# TORONTO SUBURBAN RAILWAY.

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# Interurban Cars for Toronto Suburban Railway.

The Toronto Suburban Railway has under consideration tendered for six double truck cars for its Lambton-Guelph extension, which is under construction. They are to be of the centre entrance type, with central partitions dividing the main part of the car from the smoking section. Three of the cars will be for passengers only, while the other three will have a small baggage compartment in the end of the smoking section, from which it will be taken, leaving the main part of the car the same in both cases. There will be emergency exits front and rear, but there will be no end bulkheads. They will have a seating capacity for about 70 passengers, and will approximate 55½ ft. long and 8½ ft wide. The underframing will in all probability be of steel, and it is possible that the whole car frame may be of steel construction. The body will be mounted on double trucks, and will have four 80 h.p. motors. The electrical equipment has been ordered from the Canadian General Electric Co.

July 1914

R., and to grant permission [illegible]
of the Lake Shore Division cars over it.

**Toronto Suburban Ry.**—An agreement has been reached between the Weston Village Council and the company, by which the tracks on Main St. will be moved from the side to the centre of the road. This matter has been under consideration for two or three years. The question of building a new bridge across the ravine, to the north of the village, is under consideration, and it is not improbable that the company will build a bridge for its own use.

The Board of Railway Commissioners, on July 14, deferred giving judgment on the company's application, pending submission of details on present and prospective traffic over the road.

It is reported that the difficulties which have prevented the completion of the extension to Woodbridge have been smoothed out, and that the line is to be completed and opened this summer.

A press report states that surveys have been made for a line from the Weston-Woodbridge line to a junction with the Lambton-Guelph line, passing through Brampton. An official of the company states that several routes have been surveyed to give this connection, and although there have been certain negotiations with Brampton, nothing has been decided, and the matter is likely to stand over for some time yet.

August 1914

Track is reported laid from Islington to the boundary of Georgetown on the Lambton-Guelph line, and the bridge work is being progressed with. The line is being built westward, but nothing is being done between Lambton and Islington. (July, pg. 336.)

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WORLD. [January, 1915.

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# The Toronto Suburban Railway's Franchise in Toronto.

In response to a request from the City Board of Control, City Solicitor Johnston has given the following opinion:

"The Toronto Suburban Ry. Co., under an agreement with the York Tp., dated Sept. 4, 1899, has the exclusive right to construct, maintain and operate a single and double iron or steel railway on Davenport Road, from the northern limits of the city to the east limit of the Town of Toronto Junction, and in that part of Bathurst St., between Davenport Road and the northerly limits of the City of Toronto. The franchise entitles the company to use its railway for carrying freight, goods, merchandise and passengers. The franchise extends over 30 years and therefore expires on Sept. 4, 1929. Upon the expiration of the 30 years the company is entitled to a renewal for a further term of 20 years upon such terms as may be mutually agreed upon between the township and the company or to be determined by arbitration, and so on at the end of each 20 year period. There is a proviso for the township at the end of any of the periods taking over the railway at a valuation to be determined by agreement or arbitration.

There is a further provision in the agreement that the company "shall grant running rights over the portion of its railway on Bathurst St., from the C.P.R. tracks to Davenport Road, and on Davenport Road, to one other railway company operating a street railway and having ingress to the city, upon such terms as may be mutually agreed upon between the company and the company applying for such running rights, or in case of disagreement to be settled by arbitration under the Municipal Act."

January 1915

Radial Railway Operating

February 1915

# Toronto Suburban Railway Company's Appeal Granted by British Privy Council.

The Toronto Suburban Ry.'s appeal against the Ontario Railway and Municipal Board's order, requiring it to pave portions of Davenport Road, Toronto, has been granted by the Judicial Committee of the Privy Council, in London, Eng. The case came before the Ontario Board on the application of the city, dated April 25, 1912. The city asked that the railway company be directed to reconstruct and put in a proper state of repair its track and substructures on Bathurst St. and Davenport road, and also the roadway used for railway purposes, and 18 ins. on each side of the tracks. The Board ordered the railway company to dig out and pave the track allowance and 18 ins. on each side with such material as the Board's engineer should direct.

The company appealed to the Appellate Division of the Supreme Court of Ontario, which held that the Board had jurisdiction to order the railway to pave and to determine the character of the pavement, but that it could not delegate this power to its engineer, and referred the matter to the Board that it might direct what kind of material should be used. The company contended that under the agreement in force between it and the municipality it was obliged only to repair the portions of the roadway, not to construct a new roadway or pavement. The difference in the cost of repairs and the cost of construction as proposed by the city is estimated [illegible] company at $50,000.

mine the kind of pavement to be used was, however, varied on the ground that it did not, as it should, in the view of the court, have done, prescribe the kind of pavement which the company lay, and it was remitted to the Board to determine what kind of pavement it should be.

The Lord Chancellor proceeded: "Their Lordships cannot give to the word 'tracks' used in the context, in which it occurs in section, the wide interpretation placed on it by the court, which extends it not only to rails, but to ground occupied not only between rails, but up to 18 ins on each side. They think the words in section indicate an interpretation of more restricted and literal kind, and exclude from the power given by section the general roadway itself, as distinguished from rails, etc., laid upon it."

In the opinion of their Lordships the other question which arises on interpretation of clause 6 of the agreement of 1899, presents a greater difficulty, and it is only after much consideration that they arrived at a conclusion on this point. It is argued that the obligation of the railway company extends to a portion of the travelled road which the company occupies in whatever improved condition that portion may have been put, the purpose of the section being to secure that the entire roadway shall be in the same condition throughout its entire breadth.

This argument does not, however, suffice to determine the question at issue. It [illegible] been im-

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Under this agreement the railway company was given the right to construct a railway along roads, including Bathurst St. and Davenport Road. The controversy which arose was substantially as follows:—"Roads in which rails had been originally laid were at that time mud roads, or at all events unpaved. Respondent corporation desired that these roads should be dug out and paved with blocks. Appellant company did not contest their liability to keep the portion of the roads between the rails and 18 ins. on each side in repair, but maintained that they were under no obligation to reconstruct this space so as to make it a roadway of improved character such as the corporation designs for the rest of the roadway on each side.

In support of their case the city relied not only on the agreement itself, but on the Ontario Railway and Municipal Board Act, and as a result of an application by the city the Board made an order directing the railway company to put tracks in proper repair, also to dig out and pave the part of the roadway used for railway purposes, the city being ordered to pave the remaining parts and the Board's engineer to supervise the carrying out of this order.

On appeal to the Supreme Court it was declared that the Board had jurisdiction to make the order, and that the word "tracks" included all that part of any roadway occupied by the railway. The portion of the [illegible] over in proper repair on the roadway [illegible] taining it in a state into which it has been put, and quite a different thing to interpret an agreement "to keep clean and in proper repair" as imposing an obligation to lay a new pavement of a kind which did not exist and was not provided for when the agreement originally was entered into, merely because the municipal authorities have themselves thought it right to improve the remainder of the roadway.

It may well be that if the city desires to pave the whole of the travelled road they may do so at their own expense, using the powers conferred by clause 17 to take up street or road for any purposes within the province and the privileges of the municipal corporation, but the restricted language of clause 6 which imposes an obligation on the railway company appears prima facie to confine that obligation to keeping in proper repair what is already there and not to extend it to doing works which would give a portion of the road between and beside the rails a new character.

"For these reasons their Lordships are of the opinion that the Ontario Railway and Municipal Board had no jurisdiction to make the order appealed from and that the Supreme Court of Ontario was wrong in affirming that order. They will therefore advise His Majesty that the appeal should be allowed and the orders in question be discharged. The city must pay the costs of the appeal and of the appeal to the Supreme Court."

February 1915

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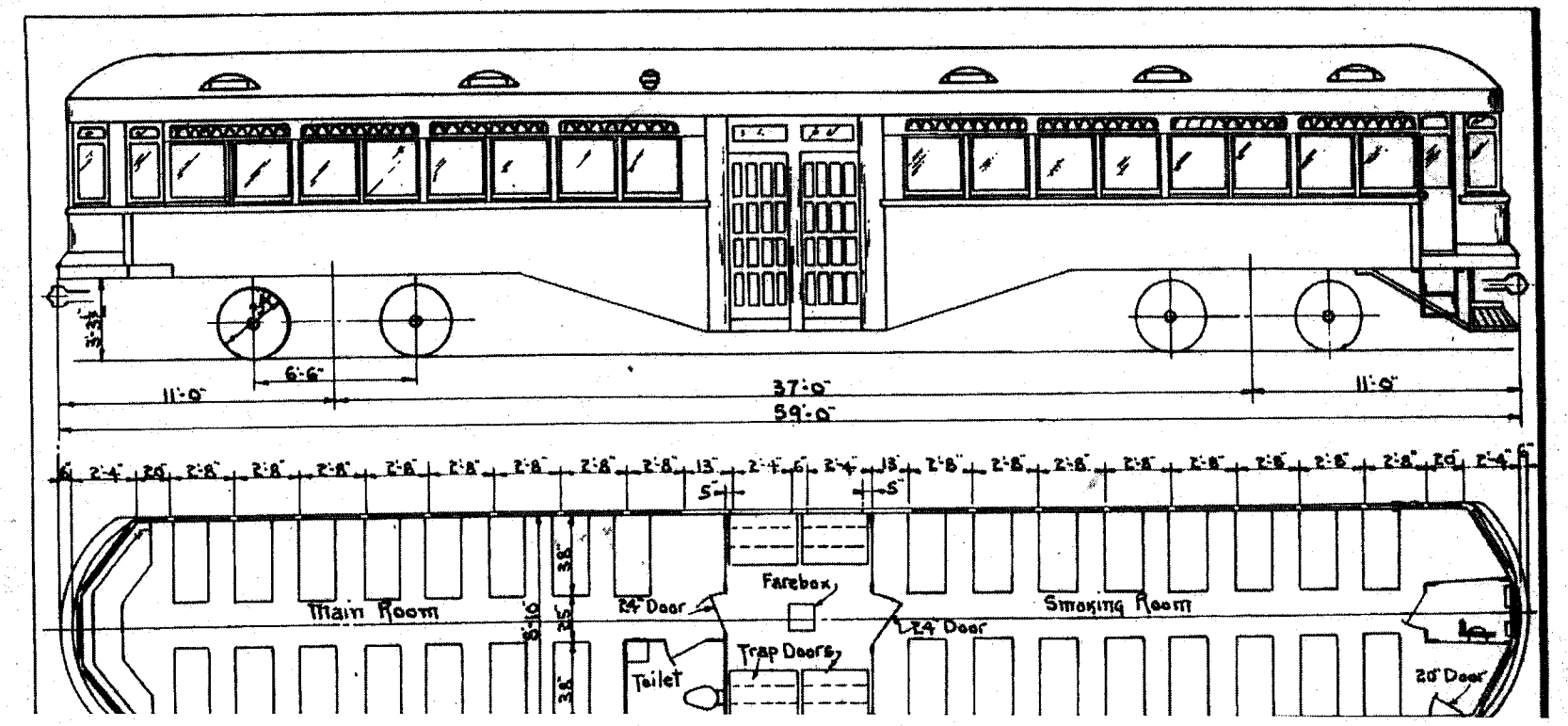
February 1915

# Electric Railway Department

## The Toronto Suburban Railway's Line to Guelph Opened.

The official inspection of the extension of the Toronto Suburban Ry. from Lambton to Guelph, by th eOntario Railway and Municipal Board, took place April 12. A car was run through from Lambton on the previous day and the official party joined it at Guelph. The car left Guelph about 10 a.m., April 12, and arrived at Lambton about 2 p.m The party included A. B. Ingram, Deputy Chairman, and H. W. Middlemist, Chief Engineer, Ontario Railway and Municipal Board. Lt. Col. G. C. Royce, General Manager, H. T. Hazen, M.Can.Soc.C.E., Chief Engineer, E. T. Wilkie and T. Malm of the Toronto Suburban Ry.'s engineering staff. A. F. and paralleling the C.P.R. to Cooksville station, where it crosses Dundas St., and turns northwesterly, proceeding in almost a straight line to Meadowvale, crossing the Credit River and passing under the C.P.R. near Churchville, thence proceeding through Huttonville and Norval to Georgetown. From the latter place the line parallels the G.T.R. to Acton and runs through Eden Mills nearly direct to Guelph. Surveys for the extension were completed to Georgetown, 25.5 miles, in 1911, and through to Guelph and Berlin in the following year. Construction was started in July, 1912, and grading was completed in 1913, but no track was laid tain waiting, baggage and express rooms and dispatching offices, providing railway station facilities.

The Lambton car barn, which was fully described and illustrated in Canadian Railway and Marine World for May, 1916, consists of inspection, repair, machine, paint, and blacksmith shops, boiler room, coal store and men's lavatory, in addition to the administrative offices, the whole occupying a space 184¾ x 128 ft. The repair shop has three tracks and the inspection shop four tracks, each to accommodate two cars. The machine shop is equipped with all the necessary tools for the repair and upkeep of the equip-

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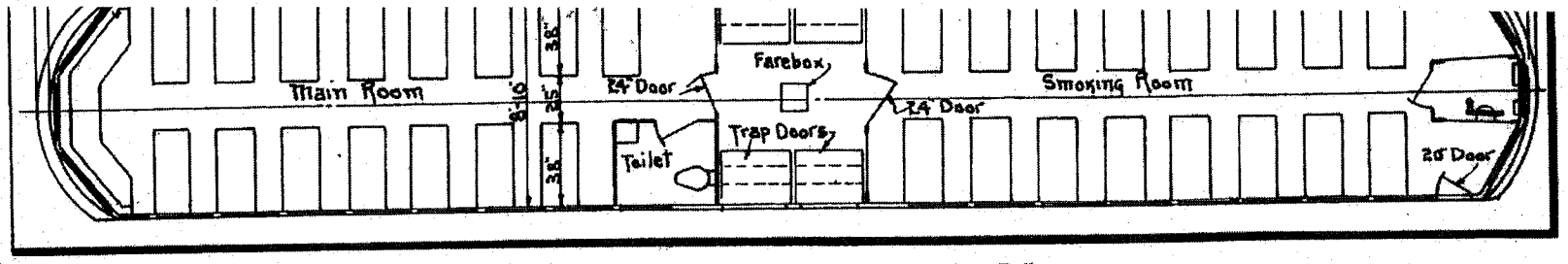


Centre Entrance Interurban Car, Toronto Suburban Railway.

Stewart, M.Can.Soc.C.E., Chief Engineer, Eastern Lines, Canadian Northern Ry., and Ewen Mackenzie, General Contractor for the line.

A temporary service was commenced over the line, April 14, two cars being operated, each making a round trip daily, except Sunday. It is expected that a complete service will be put on during May, but the company has to a certain extent been handicapped owing to a fire which destroyed a number of cars intended for this service, at the Preston Car and Coach Co.'s works, a few weeks ago.

This extension, which is 48.29 miles long, starts from Lambton, the end of the original line, and running through Lambton Park, crosses the Humber River by a trestle and girder bridge, a little south of the C.P.R., and following the Toronto Niagara Power Co.'s right of way for a short distance, it swerves to the south in order to curve under the C.P.R. tracks at the crossing of Mimico Creek. The location is then practically parallel with Dundas St., partly south and partly north through Summerville and Dixie, turning south again a little west of Dixie station, until 1914, when 41.50 miles were laid westerly from Islington, the remaining mileage westerly to Guelph and easterly from Islington to Lambton being laid in 1915. The line is, for the most part laid on private right of way, and is of standard gauge ,single track with turnouts, and the rail used is 60 lb.

The overhead equipment work is of the catenary suspension type, and power is received from the Toronto Niagara Power Co.'s line at 25,000 volts, a.c. 3 phase, 25 cycle and stepped down and passed through 500 k.w. rotary converters which deliver it to the line at 1,500 volts d.c. There are three substations on the line, one each at Islington, Georgetown and Guelph, the last mentioned being at the corner of Dundas and Bay Sts. The Georgetown station has 1,000 k.w. capacity, in two 500 k.w. units, while each of the other two have a single 500 k.w. unit, with provision for the addition of a similar unit in the future. The three stations are brick and concrete construction. The Islington station is provided with living accommodation for the operator and the Georgetown and Guelph stations contain. The boiler house is equipped with a 75 h.p. boiler of the locomotive type and the coal storage is conveniently arranged for handling coal direct from the tracks. The administrative offices are arranged over the store and lavatory, and consist of five offices with a public waiting space. The buildings are heated by a low pressure vacuum steam heating system for about 4,500 sq. ft. of radiation.

The cars, probably the first of this type to be operated on suburban service in Canada, with the possible exception of some on the British Columbia Electric Ry., are of the centre entrance type. The principal dimensions are:

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|---|---|
| Length over buffers | 59 ft. |
| Length over ends | 58 ft. |
| Width over steel sheathing | 8 ft. 10 in. |
| Width overall | 9 ft. |
| Height from top of rail to underside of side sill at bolster | 3 ft. 2½ in. |
| Height from rail to top of first step tread | 1 ft. 4¼ in. |
| Height of step risers | 10½ in. |

The car is divided into two sections, the forward compartment being for smokers and the rear compartment for general use, including lavatory accommodation. They are provided for through ser-

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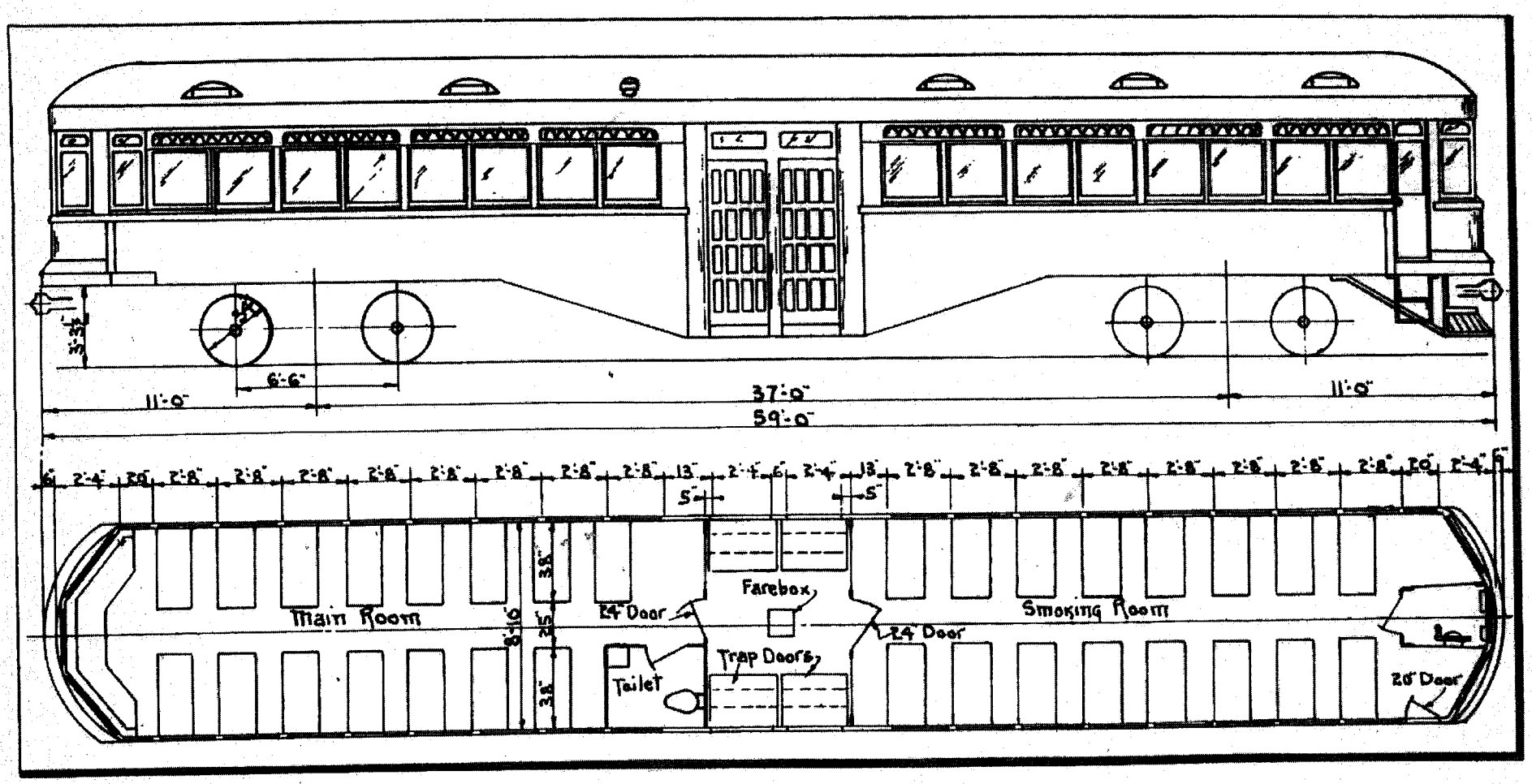


**Centre Entrance Interurban Car, Toronto Suburban Railway.**

[illegible] 1914, when 41.50 miles were laid [illegible] ment. The boiler house is equipped with

vice and are arranged for single end service only. The design of the steel framing presents a striking feature in the omission of continuous centre sills between the buffers. Although this is a novelty in interurban service, it conforms to the most modern practice in the design of side girder steel cars where light weight is imperative and single end operation desired. The interior finish is cherry, with smooth flat surfaces as far as possible; headlining throughout is of three ply poplar veneer, all body sash are of the raising type and single storm sash are to be fitted for the side windows. The centre window in the front vestibule is in two parts, the upper part made to drop with provision for holding it at different heights. The two corner windows in each end are made to drop and are not provided with cross bars. Five automatic ventilators are provided in each compartment and a globe ventilator in the lavatory. Each car is equipped with 31 walk-over seats, and one circular seat in two sections in the rear of the general compartment. The smoking compartment has low backed seats upholstered in green pantasote, and the general compartment has high backed seats with head roll upholstered in green plush. The trucks are 6½ ft. wheel base with 34 in. rolled steel wheels, M.C.B. axle journals 4¼ by 8 in. Ten of these cars were ordered from the Preston Car and Coach Co., two have been delivered and three were destroyed by fire at the car shops a few weeks ago. Two other cars have also been ordered, to be built at the Toronto Ry. shops, of a type similar to those used on the Toronto Suburban Ry. between West Toronto and Weston, for operation between Lambton and Cooksville. The centre entrance type of cars was fully described and illustrated in Canadian Railway and Marine World for March, 1916.

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July 1917

# Electric Railway Department

## The Toronto Suburban Railway's Guelph Extension and Other Lines.

Previous to 1914 the Toronto Suburban Ry. had in operation in the City of Toronto and York Tp. 9.92 miles of single track, comprising three distinct lines and a short branch line. The three principal lines were respectively, from the corner of Keele and Dundas Sts., in West Toronto, along Dundas St. to Lambton Mills, from Keele and Dundas Sts. to Church St., Weston, and from Keele St., along St. Clair Ave. and Daveport Rd. to the subway under the C.P.R. on Bathurst St. The branch line leaves the Dundas St.-Lambton line at Gilmour Ave. and runs south to Evelyn Crescent. In 1912, contracts were let to the Suburban Construction Co. for the extension of the Weston line to Woodbridge, 7.9 miles, and from Lambton Mills to Guelph, 46.3 miles. Ewen Mackenzie was given subcontracts for all work, except buildings and overhead line, on the Weston-Woodbridge extension, and for the grading, bridging, fencing, etc., of about 41 miles of the Lambton-Guelph line, and the tracklaying and ballasting of all of this line, except-

St., where it runs through the G.T.R. subway. Where the line is on private right of way, the sharpest curve, with two exceptions, is 10 degrees, and the steepest grade 2%. The exceptions are at the point where the line leaves the road allowance for a private right of way, where there is a 12 degree curve, and at a sharp bend in the Humber River, at mileage 7.1, where a 15 degree curve had to be used to avoid the necessity of diverting the river. For the first three miles the grade is undulating, following the valley of the Humber River until, after crossing the west branch of the river, it rises 80 ft. in a little over a mile to a summit nea rthe Albion Road. Thence the grade falls for another mile to the Humber River, which it follows to Woodbridge village.

Cuttings were made 20 ft. wide and embankments 14 ft. Culverts, where small openings were required, are of concrete or corrugated galvanized iron pipe. Larger culverts and cattle passes are of cedar box construction.

The overhead line is of trolley construction, 2/0 copper trolley wire, on poles spaced 100 ft. apart, and 8 ft. clear of centre line. The feed wire is of aluminum, equivalent to 4/0 copper wire. There is one substation on this line, at Thistletown, built of brick with stone trimmings and tar and gravel roof.

**The Guelph extension,** generally known as the Lambton-Guelph line, leaves the Dundas St. line at the top of the hill on the east side of the Humber River, where it enters on private right of way and continues thereon throughout. After passing through Lambton Park, the Humber River is crossed at an elevation of 82 ft. above the water level; thence paralleling the C.P.R. for 0.8 mile to near Mimico Creek, the line curves sharply to the left, and reversing, crosses Mimico Creek and runs under the C.P.R. at the latter's bridge over Mimico Creek. The line then rises on a short stretch of 2% grade to and through Islington village, after which it parallels Dundas St. for 4

Toronto Suburban Railway, Lambton yard, showing the switches and Y.

Toronto Suburban Railway, Lambton yard and car barn.

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Lambton-Guelph line, and the tracklaying

Toronto Suburban Railway. Lambton yard, showing the switches and Y.

Toronto Suburban Railway, Lambton yard and car barn.

and ballasting of all of this line, excepting the part lying east of the west bank of the Humber River, 0.6 mile. The grading and bridging of this 0.6 mile were done by the Lewis Construction Co., and the tracklaying and ballasting by the Suburban Construction Co. The grading on the westerly five miles was done by Chas. Cook & Co., and the tracklaying and ballasting, as above stated, by Ewen Mackenzie. At the same time that the work was going on, the Suburban Construction Co. did considerable work on the improvement of the city lines, particularly the Dundas St.-Lambton line.

**The Weston-Woodbridge line**, commencing on Main St., Weston, at its intersection with Church St., runs northerly on Main St. half a mile to beyond the under crossing of the G.T.R.; thence for another half mile the track is on the road allowance, but on the west side next to the fence, so that it does not interfere with the roadway. The balance of the line is on private right of way. The line, where it is on the street or road allowance, has necessarily to conform to the roadway, grades and alignment. The maximum grade of this part is 3% and the sharpest curve is 20 degrees, which is rendered necessary at the turn in Main

cedar box construction. The principal bridges are of steel, on concrete abutments and piers, as follows: Mileage 1.6, Humber River, 1-24 ft., 1-60 ft., 1-90 ft. deck plate girders. Mileage 2.7, West branch of Humber River, 2-45 ft. through plate girders. Mileage 3.1, creek, 24 ft. I beams. There is also one frame trestle on this line. All bridges are designed for Class 2 loading, Department of Railways & Canals specification.

The track is laid with 60 lb. A.S.C.E. rail, rolled by the Algoma Steel Co., with 4 bolt angle bar splices, on ties spaced 17 to 33 ft, rail length. Surfacing was done with material from shoulders and side ditches. The right of way is 66 ft. wide, fenced throughout with no. 7 wire woven fence on posts spaced 25 ft. centres. Gates are of iron frame construction, covered with woven wire. There are two small shelter stations at Thistletown and Albion Road respectively, and one larger frame station at Woodbridge. Passing sidings are provided at the north end of Weston and at Thistletown and Albion Road, in addition to which there is a siding at Woodbridge. There is also a spur about three-quarters of a mile long, leading to a material yard on the C.P.R., a mile north of Weston, which is sometimes

after which it parallels Dundas St. for 4 miles, excepting for a mile at Summerville, where it swings to the north, in order to get an easier grade down to the Etobicoke River valley, and, swinging back, a crossing under Dundas St. is obtained. Leaving Dundas St. at mileage 6, the line then runs for three-quarters of a mile through level fields and then parallels the C.P.R. for about a mile and a half to beyond Cooksville. There it strikes northwesterly on a rising grade and 4½ miles further on passes over a summit 200 ft. higher than Cooksville and thence descends to the valley of the Credit River, which is crossed at Meadowvale, mileage 15.3. The C.P.R. is crossed underneath, at mileage 15.9. The Credit valley is then followed through Churchville and Huttonville villages, at which latter point the line again rises out of the valley until it reaches the meadow land on the higher ground, which it follows, passing Norval village on the top of the hill at mileage 22.4. The west branch of the Credit River is crossed, at mileage 23.4, on a timber trestle, 70 ft. high, west of which there is located the longest tangent on the line, which extends to Georgetown, mileage 26.0. The West Credit River is again crossed at that point, on a

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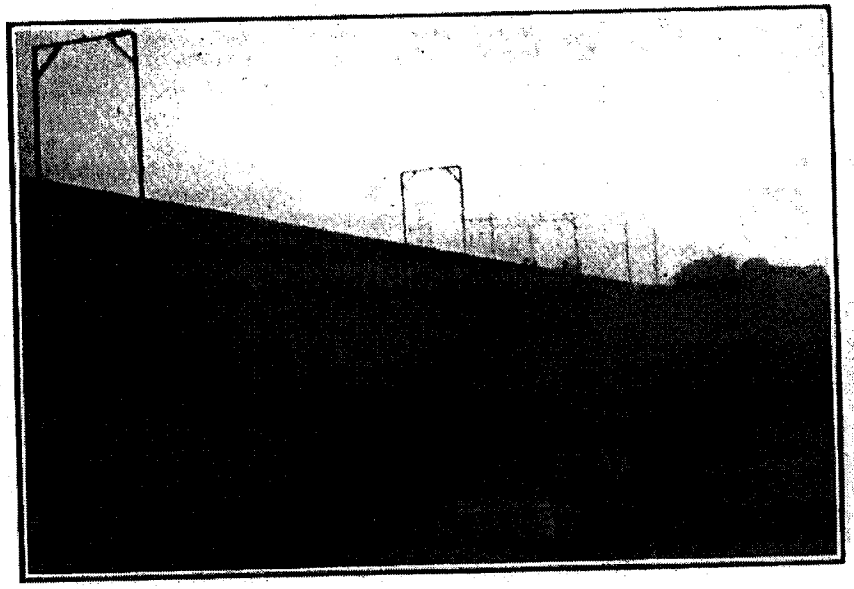
timber trestle, and Water St. is crossed overhead on a steel span. The only level highway crossing in Georgetown is Main St., on which the station is located. West of Georgetown the lines rises along the slopes of the Credit River valley, and at mileage 26.7 crosses under the G.T.R.'s Hamilton and North Western Branch. Thence the line rises almost continuously, passing through the limestone quarries at Limehouse and Dolly Varden to a summit immediately west of the latter point and reaches Acton at mileage 32.7. At that point the line runs through the Beardmore tanneries yards and crosses a G.T.R. spur in the yard at grade. The station is on Main St. West of Acton, the line passes through a somewhat swampy country and reaches its highest summit one mile west, where the track elevation is 755 ft. higher than at Lambton Jct. It then descends into the country tributary to Speed River's Eramosa branch, following Blue Springs Creek to the junction of

standard, there being very much less curvature and it was altogether a more expensive line to build. The principal bridges, which, with the exception of the Humber River bridge, were designed for class 2 loading of the Department of Railways & Canals specifications, are generally of steel and concrete, with a number of frame and pile trestle bridge at the less important streams. The principal bridges are as follows:

Humber River bridge, mileage 0.6. Total length, 711 ft.; maximum height above bed of stream, 86 ft. Commencing at the east end there is 209 ft. of frame trestle on mud sills, with a maximum height of 55 ft. This trestle ends on a high pier, which also supports the end of the first steel span. The balance of the bridge is of deck plate girder construction on steel trestle towers. The spans, commencing at the east end, are: 95 ft. 2 in., 40 ft. 4 in. tower; 95 ft. 4 in., 40 ft. 4 in. tower; 95 ft. 4 in., 40 ft. 4 in. tower; 85½ ft.

footing. They are battered out 1 in 4, giving them a thickness or projection beyond the neat work of 4 ft. 8 in. at the top of footing. The land tower is supported on 4 pedestals of ordinary construction 6 ft. square on top, with side batters of 1 in 6. The river towers each rest on two piers, which are carried full size, 39½ ft. x 6 ft., to above high water, from whence they are carried up an additional 4 ft. in the form of pedestals at each end of the pier. There is a 90 degree cut water on each end of each pier. The west abutment is on the slope of the hill, immediately west of the river, and is of ordinary wing construction. All piers and pedestals are founded on solid rock. The west abutment is on stiff clay foundation, in which no piling was necessary. The steel work of this bridge was designed for class heavy loading of the Department of Railways and Canals specification.

Mimico Creek bridge, mileage 1.8, 80 ft.



Toronto Suburban Railway, Humber River Bridge.

Toronto Suburban Railway, typical trestle construction, west fork of Credit River.

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Toronto Suburban Railway, Humber River Bridge.

Toronto Suburban Railway, typical trestle construction, west fork of Credit River.

spur in the yard at grade. The station is on Main St. West of Acton, the line passes through a somewhat swampy country and reaches its highest summit one mile west, where the track elevation is 755 ft. higher than at Lambton Jct. It then descends into the country tributary to Speed River's Eramosa branch, following Blue Springs Creek to the junction of the latter with the Speed, and then for the most westerly five miles close to the Speed itself. The grade on the last 12 miles is generally slightly undulating, with a total drop of 130 ft. between the summit, west of Acton ,and Guelph. This western part of the line is generally through a limestone country and although there are good farms but a short distance away, the land immediately adjoining the railway is generally barren or covered with scrub brush.

The construction standards of this line are similar to those of the Weston-Woodbridge line, but the location is to a higher

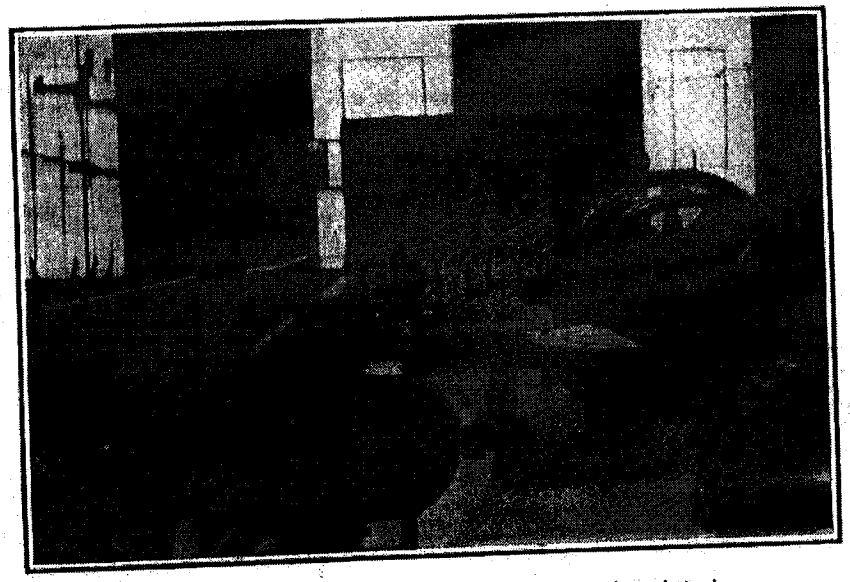
on mud sills, with a maximum height of 55 ft. This trestle ends on a high pier, which also supports the end of the first steel span. The balance of the bridge is of deck plate girder construction on steel trestle towers. The spans, commencing at the east end, are: 95 ft. 2 in., 40 ft. 4 in. tower; 95 ft. 4 in., 40 ft. 4 in. tower; 95 ft. 4 in., 40 ft. 4 in. tower; 85½ ft.

The easterly pier is of somewhat unique construction. It is 55 ft. from the ground to the bridge seat and the bridge seat is 14 ft. x 7½ ft. in plan. End batters are 1 in 24 and side batters 1 in 18. In order to lessen the concrete quantities, an opening 30 ft. high and 5 ft. wide, was left in the pier from front to back, and commencing 7 ft. above the footing. As the slope of the embankment comes against the back of the pier, 35 ft. above the footing, a counterfort was built on each side of this opening. These counterforts are each 3 ft. wide, and commence at the face of the pier, 24 ft. above the

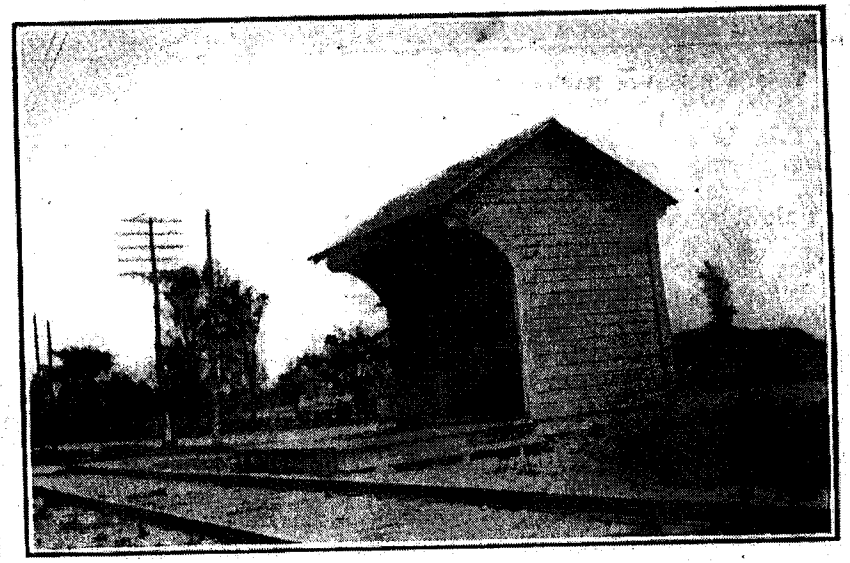
is of ordinary wing construction. All piers and pedestals are founded on solid rock. The west abutment is on stiff clay foundation, in which no piling was necessary. The steel work of this bridge was designed for class heavy loading of the Department of Railways and Canals specification.

Mimico Creek bridge, mileage 1.8, 80 ft.

through plate girder, on concrete piers and abutments, 14 ft. from bed of stream to base of rail. This bridge is in a bad location, owing to the angle at which it crosses the stream, and to the sharp curvature of the track. In order to ease the flow of the stream, the river was widened on the east side, and protected with a sheet pile bulk head for 180 ft. up stream from the bridge. A short bulk head was also built on the down stream side of the east abutment and the banks on both sides were further protected with heavy rip rap. Both abutments are founded on gravel, in which no piling was necessary.



Toronto Suburban Railway, Georgetown substation, interior.



Toronto Suburban Railway, standard shelter.

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Etobicoke River bridge, mileage 5.0. Two 50 ft. through plate girders on 2 concrete abutments and 1 pier. Bed of stream to base of rail 12 ft. Both abutments and pier are on solid rock foundation.

Dundas St. overhead bridge, mileage 5.4. Reinforced concrete construction. Two abutments supporting slab on which the road is carried. Clear span 16 ft., at right angles to centre line of railway. Bridge on 47 degrees skew. Clear height, top of rail to trolley wire, 16 ft.

Dixie Creek, mileage 6.1. Timber trestle on mud sills 165 ft. long. Maximum height 23 ft.

Creek, mileage 10.3. Timber trestle on mud sills 35 ft. long. Maximum height 7 ft.

Creek, mileage 14.2. Timber trestle on crib piers. 90 ft. long. Maximum height, 20 ft.

Credit River, mileage 15. 3. Three spans through plate girders, one 40 ft. and two 80 ft. The 40 ft. span is over an old tail race, and is supported on 2 concrete abutments. The two 80 ft. spans are over the main river and are supported on 2 concrete abutments and 1 pier. Bed of stream to base of rail 12 ft.

C.P.R. crossing, mileage 15.8. The C.P.R. is crossed underneath, and an I beam bridge, on concrete abutments, was built to carry the C.P.R. track. The width

Limehouse Creek, mileage 29.3. Pile trestle 180 ft. long. Height above bed of creek 8 ft.

Mileage 30.8. Frame trestle, 180 ft. long, on mud sills, over Toronto Lime Co.'s at Dolly Varden Mine. Total height, 13 ft.

Creek, mileage 31.3. Pile trestle 60 ft. long. Maximum height, 17 ft.

Creek, mileage 32.8. Frame trestle on piles 75 ft. long. Maximum height 18 ft.

Fairy Lake, mileage 33.3. Pile trestle 180 ft. long. Maximum height, 14 ft.

Blue Springs Creek, mileage 35.4. Pile trestle 75 ft. long. Maximum height 8 ft.

Blue Springs Creek, mileage 40.3. Pile trestle 75 ft. long. Maximum height, 8 ft.

Speed River, mileage 41.3. 80 ft. through plate girder on concrete abutments. Bed of stream to base of rail 10 ft. Abutments are founded on coarse gravel, in which no piling was necessary.

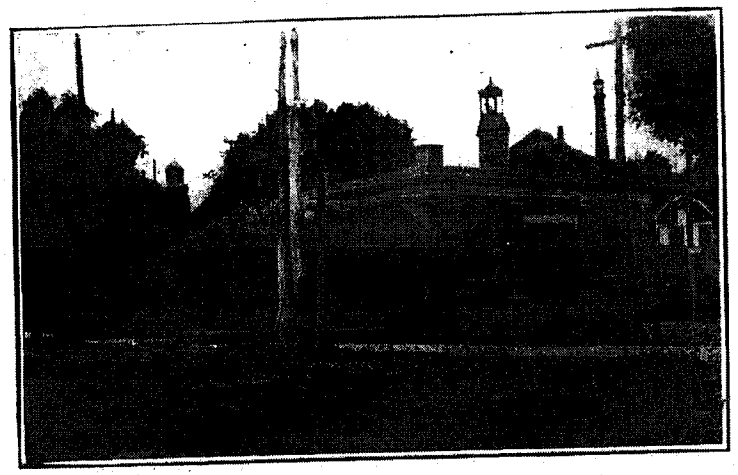
Speed River, mileage 43.4. 80 ft. through plate girder on concrete abutments. Bed of stream to base of rail 10 ft. Abutments founded on coarse gravel and boulders.

The track is laid with 60 lb. A.S.C.E. section rail rolled by the Algoma Steel Co. anl laid on jack pine and hemlock ties, 17 to the rail length. Generally, continuous joints were used, but there are a few miles also of ordinary 4 bolt angle

mosa. At Georgetown a brick station of neat design, with waiting room, office and baggage room, was built adjoining the substation. At Acton there is a 2 story frame station 18 x 24 in plan, with waiting room, office and baggage room downstairs, and living rooms upstairs. At Guelph, pending the construction of a better station, there is a platform adjoining the track, and across the street from this platform, a stone building is being used for station purposes. This building has a large waiting room, an office and an express room downstairs and 4 good sized living rooms upstairs.

There is a large car barn at Lambton, which was fully described and illustrated in Canadian Railway and Marine World for May, 1916, in which there are in addition to the car storage space, inspection, repair, machine, paint, and blacksmith shops, boiler room, coal store, offices and lavatories. It is the intention to put up a 2-car barn at Guelph, construction of which will commence immediately.

There are three sub-stations, at Islington, Georgetown and Guelph respectively. The Islington one is a frame building, covered with galvanized, corrugated iron; the Georgetown one is of brick, attached to the passenger station, and the Guelph one is also of brick. The high tension supply is from the Toronto Power Co., 12,000 volts, 3-phase, 25-cycle, although all the high tension wiring is installed to



Toronto Suburban Railway, Georgetown station and substation.

Toronto Suburban Railway, combination passenger and baggage car at Georgetown.

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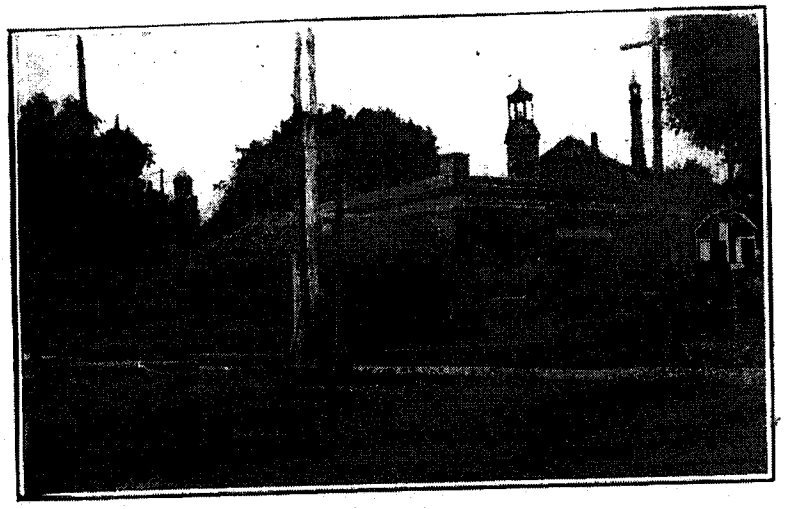

Toronto Suburban Railway, Georgetown station and substation.

Toronto Suburban Railway, combination passenger and baggage car at Georgetown.

C.P.R. is crossed underneath, and an I beam bridge, on concrete abutments, was built to carry the C.P.R. track. The width at right angles to the Toronto Suburban Ry. track is 16 ft. in the clear, and the clear height 15 ft.

West Credit river, mileage 23.3. Timber trestle, partly on mud sills, and where in the stream on crib work piers; 315 ft. long, with a maximum height of 64 ft.

West Credit River, mileage 25.8. 410 ft. timber trestle on piles. Maximum height above bed of stream 32 ft. This trestle is extended on the west, with a 3 span I beam bridge on 2 abutments and 2 pairs of pedestals, to carry the railway over Water St., Georgetown. This bridge consists of 2-16 and 1-24 ft. spans, giving a clearance above the roadway of 14½ ft.

G.T.R., mileage 26.7. The G.T.R. Hamilton & Northwestern branch is crossed underneath and a bridge of I beams, on concrete piers, with a clear span at right angles to the Toronto Suburban Ry. of 16 ft., was built to carry the G.T.R. track. Clearance from rail to trolley wire under the bridge 16 ft.

West fork of west branch of Credit River, mileage 28.1. Timber trestle 270 ft. long, on mud sills, and where in the river on timber cribs. Maximum height, 45 ft.

ties, 17 to the rail length. Generally, continuous joints were used, but there are a few miles also of ordinary 4 bolt angle bars. There is throughout 6 in. of good gravel ballast. Main line switches are laid with no. 7 frogs, with the exception of Lambton and Guelph Y tracks, in which no. 5 frogs were used. Yard switches and tails of Y have no. 5 frogs.

At Lambton there is a yard in connection with the car barn, and at the same point there is room for considerable additional trackage. Passing sidings are provided at Eaton farm, Summerville, Dixie, Cooksville, Huronbrow St., Streetsville, Meadowvale, Churchville, Huttonville, Norval, Georgetown, Dolly Varden, Acton, Blue Springs, Eden Mills and Eramosa. There are Y's at Lambton, Cooksville, Georgetown and Guelph. The Y's are all laid with curves of 100 ft. radius, with the exception of the east leg of the Georgetown Y, which is 130 ft. radius. Guard rails are used on all of these sharp curves. There is a yard at Guelph, with room to handle a considerable amount of freight.

Shelter stations have been built at Islington, Eaton Farm, Summerville, Cooksville, Huronview St., Streetsville, Meadowvale, Churchville, Norval, Limehouse and Eden Mills, and platforms at Lambton, Dolly Varden, Blue Springs, and Era-

one is also of brick. The high tension supply is from the Toronto Power Co., 12,000 volts, 3-phase, 25-cycle, although all the high tension wiring is installed to meet 35,000 volt standards, as the voltage of the supply will later on be raised to 25,000 volts. The Islington and Guelph substations each have one 500 kw. rotary installed, and the Georgetown substation has two of these rotaries. Each rotary converter receives its energy supply from 3 H.P. 25-165 kva.-12,500/25,000 volts to 965 volt oil-cooled, single-phase transformers. These transformers have four 2½% reduced capacity taps in the primary, and 50% starting taps in the secondary. The rotary converters are rated T.C.C. 4-500 k.w.-750 r.p.m.-1,500 volt, compound-wound commutating pole. The converters receive 3-phase energy, at 965 volts, from the transformers, and deliver 1,500 volt direct current to the trolley. The converters are equipped with brush raising mechanism for starting. Each substation is protected against lightning by an aluminum cell lightning arrester, and is provided with the standard arrangement of choke coils, disconnecting switches and oil switches on the high tension side. The switchboard panels are of natural black slate, the instruments having a dull black finish. The K-21-25,000 volt automatic oil switches are provided

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with series relays. The rotary starting panels are located near the rotary converters, and are separate from the main switchboard. In addition to the main lightning arresters, aluminum surge protectors are installed directly across the armatures of each of the rotaries. The operation of the substations is proving very satisfactory, the design of the rotary converters permitting very heavy momentary overloads without injurious sparking. The complete electrical equipment was built by Canadian General Electric Co., at its Peterborough works.

The contact system.—In general the side bracket type of catenary construction is employed; 25,000 volt high tension transmission is carried on the same poles; also the feed wire, the telephone and signalling system. The standard pole spacing on tangents is 150 ft. More than 30% of the main line mileage is curved track, and on account of this the pole spacing varies according to the curvature. The standard pole length for construction is 35 ft.; for transmission and catenary 40 ft. Local conditions, such as crossing of railways, telephone and telegraph and public highway, increase these lengths.

The details of the material used in supporting the contact system are along standard lines, some modifications having been made to meet local conditions. All pole line hardware is either galvanized or sherardized. The messenger cable consists of 7/16 in. high standard steel strand, 90,000 lb. per sq. in., supporting a 4/0 standard grooved trolley wire. Five-point catenary construction is used with 23 in. deflection. A 4/0 feed wire is run all along the line and tapped into the trolley every half mile. The contact system is anchored every half mile, on tangents, and against a curve at both ends. The line is sectionalized at all substations, and where the voltage changes from 1,500 to 600 volt. The high tension transmission consists of 3-phase, 25 cycle, 115,000 C/M copper cable and is supported on a buerrow bracket construction. All along the line is a 5/16 in. ground wire, protecting the line from lightning and grounded every half mile. Three types of bonds have been used, one brass welded, one gas welded and one electric welded bond. The track is cross bonded with a 4/0 copper cable every half mile; also cross bonded on the intersections and switches. The entire electrical installation was designed and constructed by the company's own engineering staff.

This line between Lambton and Guelph was opened for operation on April 14 of this year. The passenger cars were described in Canadian Railway & Marine World in March, 1916, and May, 1917.

The present daily passenger service consists of 2 cars each way between Toronto and Guelph, 1 additional car between Toronto and Georgetown, and 5 additional cars each way between Toronto

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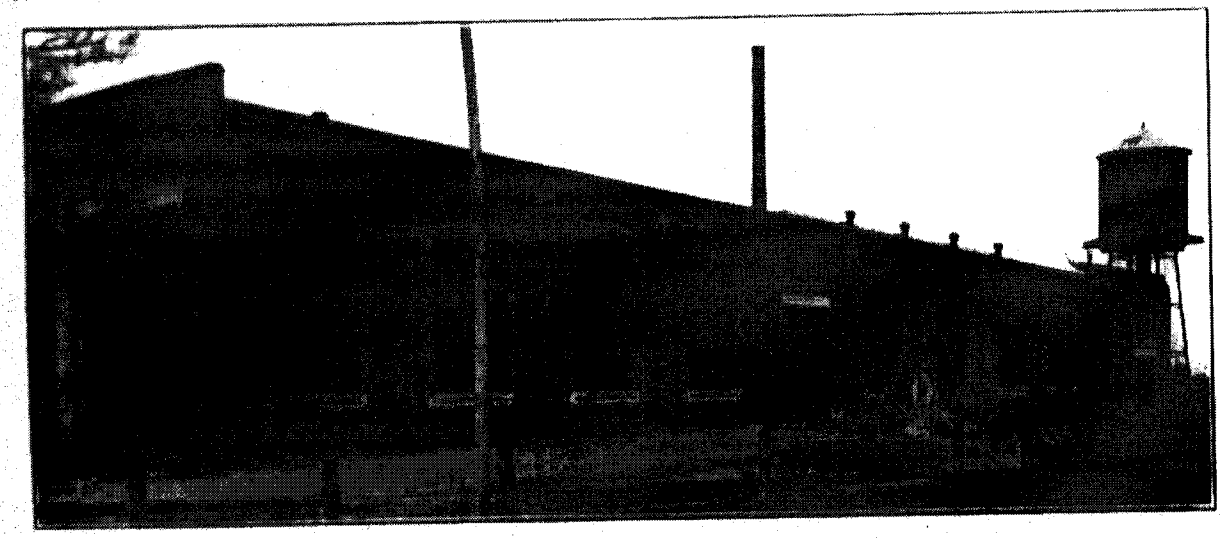
# Toronto Suburban Railway's Car Barn Etc. at Lambton.

The Toronto Suburban Ry., in anticipation of the completion of its extension to Guelph, Ont., has built a car barn on the property between Dundas St. and the C.P.R. Toronto-Windsor line, at the top of the hill east of the Humber River and at the junction of the new Lambton-Guelph line with the old West Toronto-Lambton line. The buildings are as follows:—

| | |
|---|---|
| Inspection shop | 63 ft. 3 in. x 151 ft. 0 in. |
| Repair shop | 61 ft. 1 in. x 83 ft. 7½ in. |
| Machine shop | 40 ft. 10 in. x 66 ft. 7½ in. |
| Paint shop | 19 ft. 6 in. x 66 ft. 7½ in. |
| Blacksmith shop | 28 ft. 0 in. x 30 ft. 0 in. |
| Boiler room | 30 ft. 0 in. x 83 ft. 0 in. |
| Coal store | 30 ft. 0 in. x 29 ft. 1 in. |
| Men's lavatory | 30 ft. 1 in. x 11 ft. 0 in. |

floor is of concrete, 4 in. thick; 1, 2 and 4 mixture, with 1 in. fine finish and 3 in. mesh. Six gauge expanded metal, resting on 7 in. I's at 15 lb. at 8½ centres. These 7 in. I beams rest on and are bolted with angles to the 10 in. I beams and at external walls, and anchored to foundation wall at piers with ¾ in. diameter w.i. hook bolts, 4⅜ x 6 x 6 in. w.i. plate to outside. The whole of the space under the repair shop is excavated for a depth of about 4 ft. and has a 4 in. concrete floor on 4 in. of gravel, laid with fall to sub pit of ½ in. to the foot. Below the tracks, on this floor, rails 2½ ft. gauge are laid on solid concrete beds. On these



**Lambton Car Barn, etc., Toronto Suburban Ry., South Elevation.**
The track shown in the foreground is the main line, which joins the old line on Dundas St., immediately to the right of the view.

The administrative offices are on the

a hand truck can be operated, on which

set at any desired height. Twelve standard skylights 8 x 17 ft. are framed in roof.

**The machine shop** is to be equipped with: 100 ton capacity wheel press; two in one lathe for axle, wheel and small work; spindle lathe; combination radial drill; air trip hammer; wheel grinder; shaper; slotting machine; babbitting furnace; soldering iron furnace; forge; air compressor; 2 pit jacks; 2 cranes; travelling crane; benches, vises, machinist's and blacksmith's tools; full set wood working tools and machines. Two skylights, 8 x 68 ft., run longitudinally in centre of each span and provide excellent lighting to every portion of the shop.

In the paint shop, in addition to the windows, a skylight, 8 x 68 ft., is placed over tracks giving sufficient light for every purpose. The blacksmith shop also contains a standard ventilated skylight 8 x 11 ft. The men's lavatory is provided with 6 water closets, wash basin and urinal troughs and 6 lockers. There is a large ventilated top light.

The boiler room contains a 75 h.p. locomotive type boiler. There is a skylight 8 x 11 ft. The coal storage is very conveniently located, and is so arranged that the coal will be brought direct in cars over the company's own tracks and shovelled through a high doorway level with the coal car, thus necessitating a minimum of handling. The coal space is well placed in relation to boiler. The chimney rests on a solid concrete foundation and the brick work, 7 ft. square, is carried 15 ft. above grade. The steel stack, 36 in. diameter, is 65 ft. above

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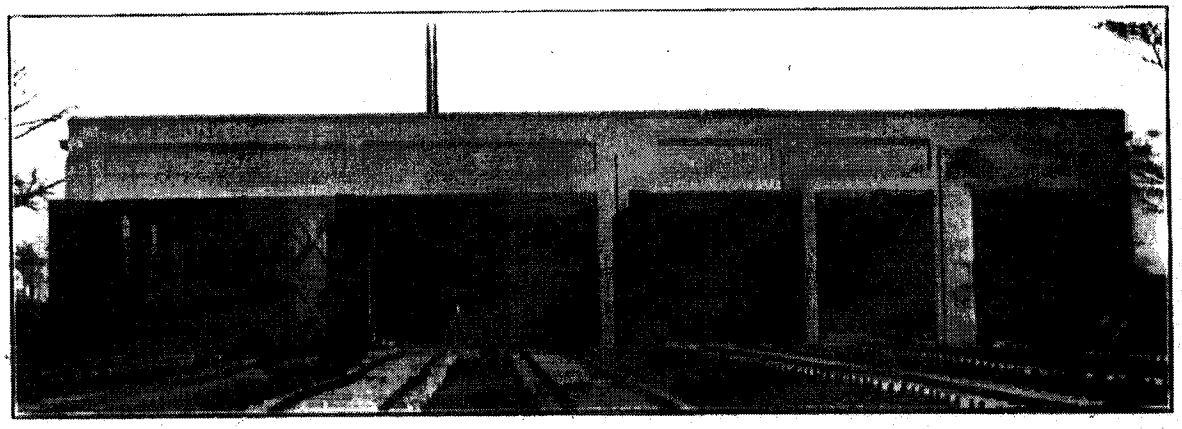
**Lambton Car Barn, etc., Toronto Suburban Ry., South Elevation.**
The track shown in the foreground is the main line, which joins the old line on Dundas St., immediately to the right of the view.

The administrative offices are on the first floor over the store and lavatory. The walls throughout are of good hard burned brick with massive buttresses to the outside. Toronto pressed brick is used for facing. The different shops, etc., are separated by brick walls, with substantial pilasters, and intercommunicating large sliding doors are provided between each. Excellent lighting is provided by large windows 8½ ft. wide and averaging about 13 ft. in height, and by ample roof lights to every portion. The roof is of mill construction, covered with asbestos and tarred and gravelled. One row of posts runs longitudinally down the centre of the inspection shop spaced at 17 ft. centres, and two rows similarly in the repair shop; one of these continuing through the machine shop. These rest on tapered concrete pedestals. The posts are 12 x 12 in., 22 ft. long, and have 6 x 8 in. braces with 10 x 12 in. corbel heads, the latter bolted to posts with ¾ x 24 in. drift bolts. These take the main 12 x 12 in. roof beams, the ends of which at brick walls are spiked to 3 x 8 in. wood plates bolted down to walls. Into these main beams are framed, with duplex hangers, the 6 x 8 in. transverse beams which carry the 2 x 8 in. dressed roof planking. Large skylights are framed in roof. The floors generally are of concrete, except in the inspection shop, which has a 4 in. cinder floor on sand. The administrative offices have wood floors. The average height of the shops is about 21 ft.

**The repair shop** has three tracks; 4¼ in. x 60 lb. rails A.S.C.E. section are used, supported on 10 in. I's at 25 lb. resting on 4½ in. steam pipe columns, set on concrete bases 24 x 24 x 9 in. These columns have companion flange cap and base. The 10 in. I's are secured to the companion cap flanges by four ¾ in. bolts and the column bases are anchored to the concrete bases with two ½ in. pins 4 in. long. The a hand truck can be operated, on which a hydraulic jack will be mounted for dropping car parts. With the open construction employed this jack can be moved from point to point as required. The sub pit provided is 58 ft. long, 11 in. wide and 10¾ in. deep at highest point, laid with falls to 4 in. diameter in centre of pit, and carries away surface water, oil, waste, etc. Concrete steps lead from tracks at both ends down to the lower floor. Six standard ventilated skylights, two 8 x 17 ft. and four 10 x 17 ft., glazed with wired rolled plate glass, set on 4 in. solid wood curbs, are placed in roof.

**The inspection shop** contains 4 tracks, each of which will accommodate 2 cars. The rails rest on tapered concrete piers placed 4 ft. centres. The floor is hollowed out around these piers below the general floor level, thus permitting the workmen to make minor repairs. To further facilitate in the light repair work, cleaning and painting of the cars, movable iron brackets can be attached to the structural wood posts, on which plank scaffolding can be placed. The posts are bored at intervals to receive the ends of these brackets, so that the scaffolding can be well placed in relation to boiler. The chimney rests on a solid concrete foundation and the brick work, 7 ft. square, is carried 15 ft. above grade. The steel stack, 36 in. diameter, is 65 ft. above grade.

At the southeast corner of the building entrance is provided to the administrative offices on the first floor. They are placed over the store and lavatory and consist of five offices; public waiting space, separated from the larger office by counter, with office lavatory and private lavatory. The rooms are 9 ft. high and are finished with ⅞ in. birch floors and the walls and partitions are plastered.



**Lambton Car Barn, etc., Toronto Suburban Ry., Front or West Elevation.**

A low pressure vacuum steam heating system has been installed. By means of a pressure reducing valve sufficient live steam is admitted automatically to effectively heat the buildings. The radiation amounts to 4,500 sq. ft., with the mains and returns included as radiation, and the following temperatures are provided for: Offices, 75° Fahr.; store, 60°; blacksmith shop, 50°; paint shop, 65°; machine shop, 60°; repair shop, 50°; inspection shop, 50°. These temperatures are guaranteed at 5° below zero, at 2 lbs. pressure, and at 15° below zero at 5 lbs. pressure.

A wood tank of 10,000 gall. capacity is placed outside the southeast corner of the

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The freight shed, which will be built immediately east of the freight office block, will be 40 x 800 ft., supported on pile foundations. The roof will be supported on steel columns and will be constructed of steel trusses carrying wood purlins and covered with 2 in. plank, finished with tar and gravel roofing. The floors will be of heavy timber construction, finished with 2 in. rough and ⅞ in. finished flooring. The walls to level of door heads will be constructed of studding with ⅞ in. sheeting outside and inside. The outside surface will be finished with galvanized corrugated iron. Along the entire length of the building above door heads will be a continuous glazed transom light. On the track side of shed doors will be continuous, and on teaming side doors will occur only in alternate 16 ft. bays. The shed will be divided into four compartments by the introduction of three 13 in. fireproof walls at equal intervals along the length of shed; provision will also be made at extreme east end of shed for cold storage, and at the west end (that is the end nearest the freight office block) rooms will be provided for the shed foreman, porters and for staff lavatory. About midway up the shed will be located the customs office. Electric light will be used in both freight offices and shed.

Along the track side of shed will be run three lines of tracks and beyond the farthest out of these will be a distributing platform 13 ft. wide, which will be continued along the entire length of the shed.

The buildings have been designed by the company's architects, Pratt & Ross, of Winnipeg and Vancouver, and the cost, exclusive of tracks and teamways, will probably run to about $150,000.

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## Railway Finance, Meetings, Etc.