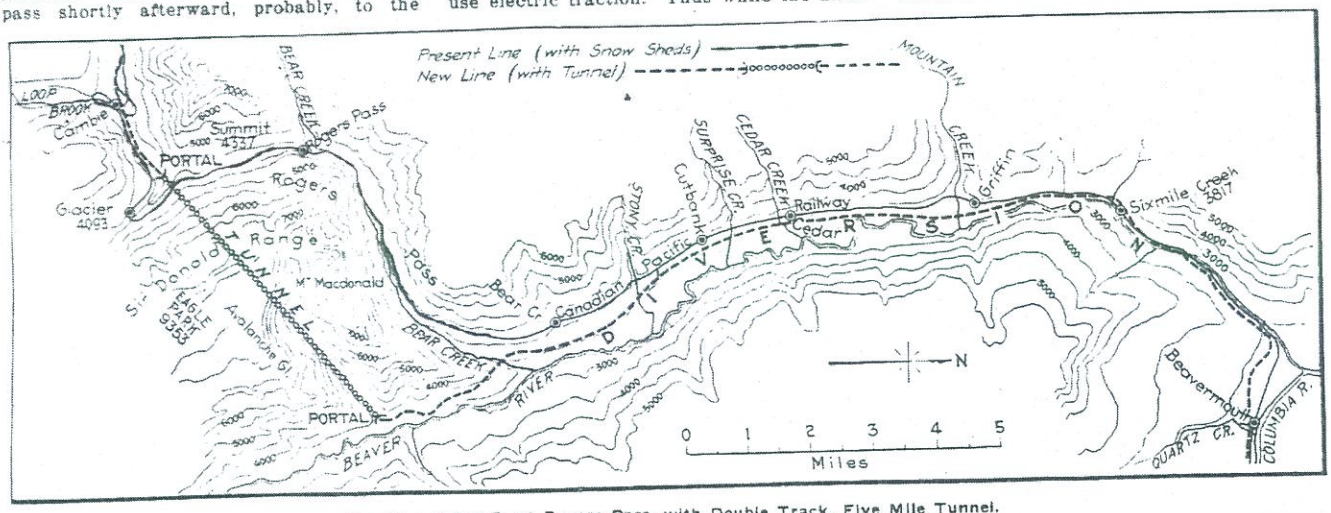
ROGERS PASS TUNNEL

The Rogers Pass Tunnel. Canadian Pacific Railway.

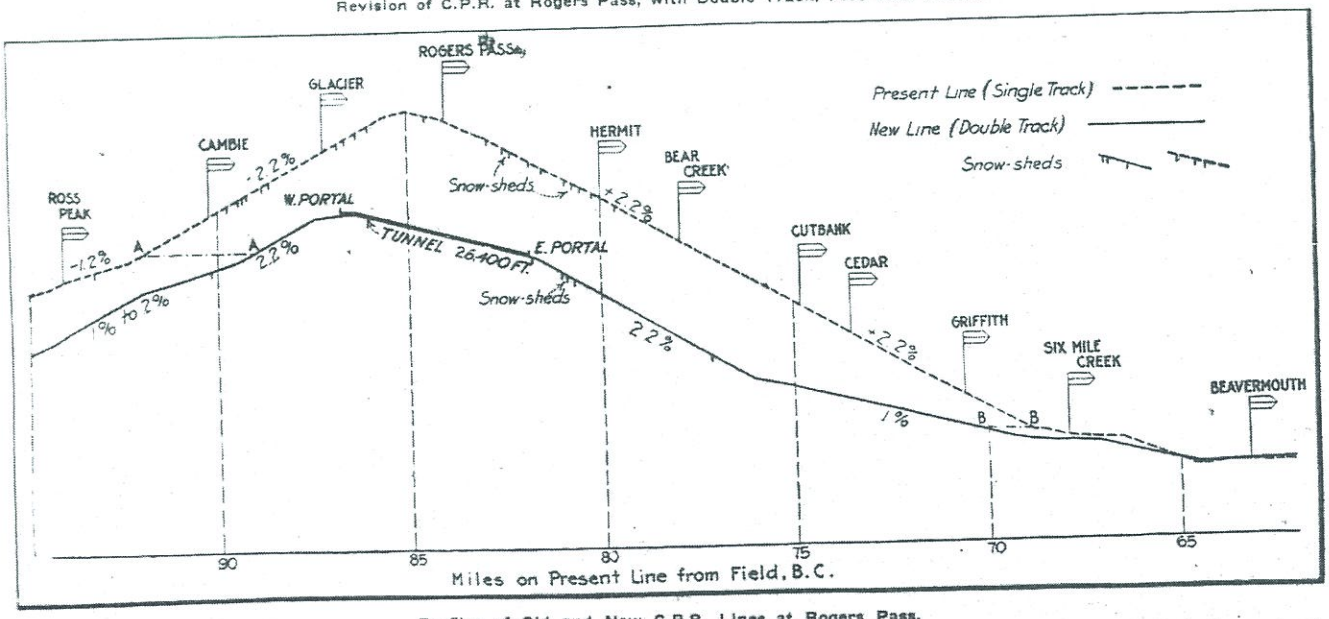
The C P. R. has undertaken a very important task to improve its main line where it crosses the summit of the Selkirk range in the famous Rogers Pass in British Columbia. An entirely new line is being constructed for 18 miles and its most notable feature is a 5 mile tunnel, under the summit of the pass, which will be, when completed, the longest railway tunnel in North America. That distinction, however, will pass shortly afterward, probably, to the stretch of line subject to frequent troubles from snow and requiring long stretches of snowsheds. The present line has nearly five miles of snowsheds in 13 miles, while the new line will have only about 4,800 ft. The maximum grades on the new line are 2.2%, but their total length is less than one third of those on the old line. The total curvature is also reduced considerably and two loops are eliminated. It is proposed to use electric traction. Thus while the maxi-

Grade through tunnel (tangent)		0.98%
Summit elevation	4,330 ft.	3,791 ft.
Sharpest curves	10°	10°
Max. train load	870 tons	870 tons
Track	Single	Double

The tunnel will be 26,400 ft. long (exactly five miles), and all on tangent. It will have no intermediate shafts. For about 1,100 ft. at each end the material encountered will be clay and boulders. The balance is expected to be in solid rock, mica schist and quartzite, so far as can be judged from the investigations made. The maximum depth of rock above the tunnel will be 5,690 ft. In cross-

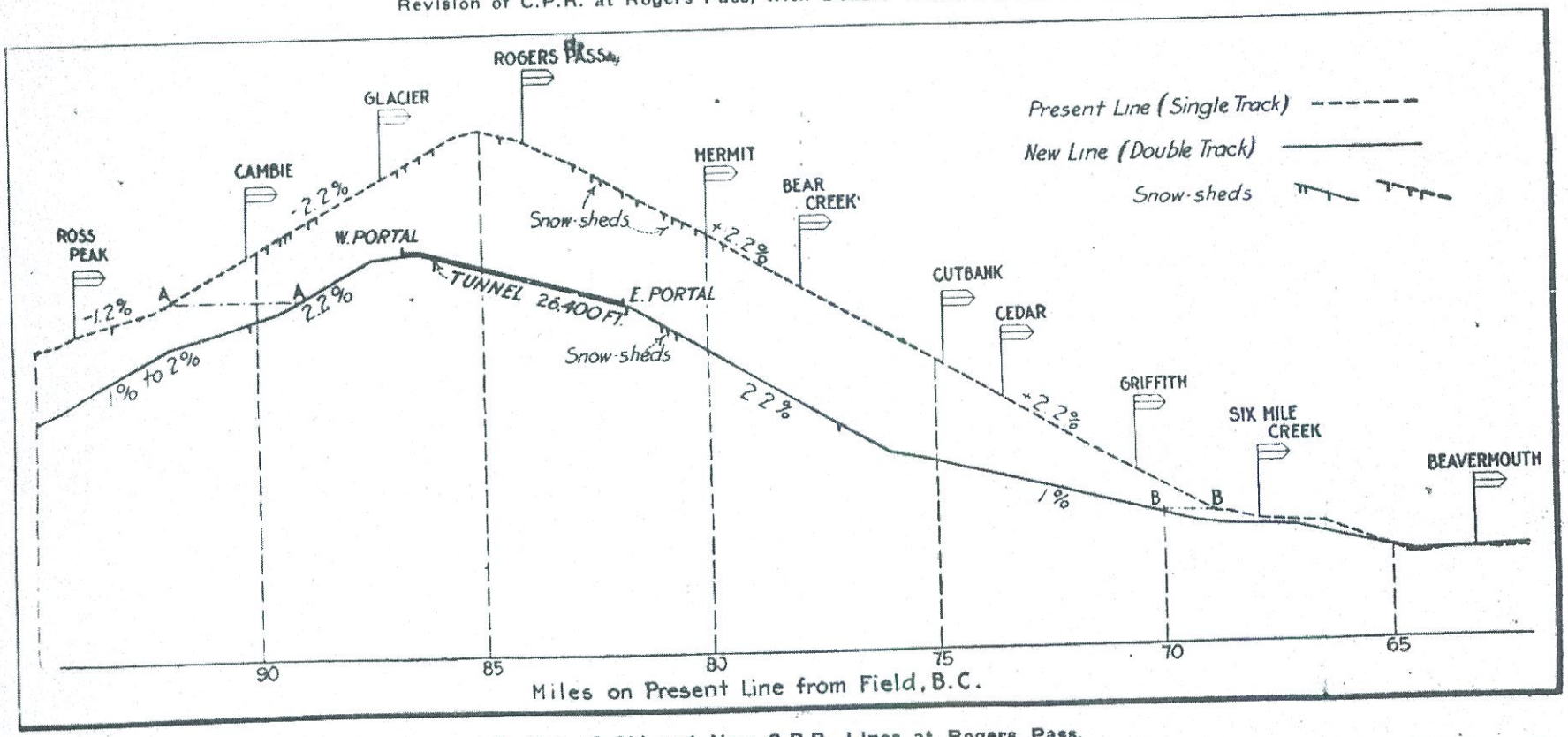


Revision of C.P.R. at Rogers Pass, with Double Track, Five Mile Tunnel.



Profiles of Old and New C.P.R. Lines at Rogers Pass.

Revision of C.P.R. at Rogers Pass, with Double Track, Five Mile Tunnel



Profiles of Old and New C.P.R. Lines at Rogers Pass.

At A-A and B-B the double track line will be on the same location as the present single track; the differences in distances indicate the saving by the new line.

Moffat tunnel under the continental divide, 50 miles west of Denver, Col., which is to be built jointly by the Denver & Salt Lake Ry. and the City of Denver, and will be nearly six miles long if built according to present plans.

The accompanying map and profile show the old and the new C. P. R. lines at Rogers Pass. The old line has long grades of 2.2% and reaches a summit elevation of 4,330.67 ft. in the pass, while the summit on the new line is 540 ft. lower. The new line will effect a saving of five miles in distance, and has the special advantage of eliminating a mum train-load will remain the same, the operating conditions will be very much more favorable in consequence of the lower elevation, the shortening of the heavy grades, and the reduction of the expense and delay due to snow. A comparison of the two lines is made in the following table:

	Old line open summit.	New line summit tunnel.
Length, between same points	23 miles	18 miles
Max. grades (compensated)	2.2%	2.2%
Length of max. grades	22.15 miles	6.61 miles

section, the tunnel will be 24 ft. high and 29 ft. wide, with concrete lining through the softer materials.

The method of construction is unusual. A pioneer heading or tunnel is being driven 45 ft. from the centre line of the main tunnel and with its grade 10 ft. above the subgrade of the latter. From this pioneer tunnel crosscuts will be made to the line of the main tunnel at such distances as may prove desirable, probably 750 to 1,000 ft. apart. Drifts from these crosscuts will be driven along the centre line of the main tunnel, from which drilling and shooting can be

carried on, while mucking will be done with air operated shovels in the enlarged section of the main tunnel. The muck will be handled by 16 yd. side dump cars and compressed air locomotives. The drills and ventilating fans will also be operated by compressed air.

By the middle of February the pioneer tunnel at the east end had been advanced 900 ft., and the right hand wall plate heading at the east portal had been started and carried 30 ft. The headings will be continued, timbering carried on and bench excavated by the air shovel until rock is encountered. Another steam shovel cut at the west end will enable the pioneer tunnel to be started at that end also.

The work is under the direction of J. G. Sullivan, Chief Engineer, Western Lines C. P. R. F. F. Busteed is engineer in charge, covering grade revision and double tracking as well as the tunnel. The contractors are Foley, Welch & Stewart, of Winnipeg, and A. C. Dennis is engineer in charge for them. Westinghouse Church Kerr & Co. have been retained as consulting engineers for the electric traction plans.—Engineering News.

CANADIAN PACIFIC RAILWAY'S 1914

NEW VANCOUVER STATION

The Canadian Pacific Railway's New Station at Vancouver.

The scheme for extensive improvements to the C. P. R. Vancouver terminals has been under way for upwards of two years, and will soon be nearing completion, as it is expected that the station will be ready for occupancy sometime this summer, and the steamship station facilities, adjoining the main station, somewhat earlier. Descriptions of the general scheme of the work appeared in Canadian Railway and Marine World for July and Aug., 1912, and April, 1913, the second article containing a plan of the whole terminal scheme as it will appear when completed.

The former passenger terminal, which was located at the foot of Granville St. near the shore line of Burrard Inlet, was built about 16 years ago, and save for minor alterations, was unchanged from the original plan. By reason of its favorable location and good transportation facilities, Vancouver has grown to a city of about 125,000 in slightly under 30 years. The consequence was that the station facilities were considerably outgrown. In view also of the fact that the growth of the city's population would doubtless continue uninterrupted for many years, on account of it being based on advantages that will assure a steady advance, it was planned to build a station that will meet the reasonable requirements for some time to come.

The problem presented was materially different from that usually encountered, as while the traffic is quite heavy, there is a marked absence of suburban traffic. The aggregate number of trains is not large, and they are largely transcontinentals, and are long, frequently running in two and more sections, and carry a number of classes of traffic.

The general scheme embraces a passenger station and office building, situated on a stretch of available land to the east of the former station site. The former station level was 30 ft. above the tracks, and as it was desired to have the new station at the same level, the tracks have been raised 5 ft., making the new station level 25 ft. above them. There will be four passenger tracks in the present scheme, with provision for more when required, and they will be separated by wide platforms, between the station and the present freight yard. The four tracks will be covered by two sheds, 1,000 ft. long.

In order to avoid an inconvenient grade crossing and delays to traffic between the city and steamship wharf, because of the 1,000 ft. platforms extending beyond Granville St., a bridge on the line of that street is to pass over the passenger and freight tracks to the steamship pier, and connect directly with the passenger accommodations on the pier. An incline will also lead from the west side of the bridge to the wharf, giving access to the lower deck of the pier and freight sheds, and water front. This Granville St. viaduct will lead directly through the site of the former station, and, in consequence, will not be completed until some little time after the new station, due to the delay in tearing down the old structure.

Cordova St. Facade of C.P.R.'s New Station at Vancouver.

The main entrance to the passenger station will be from Cordova St., with the general waiting room central in the station, and at the street level. The station is a combination stone and brick structure, on a steel frame, divided into two principal levels, the main floor for waiting rooms and ticket offices, and the lower level floor for baggage, mail and express rooms. An upper floor will contain the company's divisional offices.

The building is of a triangular shape, with a frontage of 380 ft., a depth of 60 ft. at the Granville St. end, and about 130 ft. at the other end. The central frontage will consist of 10 columns, forming a porchway, in the centre of which, there will be three double swing doors, leading directly into the main waiting room, which will be 145 by 55 ft., with a lobby on either end, 45 by 30 ft. At the lower end of the west lobby, containing telephone and telegraph accommodation and cab call stand. The women's quarters will occupy the southeast corner of the building, and consist of a waiting room, 46 by 35 ft., entered from the east lobby, this waiting room connecting in turn through a lobby with a women's lavatory and retiring room, which will occupy the balance of that corner of the building.

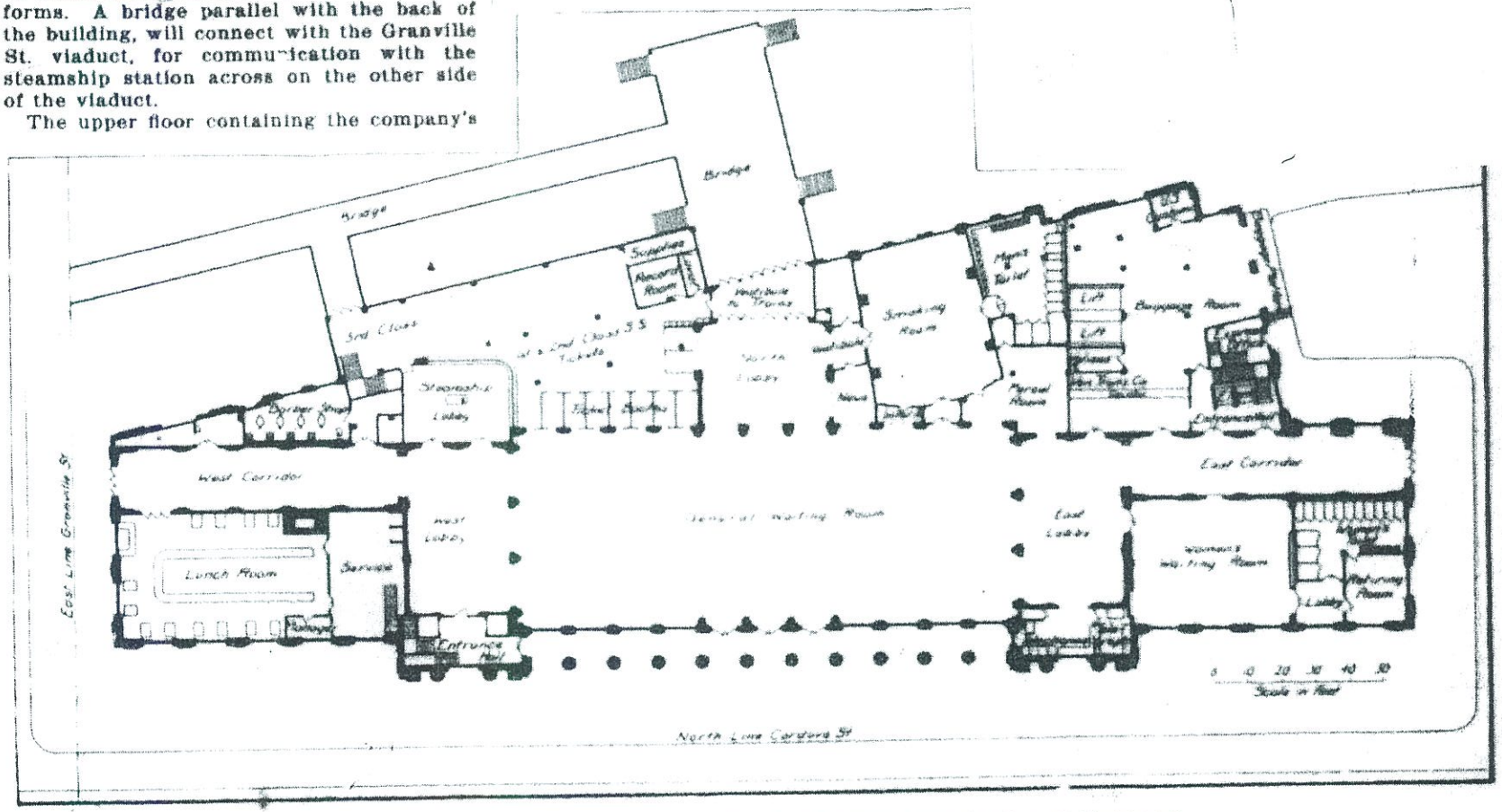
A north lobby will lead out from the centre of the main waiting room, through a doore on the east side of which the smoking room, 33 by 47 ft., will be entered. There will also be an entrance to this room through a vestibule from the east end of the general waiting room. The east side of the smoking room will connect through a vestibule with the men's lavatory. In one corner of the smoking room, will be the information booth and in another, the parcel room. The baggage receiving and delivering quarters will all be located in the northeast corner of the building, entered from the east corridor. In the baggage room will be two lifts for moving baggage in truck loads between the two levels, the main baggage room being below at the track level. An entrance hall from the east corridor, will contain two passenger elevators and stairway for communicating with the lower baggage room. Back of this entrance hall, in a corner of the baggage room, will be the express office, and in a back corner, the U. S. Customs office. The baggage will be brought into the building through the plaza at the east end and deposited on the baggage platform at that end.

On the west side of the north lobby will be the ticket booths, in a corner of the steamship accommodation. This latter will contain a lobby, and first, second and third class ticket booths. West of this, and con-

necting with the west corridor, will be a barber shop, boot blacking stand, and the janitor's room.

Through the north lobby, connection will be made by way of a train vestibule, with a bridge leading across the tracks, with stairs on either side leading down to the train platforms. A bridge parallel with the back of the building, will connect with the Granville St. viaduct, for communication with the steamship station across on the other side of the viaduct.

The upper floor containing the company's



Street Level Floor Plan of Canadian Pacific Railway's New Station at Vancouver.

divisional offices, will be divided on the unit system, each unit having complete heating and lighting facilities, with partitions that may be readily installed or removed as changes in the arrangement of the offices become necessary.