

The New Station at London, Ont.,
Showing the Baggage Wing at
the Right



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New Passenger Station Has Interesting Features

Structure built by the Canadian National at London, Ont. employs multiple-track rigid-frame construction to carry platforms and tracks over sub-level concourse — Result is particularly effective

AS a part of a large program of improvements at London, Ont., a city of approximately 70,000 population about 220 miles west of Toronto, the Canadian National has built a new passenger station which, while typical in many respects of modern station construction of moderate size throughout the eastern part of the United States and Canada, incorporates several features of interest which have proved both effective and economical. The station is one story high, is well proportioned and attractive in appearance, and, withal, is thoroughly utilitarian.

The most unusual feature of the station layout is the carrying of five passenger tracks immediately behind the station building proper on a rigid-frame, reinforced concrete structure with a clear span of 35 ft. 10 in., below which the area has been laid out, furnished and decorated as the main waiting room and concourse of the station. This structure has a minimum deck slab thickness of 30 in., and carries the track rails without ties or ballast. As a result, considerable economy in construction was effected. At the same time, the gracefully curved intrados inherent in the rigid-frame design afforded a basis for a most pleasing concourse interior.

Another feature of interest in the station layout is the arrangement of the baggage and express facilities in wings flanking the main body of the station. These facilities have their trucking platforms and driveways exposed to the main approach to the station, and yet the treatment employed is such as not to detract from the pleasing appearance of the station as a whole.

Restrained Classic Architecture

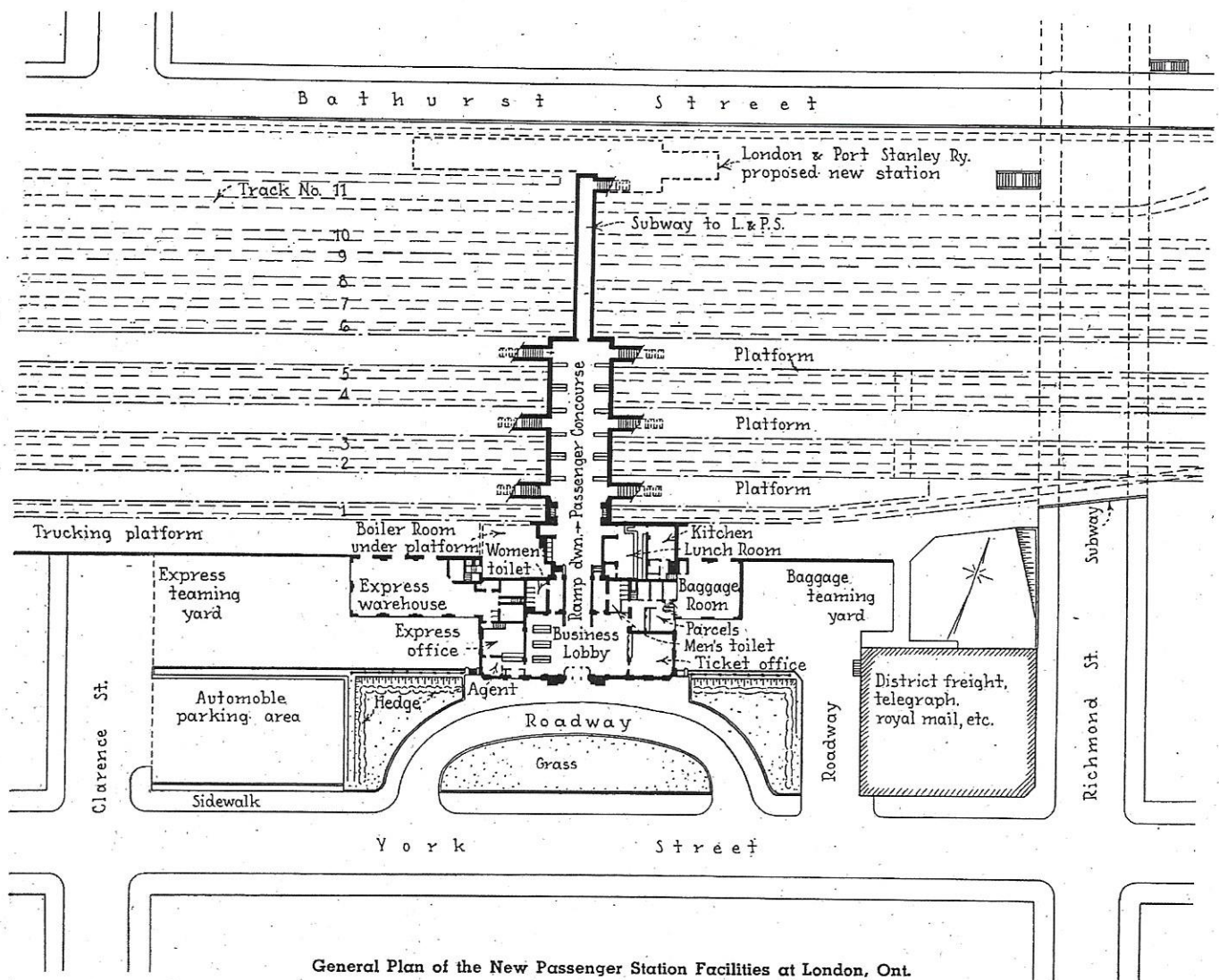
The new station is a part of a project which calls for the eventual elimination of seven grade crossings through grade separation, and the closing of six additional crossings. To date, track elevation has been carried out

through and beyond the station area for a distance of approximately 1,500 ft., and two street subway structures have been constructed, one carrying 11 tracks and the other 12 tracks.

The new station, which is located on practically the same site as the old building, is set back approximately 74 ft. from the street line of York street, about midway between Richmond and Clarence streets, the former passing beneath the tracks, while the latter is closed at the railroad. The building itself, which faces north, is essentially a single-story structure, with a central section 120 ft. across the face, rising to a maximum height of 30 ft., and with flanking wings on the east and west sides 82 ft. and 42 ft. long, respectively. These wings, which are set back 39 ft. from the main face of the building, have a higher foundation level than the main body of the building, and a lower roof level, which gives them the subordinated aspect desired.

The building has a concrete foundation, and is of steel frame construction with hollow tile filled exterior walls, reinforced concrete floors and a reinforced concrete roof slab, insulated on top with one inch of cork and waterproofed with built-up, gravel-surfaced pitch and felt roofing. The exterior treatment of the building follows modern restrained Classic lines, employing face brick in a range of dark browns, and Canadian limestone for pilaster facing and for base courses, copings and cornice, which are carried completely around both the station proper and the adjoining wings.

The main entrance to the station, centrally located in the front face of the building, has been made the most dominant and pleasing feature of the exterior, consisting of a broad, high, rectilinear opening, enclosed by glass and a white metal grille above a group of three glazed doors with frames and sash also of white metal. Adding prominence to the entrance are wide flanking pylons in limestone, terminated at the top in sculptured



General Plan of the New Passenger Station Facilities at London, Ont.

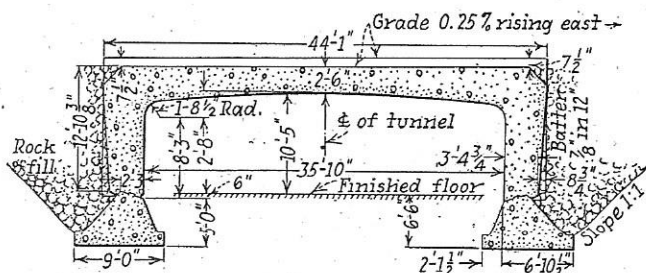
plaques symbolizing on the one hand, "Commerce," and on the other, "Engineering." The wings are in harmony with the main central portion of the building, except that to serve their functions, each is provided with rolling steel shutter-type doors across its front face.

Giving prominence and setting to the station are its broad landscaped station grounds, which extend from Clarence to Richmond streets; a semi-circular concrete driveway and walk which approach the main entrance; and shrub-topped terraces which, in effect, pedestal the two wings and partially obscure the driveways which serve these units. Immediately east of the station is a large parking area for taxis and the private cars of patrons, while at the extreme west end of the station grounds, located directly on the property line of York

street, is a two-story brick building which houses the local division offices of the railroad. This latter facility, which provides adequately for the needs of the road for local office space, made it unnecessary to provide office facilities in the new station building.

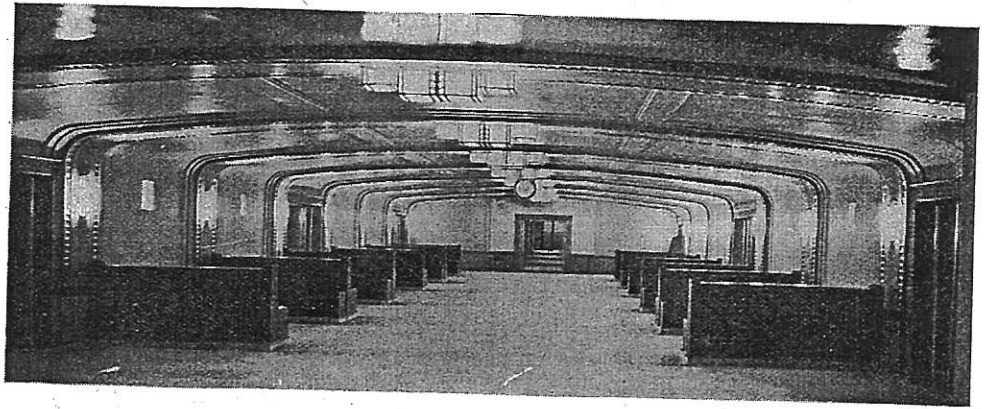
Interior Arrangement Is Effective

The interior of the station presents an effective layout, both from the standpoint of patrons and in the utilization of space. Just inside the main entrance is a glass-enclosed vestibule framed in white metal, which protrudes directly within one of the two principal areas of the station, the business lobby, a room 40 ft. wide by 64 ft. deep, with a ceiling height of 20 ft. This room, which is flanked on both sides by passenger service facilities, has a broad opening at its far, or south, end, leading to a ramp 12 ft. wide and 80 ft. long, which extends down to a waiting room and train concourse beneath the station tracks. This latter area, which is 7 ft. 9 in. below the floor level of the lobby, is 117 ft. long by 35 ft. 10 in. wide, with its walls and ceiling formed by the arch-like underside of a rigid-frame, reinforced concrete bridge carrying the passenger tracks and station platforms. The concourse is entirely free of columns and has a maximum height through the center of 10 ft. 5 in. Stairs from each side lead up to the passenger platforms and are closed off at the concourse level



Cross Section of the Rigid-Frame Structure Under the Tracks

Waiting Room and Concourse
Occupy the Rigid-Frame Structure
that Carries the Station Track and
Platform Layout.



by double glazed doors with white metal frames and sash.

Extending from the south end of the concourse is a pedestrian subway, approximately 100 ft. long, which passes beneath six tracks and gives access from the concourse to a newly constructed small station of the London and Port Stanley Railway, immediately along the south side of the elevated Canadian National tracks. This subway is a reinforced concrete box structure, approximately 9 ft. wide and 7½ ft. high.

The various service facilities at the station are arranged as shown in the accompanying floor plan, with the ticket office and parcel and baggage checking room along the west side of the lobby, and the public office of the Canadian National Express along the east side. So arranged, the baggage room is immediately adjacent to and in connection with the baggage warehouse forming the west wing of the station, and the express office is in direct connection with the express warehouse forming the east wing of the station. Men's and women's wash and toilet rooms are located directly at each side at the top of the ramp leading to the concourse, with entrances from both the business lobby and the ramp. Directly above them and over the upper end of the ramp, is a mezzanine floor occupied by record rooms, a fan room and minor offices.

Midway down the ramp joining the business lobby and the concourse, on the west side, is an entrance to a lunch room and news stand, and almost directly opposite is an entrance to stairs leading to mechanical facilities located in the basement of the station. The lunch room, which is 32 ft. by 27 ft. in plan, and at a level 5½ ft. below the floor of the business lobby, meets, in its central location, the convenience of both passengers and nearby business people who use this facility. The kitchen is located immediately adjacent to the lunch room and has a service entrance direct from a station-side trucking platform above.

A feature of the facilities at the station is the atten-

tion that has been given to the detail of equipment for the convenience of patrons. Parcel lockers, telephone booths and display cases for attractive posters have been built into the walls at convenient locations, and similarly, train indicators and bulletin boards are also built-in features in such manner as to form a part of the general decorative scheme.

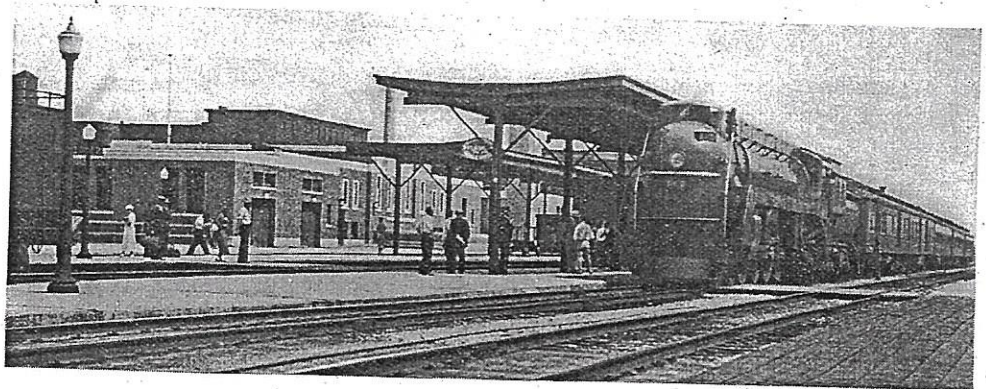
Decoration Is Attractive

In furnishing and decorating the interior of the station, both utilitarian and aesthetic objectives were attained by the careful selection of materials and the use of colors. The floor of the business lobby is in patterned terrazzo. The walls to a height of seven feet are faced with a vitreous granite tile in various shades of tan and brown, as are also the pilasters for their full height; and the whole is relieved by bands of colored tiles, with red and green predominating. Above the tile wainscoting, the walls are of plaster, painted to harmonize with the tilework. They are plain except for a number of plaster plaques depicting modes of transportation, and an ornamental cornice treated in polychrome.

The ceiling of the lobby is in plaster with simple paneling and ornamented accents about white metal lighting fixtures. Most of the trim throughout the interior is of Canadian birch with a dark oak finish.

The same general treatment employed in the lobby is carried down the ramp and into the concourse, except that the ramp floor is of non-slip tile and the tile wainscot in the concourse is only 2 ft. 9 in. high. A further noticeable deviation is in the ceiling of the concourse, where, unlike the relatively flat ceiling in the lobby, the segmental arch lines of the rigid-frame structure carrying the tracks have been preserved and have been ornamented by moulded arched ribs in plaster. The side walls, like the ceiling, are finished in plaster, and are ornamented between stairway openings to the track level by a series of plaques which depict the development

View of the Station from the
Track Level



of railway motive power. Lighting fixtures are of both the wall and ceiling types, in white metal and white glass.

The track layout at the station includes six through station tracks at an elevation approximately 7 ft. above the station lobby floor level, and approximately 14 ft. above the concourse floor level. These tracks are served by three low-level intermediate passenger platforms, and one trucking platform immediately along the rear of the station. The platforms, which are largely of concrete construction have a combined length of 2,100 ft., and for approximately 1,500 ft. are sheltered by steel-frame canopies with wood roof decks covered with built-up roofing. Immediately south of the station track and platform layout, there are five freight tracks, none of which interferes in any way with passenger train operation at the station.

Heating of the station and concourse is by means of two 100-hp. water-tube boilers fired with rotary-type oil burners. These units, which are located in the basement of the station, also supply steam for heating coaches and the nearby railroad office building.

Rigid-Frame Bridge Forms Concourse

Possibly the most unusual and interesting part of the new station facilities is the concourse superstructure, which, as already pointed out, is a rigid-frame, reinforced concrete structure carrying five tracks and three low-level intermediate platforms. This structure, which provides an unobstructed concourse area 35 ft. 10 in. wide by 117 ft. long, has vertical side-walls and a gracefully arched underside, or intrados, which lent itself to particularly effective decorative treatment. The maximum headroom within the concourse is 10 ft. 5 in. longitudinally through the center, decreasing progressively toward each side wall with the pitch of the curved ceiling to a height of approximately 9 ft.

A feature of the structure carrying the station tracks over the concourse is that its deck has a thickness of only 30 in. at the center. This feature, combined with the fact that the track rails are laid directly on the concrete deck, without crossties or ballast, minimized the overall depth of the deck from base of rail to underside of slab, and thereby minimized the amount that the tracks had to be raised through the station area to provide suitable concourse headroom. Entirely aside from this fact and the attractive interior which this structure afforded, the fixed-frame design was considerably more economical of construction than any other type of structure which might have been built.

Details of Design

The rigid-frame structure over the concourse, while unusual for railroad loadings, is not new to the Canadian National, which has already employed this design effectively for several grade crossing elimination projects, the most recent of which was carried out at Petete Cote road, on the main line near Vaudreuil, Que. Here, as pointed out in an article in the *Railway Age* of March 24, 1934, a double-track clear span of 72 ft. 6¼ in. was involved. In spite of this sizeable span, the thickness of the deck slab at the center was held down to 3 ft. 9 in.

At the London station, the clear span involved was only 35 ft. 10 in., but the same principles of design and construction were employed. In this type structure, the deck and the abutments are monolithic, the ends of the slabs being designed to take negative bending movement which is carried into the abutments by the rigid, reinforced connections between the slab and the abutments.

Through these rigid connections, the bending movement at the center of the slab is reduced materially, permitting an appreciable reduction in the effective depth of the slab as compared with a slab simply supported at the ends.

The abutments of the structure, unlike the usual gravity-type abutments, are thicker at the top than at the bottom, tapering from a maximum thickness of approximately 4 ft. near the joint with the deck slab, to a minimum thickness of 3 ft. 4¾ in. at the base. Both abutments rest on and have keyed, hinged anchorage to massive spread footings. These footings, which are continuous throughout the width of the structure, have a rectangular base 9 ft. wide, in a horizontal plane, and battered side faces which rise to an inward sloping top face 27 in. wide, in which there is a continuous, longitudinal tongue, 5 in. wide and 1 in. high, which forms a key between the footing and the abutment wall above. The key area, which carries the entire load of the superstructure, has direct contact with the superstructure concrete, while the remainder of the joint is filled with a premoulded asphalt filler, ½ in. thick, and is made water-tight with a strip of ¼-in. by 7-in. sheet copper embedded in the concrete.

Designed for E-60 Loading

Both the superstructure of the rigid-frame structure and the footings are reinforced to resist positive and negative bending movements, and great care was exercised to insure accurate spacing of all reinforcing, both the bars and additional rail reinforcing employed in the bases of the footings. Altogether, there are 86,400 lb. of bar reinforcing in the frame, and 31,100 lb. of bar and rail reinforcing in the two footings.

The structure was designed for Cooper's E-60 loading, using the impact formula $\frac{L^2}{L + D}$, and assuming the

live load on each track spread over a width of 13 ft. High-early-strength concrete, developing a strength of 3,000 lb. in seven days, was used throughout in the superstructure, and standard Portland cement concrete, designed to have a strength of 3,000 lb. in 28 days, was used in the footings. Specifications required not only close control of the mix in accordance with the water-cement ratio, but also that all concrete be mechanically vibrated as placed. Altogether, 1,062 cu. yd. of concrete were employed in the structure.

Because of its width of 117 ft., with stairwell openings through the abutments on each side on the center lines of the platforms, the superstructure of the concourse structure was constructed in four sections. This not only made construction practicable, since in the fixed-frame design it is necessary to cast the deck slab and abutments as a unit, but it also permitted undisturbed passenger train operation through the station area while the construction work was under way. Sections of three widths were involved, two 43 ft. wide, one 23 ft. wide, and a fourth 9 ft. 7 in. wide. The largest sections carry two tracks, with a half section of low-level intermediate platform on each side. The 23-ft. section carries a single track with a half section of platform on each side, while the narrowest section carries only a half section of platform. Located side by side, the various sections of the structure provide for the desired track and platform layout.

The double-track deck area on the two largest sections of the structure is 23 ft. 10 in. wide, while the single-track deck area on the smaller track-carrying section is 10 ft. 10 in. wide. Each half section of platform is 9 ft. 7 in.

wide, forming together, intermediate platforms 19 ft. 2 in. wide. The stair openings through the abutments are six feet wide and are symmetrical above the center line of the platforms as a whole. Thus, one-half of each opening is formed in each of the adjoining ends of abutments sections, directly beneath the platform areas. Concrete side walls, structurally independent of the abutments but joined to them with waterproofed flexible joints, form the stairwells; the stairs themselves, in two flights, are also of concrete and independent of the bridge structure.

Through the design adopted, the thickness of the deck slab within the track areas was held down to a minimum of 2 ft. 6 in. at the center of span, increasing gradually each side of the center to a maximum thickness of approximately 3 ft. 6 in. at the rigid connections with the abutments. Through the platform areas of the deck, solely for the purpose of elevating the surface of the platforms above the level of the track area, the deck slabs are a maximum of 3 ft. 3½ in. thick at the center, with the surface pitched laterally toward the track area for drainage.

Drainage from the track area is toward one end of the structure, the deck surface being constructed on a grade of 0.25 per cent rising to the east to conform with the track grade. The deck is not surfaced or treated with any form of waterproof coating, reliance being placed on the dense, impervious character of the concrete and the pitch of the deck, against percolation through the slab. However, all concrete below ground level, including the backs of the abutment walls, was damp-proofed with two coats of asphalt emulsion.

To insure thorough drainage from behind the abutments, and at the same time to minimize any lateral earth pressure against the abutment walls, both walls, to near the base of their footings, were backfilled with rock, this material being carried back to a 1-to-1 slope on the adjacent earth fill. At the base of the rock backfill, tile drains were installed to carry off any water that might accumulate.

All joints between the separate sections of the structure proper, and, likewise, between the rigid-frame structure and the stairwell walls, were waterproofed with 7 in. by ½-in. sheets of copper, V-shaped directly in the joints, which were buried in the concrete about 3 in. below the surface. The surfaces of all of these joints, as well as of all other joints where there was to be no bond between the sections, were faced with two-ply, asphalt-impregnated roll roofing.

One of the most unusual features of the structure carrying the station tracks over the concourse is the fact that the track rails, of 100-lb. section, are set in a vertical position, on steel plates, with only thin cushion pads between the plates and the concrete deck. The plates are held in place by U-shaped anchor bolts of 1-in. bar material, which are embedded in the concrete in such manner that opposite threaded ends extend up through holes in the pads and in the plates. Two such anchor bolts, fitted with square head nuts and flat steel washers, hold each plate in position.

The rails, on the other hand, are secured to each plate by means of two 1-in. bolts, with countersunk heads. These extend up through holes in the plate on opposite sides of the rail seat. Each of these bolts is fitted with a square nut, a coil spring washer, and a simple steel rail clip, the latter resting directly on the base of the rail. In spite of this direct connection of the track rails to the deck, vibration in the structure under load is hardly noticeable, and the sound within the concourse caused by trains moving over the structure is inappreciable.

The new station facilities at London were planned

and built under the general direction of W. A. Kingsland, vice-president of the Central region of the Canadian National, C. B. Brown, chief engineer, operation, of the system, and T. T. Irving, chief engineer of the Central region. The station building design and construction were handled by J. Schofield, system architect, and R. A. Baldwin, engineer of construction of the Central region, while C. P. Disney, bridge engineer of the Central region, was in charge of the design and construction of the rigid-frame structure carrying the station tracks over the concourse.

C. & O. Would Hold Erie and Nickel Plate Directly

WASHINGTON, D. C.

INITIATING the first important step taken in several years toward carrying out the four-system consolidation plan for the eastern railroads approved by the Interstate Commerce Commission in 1932, the Chesapeake & Ohio on February 4 filed with the commission an application for authority to acquire direct control of the New York, Chicago & St. Louis and the Erie. It is proposed to acquire stock of the two roads now held by the Virginia Transportation Company, a subsidiary of the C. & O., and by the Alleghany Corporation, which indirectly controls the C. & O., sufficient to give the railroad company in its own right a numerical majority of the stock without the intervention of any of the holding companies which the Van Sweringen interests had organized in such profusion in their efforts to hold control of their railroad properties during the long period while they were seeking authority from the commission in various proceedings for a combination of their eastern holdings into one large system.

As far back as 1925 the Van Sweringen interests had sought I.C.C. approval for the acquisition of the C. & O., Erie, and Pere Marquette by the Nickel Plate but the commission objected to various features of the plan and suggested that the C. & O. should be the controlling company. The C. & O. then asked authority in 1927 to acquire the Pere Marquette and Erie but the commission denied the application as to the Erie although it allowed the C. & O. to take over the P. M., and later authorized C. & O. officers to serve also as officers of the Nickel Plate. Meanwhile the Van Sweringen interests continued to maintain control of the railroads by distributing their holdings through various railroad and holding companies while the commission was considering the four-system plan for the eastern roads, which it approved in general in 1932, finally allocating to one of the four systems practically all of the Van Sweringen eastern roads as well as some others.

Because of the depression no further steps were taken toward combining the eastern roads after the C. & O. officers had their jurisdiction extended over the Nickel Plate in 1933 and stock representing control of the Alleghany Corporation, principal holding company of the system, was sold in September, 1935, at an auction sale of the collateral held by a group of banks, to the Midamerica Corporation, controlled by George A. Ball, of Muncie, Ind. Testifying recently before the Senate committee Mr. Ball had indicated an intention of proceeding with the consolidation plans of the Van Sweringens.

The Chesapeake & Ohio proposes to exercise an option from the Alleghany Corporation to purchase 167,300 shares (49.58 per cent) of the common stock of the

Canadian Railway AND Marine World

Canadian National Railways New Station at London, Ont.

Complete details of the station structure, the track arrangement and express and other facilities are given in the following.

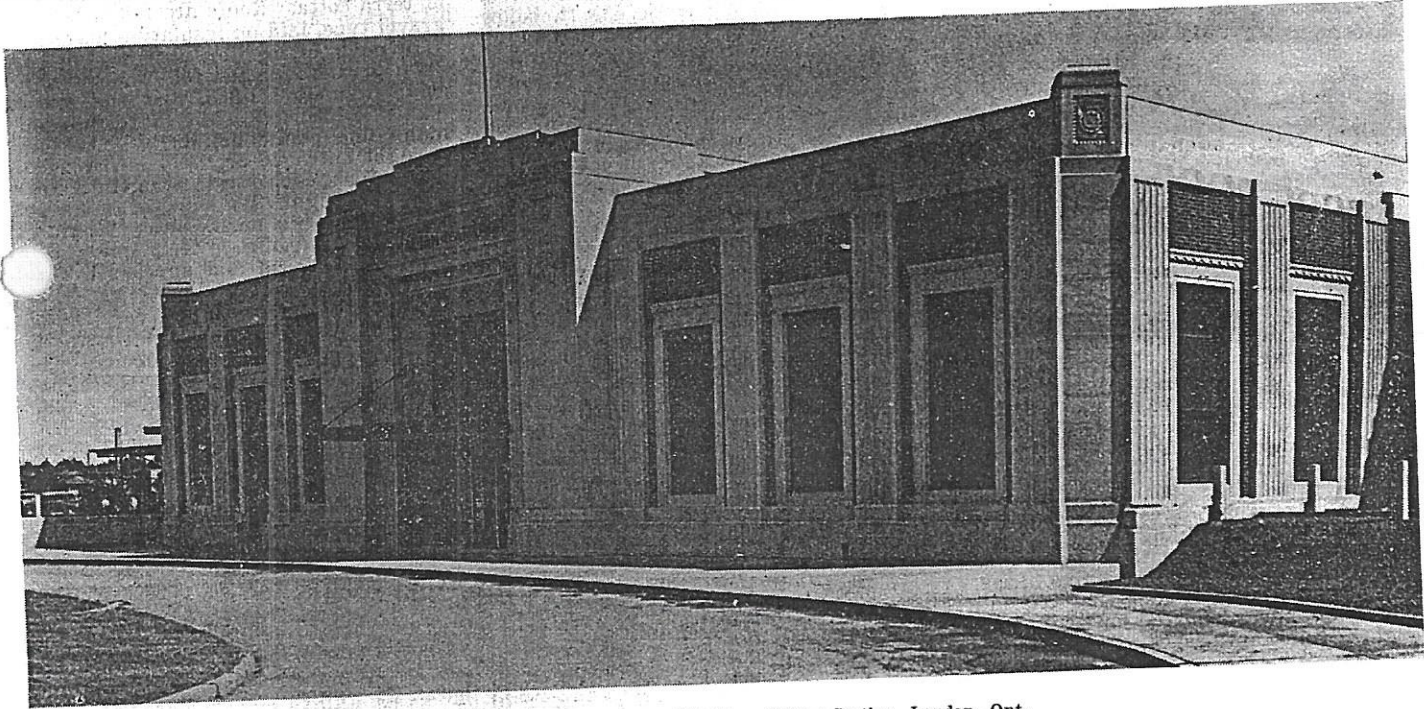
The celebration at London, Ont., on Sept. 1, when the Canadian National new station there was formally opened by Sir Percy Vincent, Lord Mayor of London, England, was a memorable one. The effort by the citizens of London to secure a station which would be in accordance with the size and importance of the city extended over many years, and depressed economic conditions were responsible for a great deal of delay in the provision of the new facility. However, with the first dim signs of returning financial stability, the Canadian National management set about performance of its obligations as set forth in the agreement between the railway and city which had been entered into, and the splendid new

The Agreement Providing for Grade Separation and Station Construction

In 1930, the Canadian National and the City of London entered into an agreement providing for separation of railway and street grades and the construction of a passenger station to replace the old one on York Street, between Clarence and Richmond Streets. It provided for the construction of subways to carry Ridout, Richmond, Wellington, Maitland, Adelaide and Rectory Streets under the tracks; for the construction of a bridge to carry Egerton Street over the tracks, and for closing of portions of Talbot, Clarence, Waterloo, Colbourne, Burwell and William Streets. The agreement provided that the railway should remove

concourse, was commenced, and on its completion in August, 1935, work on the superstructure started, to be followed in May, 1936, by the final unit, the subway to the London and Port Stanley Railway, and by the landscaping, roadways and approaches.

The new station occupies approximately the same site as the old one, and the land covered is bounded on the east by Clarence Street, on the north by York Street, on the west by Richmond Street, and on the south by the tracks. The main or entrance front faces on York Street and is set about 74 ft. back from the street line. In the new development the tracks were raised about 7 ft. above the York Street level. The building was



Front View, Canadian National Railways' New Station, London, Ont.

building which has just gone into service stands as a monument not only to the ability of the C.N.R. architectural staff, but also to the willingness and desire of the railway management to carry out its undertakings and to provide improved facilities for the public just as quickly as finances permit. It was fitting that the celebration should have been marked by the presence of one of the recently-introduced streamlined passenger locomotives, and it was equally fitting that Sir Percy Vincent should have stood at the front and on one running board, while W. A. Kingsland, Vice President, Central Region, Canadian National Rys., occupied a position at the front end of the other running board, while posing for their photographs. The opening of the station was one of the last official acts of Sir Percy in Canada before he and Lady Vincent began their homeward journey.

the existing station and construct a modern station in lieu of it at or near the site of the existing station, the new station to be reasonably fit for the needs of the inhabitants of the city and the travelling public. Most of the grade separation work has been completed for some considerable time, as also have the subways at Richmond and Wellington Streets, and the completion of the new station brings the project nearer conclusion.

The Station and Other Facilities Described

A reference to the accompanying plan will show that the new station consists of three distinct units and it was so constructed, viz.:—(a) Underground passenger concourse; (b) the superstructure or station proper; (c) subway to London and Port Stanley Railway station.

In the autumn of 1934 construction of the first unit, the underground passenger

so planned that the entrance, business lobby and office facilities are at the street level, and an easy ramp leads down to the passenger concourse under the tracks, from which stairs lead up to the passenger track platforms. Extending from the south end of the concourse, in a southerly direction, is a subway giving access to the London and Port Stanley Ry. (electric line) station. Directly over the concourse run five tracks and there are an additional five south of it. The tracks are numbered from north to south, no. 1 being at the north end of the concourse and adjoining the station, and there are passenger platforms between tracks 1 and 2, 3 and 4, and 5 and 6. The tracks, as the foregoing would indicate, run east and west. The subway to the London and Port Stanley Ry. crosses under the five east and west tracks, nos. 6, 7, 8, 9 and 10, the latter four being freight tracks. On