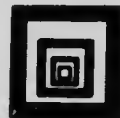


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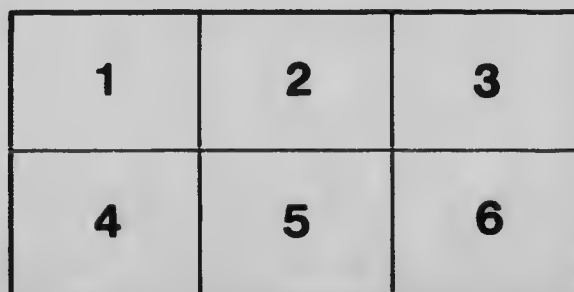
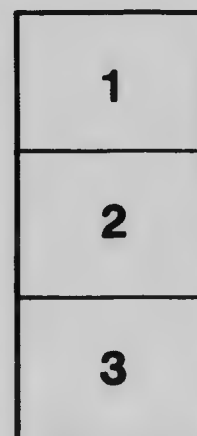
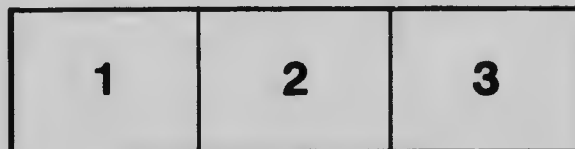
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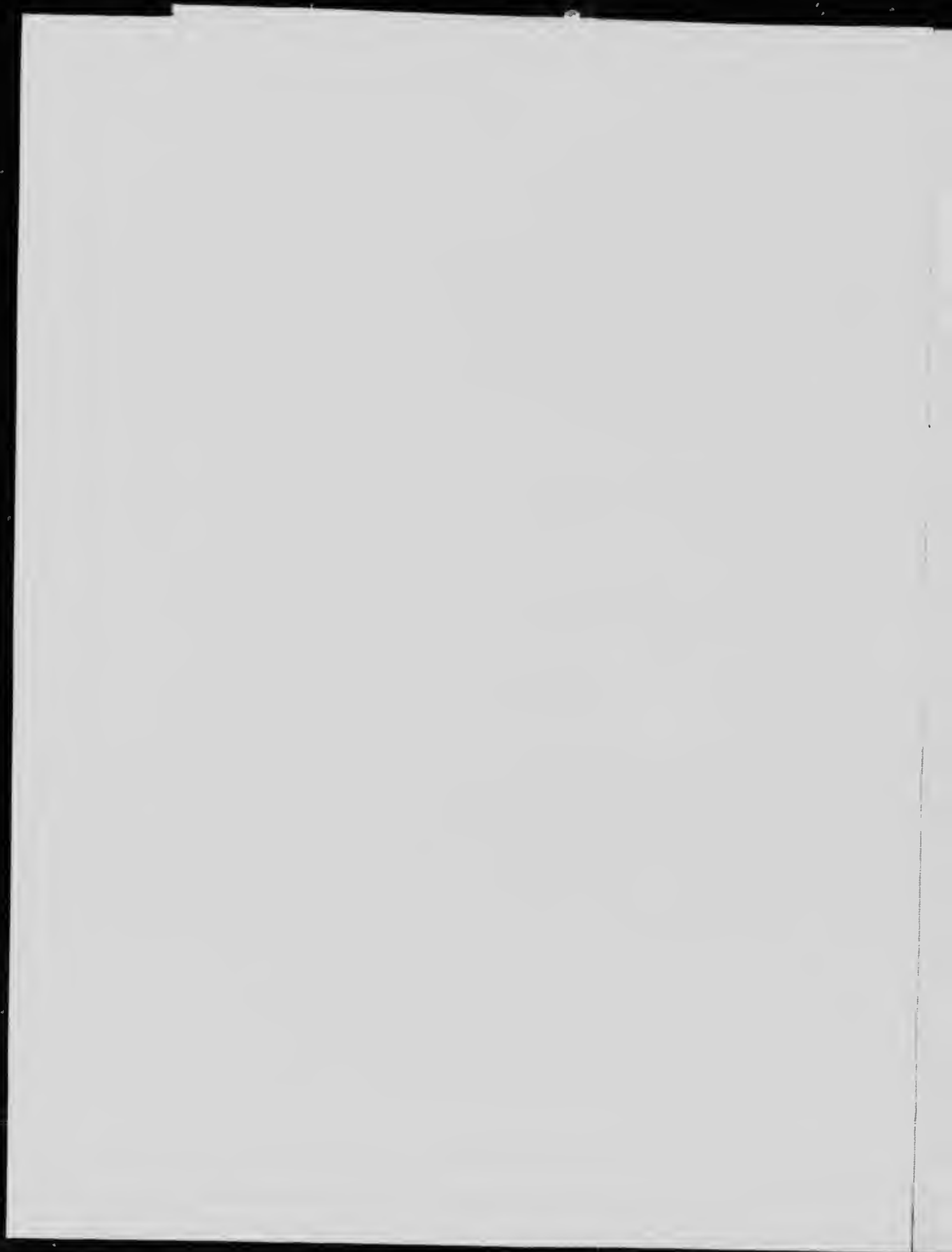
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REPORT 4487.

TO THE
CIVIC TRANSPORTATION COMMITTEE

ON

RADIAL RAILWAY ENTRANCES AND RAPID TRANSIT

FOR THE

CITY OF TORONTO

R. C. HARRIS,
Commissioner of Works.

F. A. GABY,
Chief Engineer, Hydro-Electro Power Commission of Ontario.

E. L. COUSINS,
Chief Engineer, Toronto Harbor Commission.

1915

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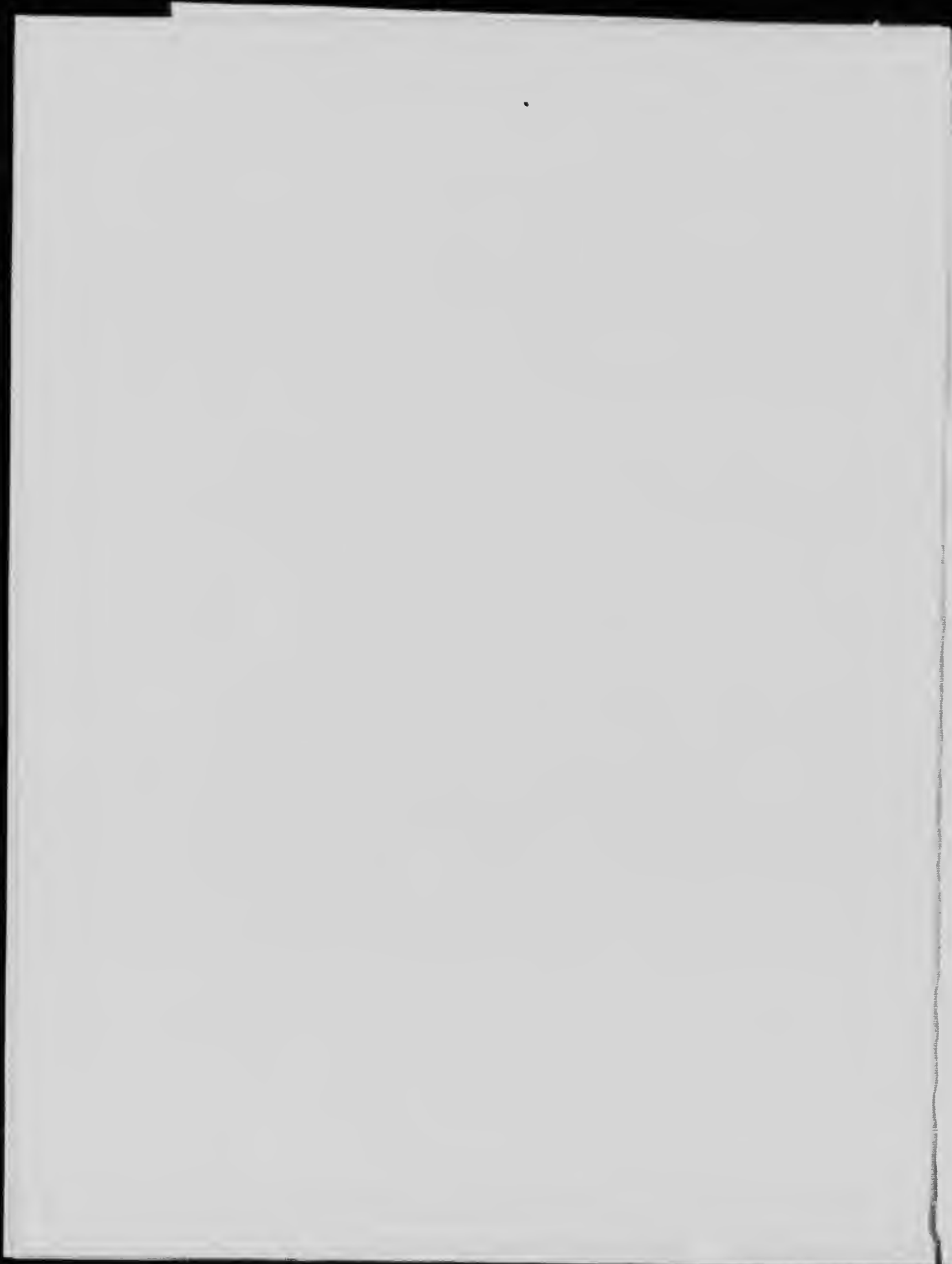
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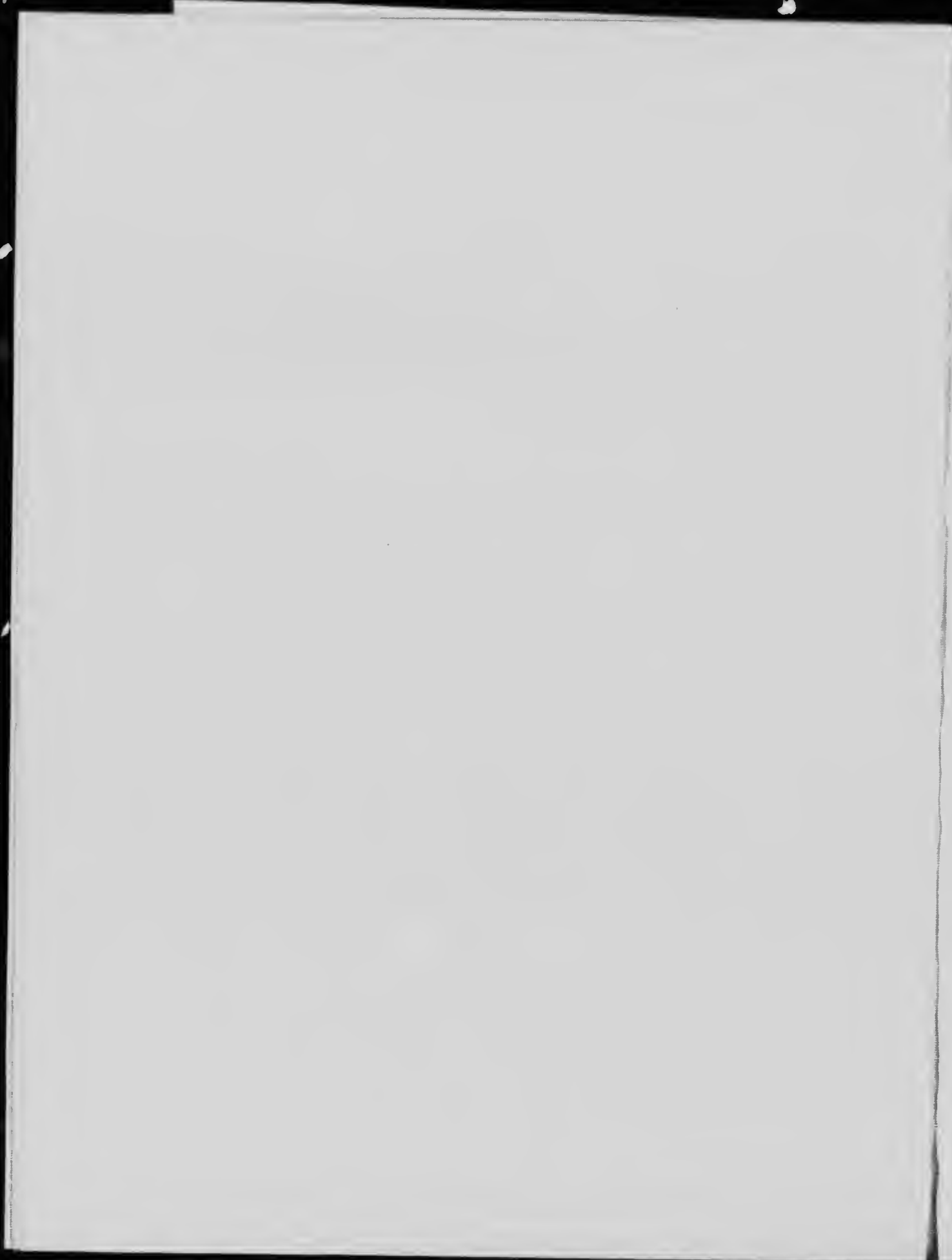


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LETTER OF TRANSMITTAL

T. L. CHURCH, Esq., K.C., Mayor, Chairman,
and Members of Special Committee
re Radial Entrance and Rapid Transit System,
Toronto.

Gentlemen:—

In submitting his inaugural message to Council on January 11th, 1915, His Worship the Mayor, suggested that Radial Railway Entrance and Rapid Transit should receive immediate attention, and that a Special Committee be appointed to deal therewith.

Following is an extract from Report No. 3 of the Board of Control, adopted in Council, February 1st, 1915.

RAPID TRANSIT SYSTEM

"The Board, reporting upon the suggestion offered by His Worship the Mayor, in his Inaugural Address relative to a rapid transit system with radial entrances for Toronto and the Province, recommend that a special committee be appointed, composed of Controllers O'Neill and Spence, Aldermen McBride, Cameron, Dunn, Maguire, Yeomans, Wickett, Gibbons and Ryding, to consider and report upon radial entrances and rapid transit system, and in connection therewith, to consult with representatives to be named by the Hydro Electric Commission of Ontario, and the Toronto Harbor Commission, in order that no time may be lost in preparing application for special legislation, if any should be required."

The City Council adopted Report No. 4 of the Board of Control on February 22nd, 1915, wherein was embodied a report from the Special Committee, as follows:—

REPORT NO. 1 OF SPECIAL COMMITTEE RE RAPID TRANSIT SYSTEM AND RADIAL ENTRANCES

"Your Committee, appointed to consider and report upon radial entrances and a rapid transit system for the City, and in connection therewith to consult with representatives to be named by the Hydro

Electric Commission of Ontario, and the Toronto Harbor Commission, considered the suggestions offered by His Worship, the Mayor, in his Inaugural Address in relation to this matter, at a meeting held on the 4th inst. at which the following were present, viz.:—His Worship, the Mayor, Controllers O'Neill and Spence, and Aldermen Dunn, Jaguire, McBride, Ryding, Cameron, Gibbons, Yeomans and Wickett, also Sir Adam Beck, representing the Hydro Electric Commission of Ontario, and Messrs. L. H. Clarke, John Laxton, and R. S. Gourlay, representing the Board of Harbor Commissioners, when it was decided to report as follows:—

"Your Committee are in hearty accord with the programme of suggestions offered for a proper rapid transit system, with radial entrances, and beg to recommend that a comprehensive plan for same be prepared forthwith by the Commissioner of Works, Mr. E. L. Cousins, Chief Engineer of the Toronto Harbor Commission, and Mr. F. A. Gaby, Chief Engineer of the Hydro Electric Commission of Ontario, and that the legal representatives of the City, the Hydro Electric Commission and the Harbor Board, be appointed to consult and advise what legislation is necessary to give effect to the plan."

"Your Committee considered the programme of the Hydro Electric Commission of Ontario, as outlined by its Chairman, Sir Adam Beck, and are heartily in accordance with the same, and recommend that a memorial be presented to the Ontario Government by the City Council, advising of the preparation of the plan proposed by the City, and urging that no further extensions of franchises to existing companies, or new franchises, be granted pending the completion of the report as aforesaid."

"It is intended that when a definite plan has been prepared, the same will be submitted to this Committee and the Council for approval, with a view to having the ratepayers vote on the necessary debenture By-law at the annual elections on January 1st next."

On February 26th we held an organization meeting, and having secured the consent of Mr. E. L. Cousins, Chief Engineer of the Toronto Harbor Commission, subject to the assent of his principals, to act as Engineer-in-Charge, we requested the Harbor Commission to release Mr. Cousins to this work for the period necessary. On February 27th, the Harbor Commissioners consented to permit Mr. Cousins to supervise this work in addition to his other duties.

We outlined the general scheme of investigation, numerous meetings having since been held and the work prosecuted unceasingly.

We beg to herewith transmit for your consideration and approval, a general resumé of the considerations involved in the study of the problems with which we were charged, our conclusions thereon, and recommendations relative thereto.

We have endeavored to condense to ultimate degree, the tremendous mass of detailed information which it was necessary to glean and assemble, in order to give adequate consideration to the study, and from this presentation, have eliminated the numerous alternatives and accompanying data, considered in arriving at our reported conclusions, in order that this report may be confined to reasonable dimensions.

A vast quantity of extremely useful data has been compiled, which, in our opinion, should be preserved and augmented by the various municipal departments. The entire problem has been attacked from a viewpoint leading to a practical solution, having regard always for the possibility of attainment.

We desire to record our appreciation of the co-operation of the heads of the various civic departments of Toronto and adjoining municipalities, and of the services of the following members of the staff engaged in the preparation of the material required for this report, viz.:—Messrs. P. H. Lazenby, Principal Assistant Engineer, A. E. K. Bunnell, G. W. Wright, N. D. Wilson and A. J. Salisbury, Assistant Engineers, and H. S. Bedell, Chief Draughtsman.

All of which is respectfully submitted.

R. C. HARRIS,
Commissioner of Works.

F. A. GABY,
Chief Engineer, Hydro-Electric Power
Commission of Ontario.

E. L. COUSINS,
Chief Engineer,
Toronto Harbor Commission.

GENERAL CONDITIONS UNDERLYING STUDY

The future growth and development of the City of Toronto, will be largely dependent upon the provision of adequate transportation facilities, properly located.

The extension of these facilities should, and usually does, precede the population, but in Toronto of late years, the conditions have been reversed. Any policy which results in such reversal, will fail to develop the resources of the city to the full extent.

The growth of Toronto beyond the limits of the areas served by car lines has been remarkable.

There are at present approximately 85,200 people residing without the City limits of 1891, and 31,400 of an interurban population, outside, but adjacent to, the present city limits, totalling 116,600 people, the equivalent of almost one-quarter of the entire population of the city.

Future expansion may be directed, and largely controlled, by the establishment of a broad, definite transportation policy, providing for the control of all electric railway lines, radial and local, operating within the City limits.

EXISTING CONDITIONS

The present situation in the City of Toronto is briefly as follows:—

The Toronto Railway Company hold the franchise, expiring in 1921, for exclusive surface railway rights, (subject to certain exceptions) on the streets of the City as of 1891.

The Railway Company many years since, objected that under their charter, they were not required to extend their lines beyond the City limits of 1891, and were upheld by decision of the Imperial Privy Council. During the period intervening between that and the present, the city continued to increase in population and area, until now as hereinbefore stated, there are approximately 85,200 people living without the limits of 1891, and within the

limits of 1914. In addition, there are some 31,400 persons residing adjacent to, but outside the city limits, and within the limits of approximately an eight mile radius from the corner of King and Yonge Streets.

The municipality in 1911, and succeeding years, constructed civic car lines in outlying districts, along Gerrard Street, Danforth Avenue, St. Clair Avenue and Bloor Street, west from Dundas Street.

At present there are 18.28 miles of single track civic line in operation, with a graduated fare, the maximum being two cents. The revenue derived pays operating expenses.

There are still districts without the limits of 1891 lacking adequate means of transportation. This condition can only be relieved by the construction of additional civic lines, always keeping in mind, the necessity for ultimate unification of the lines so built, with the present street railway system upon its acquisition by the City in 1921. This is the only economical and reasonable form of quick relief to be given these districts.

RADIAL RAILWAY ENTRANCE

We have carefully studied the question of radial railway entrance, assuming the following bases:—

- (1) The acquisition by the City of Toronto, of the Toronto Street Railway on the termination of the franchise in 1921.
- (2) The construction of the Waterfront Viaduct by the Grand Trunk and Canadian Pacific Railways.

The main principle, governing our studies, has been the creation of a comprehensive plan for entrance and terminal facilities for all radial railways, of the present and future, and to provide those facilities, on such a scale as to embrace probable requirements for the next twenty-five years, i.e., to provide forthwith, lands for ultimate requirements as to terminals and rights-of-way of the various main trunk lines, but developing and constructing on the "unit principle" as conditions necessitate and finance permits.

In investigation of possible radial entrances, we have surveyed and contoured in detail approximately one hundred and fifty miles of line, radiating from the centre of the City, in a northerly, westerly and northwesterly, easterly and northeasterly direction. These activities have not been confined to the area lying within the City limits.

While on the presentation plans we indicate areas to be served by these trunk radial railway lines, we desire to emphasize, that while detailed alternative locations have been made in every case, we have refrained from indicating exact locations, in order to prevent real estate exploitation at the expense of the citizens generally, and this project in particular. Fortunately, we were able, both on the east and west, from the waterfront north, to locate several lines, all of which would afford satisfactory alignment and gradients.

While in the estimates, liberal allowance has been made for the cost of right-of-way, we are of opinion, that if prudently handled, especially in the outlying districts, such right-of-way may be secured at little expense, by reason of the fact, that large real estate owners will, in all probability, dedicate same, because the benefit accruing to their properties from modern transportation facilities, will handsomely repay them for any land so contributed.

If real estate owners hold their lands at prohibitive prices, then, under the scheme presented, it will be easy to adopt other locations, which will equally well serve the requirements.

This phase of the problem involved detailed study of the following, viz.:—

- (a) Present and future radial railway situation and probable volume of business.
- (b) The physical location of the trunk line entrances within the city limits, adequate for present and future requirements.
- (c) The location, size and character of terminal, having always in mind the fact that it should be located, if possible, on the axis of maximum movement.
- (d) Provision for future expansion both as to trackage for trunk line entrances and terminal facilities.
- (e) Provision for the proper interchange of traffic with steam railroad lines.
- (f) The co-ordination of rail and water transportation.
- (g) The possibility of locating the trunk line entrances, so as to permit of their use, for serving suburban districts adjacent to the City.
- (h) The economics of the whole question.

RAPID TRANSIT SYSTEM

The object of the study has been, in the main, to secure by survey and research, all useful data pertaining to the economic and physical conditions of the problem.

We have attempted, by a combination of practical and theoretical analysis, to estimate the probable future growth, distribution, and density of population, for the City and surrounding territory, i.e., as applied to residence, light and heavy industries, wholesale, warehouse and general business.

To obtain these results, we have made a comparative study of the past growth of the City, and contrasted such, with like data from other cities of similar size, and some that now have several times our present population.

It is well known, that, generally speaking, the growth of most cities, having relatively similar characteristics, follow well defined lines, which, graphically plotted, are of considerable use in projecting probable future population. The density of population is controllable, requiring only adequate transportation facilities, properly placed, together with such legislation as will prevent improper housing.

Rapid transit is not necessary in any city, until such time as the congestion due to vehicular, pedestrian and surface railway traffic on the streets, in the central section, has reached or is rapidly approaching the point of saturation, and then only, after every other effort has been exhausted to improve existing surface transportation facilities. If this proves futile, then and then only, should serious consideration be given rapid transit. This term is generally misapplied. To many, it portends the elimination of all overcrowding conditions, and the final solution of transportation problems. As a matter of fact, there is as marked overcrowding on rapid transit lines as one encounters on the majority of surface railways, at the rush hour periods. It means, in effect, the accomplishment of maximum distance in minimum time, and the amelioration of surface congestion.

To provide such, the following methods are usually employed:—

- (1) Underground subway or tunnel construction.
- (2) Elevated track structures.
- (3) Combination of both elevated and subway systems.
- (4) Complete grade separation by elevation or depression.
- (5) Suburban steam railway service.

Its adoption is usually indicated by the population of the city and its environs, the physical and economic features of the situation, and the riding habit of the people.

Rapid transit service in the true sense of the term, has never been provided in cities of less than 1,000,000 population, mainly for the reason, that the initial cost is so excessive, that the average riding habit is insufficient at a five cent fare, to produce the revenue necessary to recoup the investor.

Toronto is not in position to construct a rapid transit system in the strict sense of the term, but may, when conditions demand, institute a semi-rapid transit service, by using the radial railway entrance lines. We have developed the radial entrance plan so as to permit of such joint use. By so doing, adequate and rapid service may be furnished that portion of the population living outside of what we have termed the thirty-five minute zone. We assume that persons who can travel from the central area, to their abode, or vice versa, in the space of thirty-five minutes, do not require more rapid transport.

We shall show in this report, that within the limits of the City as at present constituted, adequate extension of the existing street railway lines, coupled with improved rolling stock and efficient operation, brings the extreme outlying portions of Toronto within the thirty-five minute zone, wherein the necessity for other than surface transportation, as aforesaid, is not indicated.

The study of this section involved detailed consideration of the following, viz.:—

- (a) Existing street railway situation and preparation of time zone maps.
- (b) Do existing conditions warrant rapid transit service?
- (c) Distribution of present population, general business and industries.
- (d) Past growth of the City as applied to population, heavy and light manufacturing, wholesale and general business distribution.
- (e) Probable future growth of the City as applied to section (d) with resultant distribution.
- (f) Past and existing topographical and other barriers to proper growth and distribution.
- (g) Capacity and use of present city streets.
- (h) Is the present street railway system being operated at maximum capacity?
- (i) The economics of the whole situation.

The problem resolves itself into three main phases, viz.:--

Can the immediate future transportation demands be best met by:--

(1) The extension and more efficient operation of the existing street railway system?

(2) A separate rapid transit service without attempt to improve the present system ?

(3) A combination of rapid transit and surface feeder system, i.e., surface feeders in the areas beyond the limits of 1891, and rapid transit by means of subways within the limits of 1891?

Out of the foregoing arise the following:--

(1) Are the streets in the central area capable of handling future traction and vehicular demands, or will other rights-of-way be required to relieve them?

(2) Analysis of the present speed schedules.

(3) Possible improvement in time travel, either by more efficient operation, better routing, improved track and equipment, or a combination of all.

(4) Present volume of traffic, with origin and destination.

(5) Counts of passenger traffic to determine lines of heaviest movement, and points between which the public require other than direct movement to or from the central area.

(6) Street traffic counts to ascertain the degree of congestion in the portion of main thoroughfares lying within the central area.

(7) Determination of increased volume of future passenger business, and the possibility of handling same by larger car units.

(8) Consideration of advisability of changing gauge of present system from four feet ten and seven-eighths inches to standard gauge of four feet, eight and one-half inches.

CONCLUSIONS

After detailed consideration of the various factors, entering into and affecting the problem as hereinbefore recited, we have concluded that:—

Existing Situation

1. Additional civic car lines laid between now and 1921, without the limits of 1891, but within the limits of 1915, will, after acquisition by the City, of the Toronto Railway Company in 1921, adequately serve all sections within the present City limits; the maximum time necessary to reach extreme destination being thirty-five minutes.

2. The existing surface system of the Toronto Railway Company, if provided with improved equipment, and operated at higher service efficiency, can be made to adequately serve the City within the limits of 1891.

3. As traffic officers become more efficient in direction, and citizens better appreciate the functions of such officials, the movement of rail, vehicular and pedestrian traffic will be greatly facilitated, with consequent saving of time and added safety to all.

4. If a sufficient number of cars of modern type were provided, thereby minimizing overcrowding, and the public educated to embark and debark with reasonable speed, it would result in more rapid operation of the railway system, and the facilitation of other classes of traffic.

5. There is comparatively little congestion in Toronto streets. This may be further minimized by regulation of standing vehicles on, and diversion of slow-moving, heavily laden traffic from, main heavily-trafficked thoroughfares in the central area.

Radial Railway Entrance

1. That the following railways entering the outlying portions of Toronto, viz.:—

(a) The Toronto & York Radial Railway embracing the Metropolitan, running north on Yonge Street; the Kingston Road line from the Woodbine;

the Port Credit line from Sunnyside; (b) The Toronto Suburban to Lambton, Weston and Woodbridge, from Keele and Dundas Streets, cannot be considered rapid transit interurban lines, as in all cases they operate mainly on the highway, at low speeds. The people of Toronto and the Province, have not had the advantages of modern rapid interurban service, such as is operated in many parts of the United States. When the Hydro Radial project becomes an accomplished fact, the system of which the section operating between London and Port Stanley is a happy augury, the entire population of the Province will derive therefrom, tangible benefits, which result to a community from a modern, high speed, properly equipped and efficiently operated system.

2. That the most feasible entrances from the east and west lie along the waterfront route. The entrance from the north may be readily effected by subway construction. The foregoing conclusions were arrived at after careful reconnaissance of the possible routes of entrance for radial railways, in the City and its environs, and detailed survey of one hundred and fifty miles of line.

3. From the viewpoint of economy of operation and utility, it is essential that the terminal be located on the axis of maximum movement. Having regard for the past suggestions for an up-town terminal, we thoroughly investigated this possibility, with the result, that aside from operating considerations, the additional cost of \$8,000,000, embracing a four track subway from the waterfront to College Street, and the erection of a terminal at the latter point, proved it unfeasible.

The foregoing indicates the necessity for location on waterfront route.

The same consideration applies also to the location of yards on the waterfront property, in view of its natural advantages.

4. It is prudent to make present provision for future expansion, covering trackage for trunk line entrances and terminal facilities, therefore the necessary sites should now be provided for ultimate development.

5. That it is necessary to make ample provision for the co-ordination of rail and water transportation, and the proper interchange of all traffic.

6. The radial railway trunk lines should, as the future demands, and the City extends, provide for the operation of semi-rapid transit lines to serve outlying districts.

Rapid Transit Lines

1. The streets in the central area are sufficient to care for future traction and vehicular demands, provided reasonable regulations are enacted, and enforced, governing vehicular and pedestrian traffic.

2. Traffic may be much facilitated by an increase in speed of the existing Toronto Railway units. This entails improved equipment, track, routing and operation, together with the adoption of up-to-date loading and unloading facilities, and the much needed education of the public to embark and debark speedily. The accomplishment of this, together with adequate extension of surface lines, will make it possible to travel from the centre to the present City limits within a thirty-five minute period.

We have been assisted to the foregoing conclusions by the study of Drawings, Nos. 8 to 15 inclusive, showing present volume of traffic with origin and destination, lines of heaviest movement, and street traffic counts.

3. In relation to the matter of change of gauge, notwithstanding that almost every economic consideration declares against it, the dominant factor is that of future traffic unification, between radial, semi-rapid, and city surface lines, and this is impossible without the reduction of the present gauge from four feet ten-and-seven-eighths inches to four feet eight-and-one-half inches.

4. As hereinbefore indicated, there is no justification whatever for the construction, in the City of Toronto, of a rapid transit system, in the strict sense of the term.

RECOMMENDATIONS

We beg to respectfully recommend that:—

**Acquisition
of Toronto
Railway**

1. The City of Toronto acquire the Toronto Railway Company at the expiration of the franchise in 1921, and thereafter operate same as a municipal railway.

**Declaration
of Policy**

2. The City should at once make a definite declaration of policy in this regard.

3. If the decision be to municipalize the service, preparatory steps should immediately be taken, in order that upon the date of franchise expiry, the City may enter into occupation and operation, without overholding tenure complications.

**Transportation
Commission**

4. A Transportation Commission be at once appointed, consisting of representatives from the City, the Toronto Harbor Commission, and the Ontario Hydro Electric Power Commission, so constituted as to afford the City majority representation. This Commission should be vested with all necessary power to plan, control and direct all transportation and terminal facilities of every kind whatsoever, (exclusive of existing steam railways), including present or projected municipal lines within the corporate limits of the municipality, and to prepare and arrange for the acquisition and operation of the Toronto Railway Company as a municipal utility, upon expiry of the franchise rights of said Company; the powers of this Commission to be sufficiently inclusive to embrace all railway transportation facilities as aforesaid, and to be implemented from time to time, in order to accomplish the full intent of this recommendation. The Harbor Board and the Ontario Hydro Electric Power Commission, should be represented upon this Commission in extension of the policy of Council already expressed in the appointment of the Board charged with the duty of making this report, and for the same reasons which guided that body in the constitution of such Board, viz.:— That the future transportation facilities within Toronto should be co-ordinated with regard to the services, rights and holdings of the bodies aforementioned, with particular reference to radial entrance and railways, the operations of

the Harbor Commission as Trustees for the City, and local street railway service within the City limits. The Ontario Hydro Electric Power Commission, through their Municipal Radial Railway project, is at present undertaking the construction and development of some 1,000 miles of radial railways, with Toronto as a main terminal focal point; the Harbor Commission as Trustees for the City, control the proposed east and west trunk radial railway entrances, together with the proposed terminal site, contemplated team track delivery yards and general sorting yard, while the City has jurisdiction over all public streets, embracing surface, elevated and underground rights. Even cursory consideration, will demonstrate the necessity of harmonizing all these interests, if transportation problems are to receive adequate and effective treatment. This can best be accomplished by the creation of a Commission constituted as recommended.

**Radial
Railway
Entrance**

5. The construction of the three trunk radial entrance lines, with necessary yards and terminal, as shown on Drawing No. 18, be proceeded with when conditions warrant and finance permits.

Rapid Transit

6. A rapid transit system in the strict meaning of the term be not adopted.

**Semi-Rapid
Transit**

7. The radial railway trunk line entrances be used for a semi-rapid transit service, as conditions warrant, to serve the population in the districts lying at present without and adjacent to the existing City limits.

Legislation

8. It may be necessary to procure legislation amending existing Acts, in order to give effect to the foregoing.

**Use of Lines
by Radials**

9. The use of any of the lines, yards, terminals, and anything whatsoever, in any way relating or appertaining thereto, by any other railway, than those of the Hydro-Electric Railway Union and the City, shall not at any time be permitted, until such railway shall have obtained the consent of the Hydro-Electric Power Commission thereto.

**Finance and
Reimburse-
ment**

10. We do not make suggestion as to finance and reimbursement, feeling that this does not lie within our jurisdiction, but is for each to take up with his respective principals.

ESTIMATE

ESTIMATE OF COST RADIAL RAILWAY ENTRANCES, TERMINAL AND YARDS

(a) West Line, From Terminal to West Focal Point, 5.2 miles	\$ 4,076,000
(b) East Line, From Terminal to East Focal Point, 4.7 miles	3,120,000
(c) North Line, Queen Street to North Focal Point, 3.2 miles	7,696,000
(d) East and West Yards and Freight Facilities	1,365,000
(e) Terminal Station, and Car House	2,560,000
	<hr/>
	\$18,817,000

Note:—The foregoing estimates cover land acquisition and permanent construction, exclusive of value of lands vested in Harbor Commission and City, and property rentals for Terminal and Yards.

These estimated costs provide for ultimate construction, with the exception of the additional two tracks for four track construction. The work to be undertaken in units as conditions warrant and finance permits.

WE PRESENT HEREAFTER DESCRIPTIVE
MATTER COVERING PLANS CONTAINED
IN VOLUME II., TOGETHER WITH
CERTAIN CHARTS EMBODIED
IN THIS VOLUME

**DIAGRAM SHOWING HOMEWARD MOVEMENT DURING
EVENING RUSH PERIOD—MIDWEEK CONDITIONS
AUGUST, 1915**

This diagram shows by varying widths of ribbon, along the routes of the several car lines, the actual number of passengers carried outbound, past all points of the system, during the evening rush period, i.e., 4.30 to 7.00 p.m., under average midweek conditions.

The outward movement only is shown on this plan, i.e., the movement north, east and west, from the downtown central area.

When a cross-town movement occurs, as between Carlton and College Streets, the cross-town ribbon is shown broken at Yonge Street. Westbound movement is thus not shown east of Yonge Street, although crossing Yonge Street, westbound, there were 1,746 persons travelling from somewhere east thereof. Similarly there was an almost equal movement, viz.; 1,947 persons, travelling eastbound across Yonge Street from the west, on the aforesaid line.

A cross-town movement much smaller, but also almost equal in amount in each direction, takes place at Bloor Street. Here, 558 persons cross westbound, and 932 cross eastbound, during the rush period.

Traffic originating in the outer limits of the city, first travelling via inbound cars, and then transferring to northbound or outbound cars as at Broadview Avenue and Queen Street, or Shaw Street and King Street, is indicated at such points, where the transfer takes place, by narrow widths of ribbon, plotted to scale, originating abruptly, and curving from the direction of the initial inbound movement, into and merging with the ribbon of final outbound movement.

It is at once seen, that outside the business area, the points of greatest outbound traffic and congestion are, College Street between McCaul Street and Spadina Avenue, where 9,116 persons were carried during the period, over the westbound tracks; Yonge Street between Wilton and Carlton, where 8,068 persons passed over the northbound track; Queen Street east, between Sherbourne and Parliament Streets, where 7,954 passengers were carried over the eastbound track; King Street east, to the Don, where 8,148 passengers

travelled east, and the greatest of all, on the Don bridge and east to Broadview Avenue, where during the two-and-one-half hour period, 10,386 passengers were carried eastbound.

That such conditions could be readily remedied, by a proper re-routing, is manifest by an examination of the diagram. For example, Church Street a short distance east of Yonge, carried but 1,009 passengers northbound; Wilton Avenue Bridge, but a short distance north of Queen Street, carried but 172 persons.

The extent of short haul traffic on the Toronto Railway Company's lines, is well shown by the widths of the ribbon at the terminals of the Broadview, Avenue Road, Dovercourt and Dundas lines, in comparison with the general widths of the ribbons along these routes.

Each of the yellow spots on the plan, whether marked with a centre dot or star, represents 500 persons boarding the cars. Those marked with a dot, signify that the persons represented have either boarded the cars in the downtown area, or have been routed through it on their homeward way, thus adding to the overcrowding in that district. Those marked with a star, signify that along a length of the route, the middle point of which is at the spot, five hundred persons have either boarded cars outbound from the centre of the city, or cars inbound towards the centre, provided they alight before the business area is reached, or are routed cross town outside the downtown limits and not through it.

The red spots, signify that along various lengths of the lines, opposite where the spot is located, 500 persons alighted from outbound cars, i.e., cars bound north or west on the west side of Yonge Street, and north or east on the east side of that thoroughfare.

Where spots are shown cross hatched, it denotes that for each spot so marked, 500 passengers alighted from Toronto Railway cars and boarded civic or suburban cars to continue their journey. These passengers are again represented by red spots, as they unload from the civic car lines.

The small number of blue spots, divided by vertical segments of circles, represent inbound passengers, who reach their homes by direct passage or transfer, without crossing the downtown business area, or Yonge Street. Each spot represents 500 persons alighting from such cars, the spots being located midway between extreme unloading points.

Jitney travel is shown by green spots; those quartered and with central dot showing passengers boarding jitneys, the plain quartering indicating those alighting therefrom. It is of small amount and extremely local; 409 passengers were conveyed up Yonge Street from the central downtown

district, and discharged at the C.P.R. crossing or somewhat below it. Eight hundred and sixty-five passengers were picked up by jitneys north of the C.P.R. crossing, and transported to North Toronto; 87 passengers were picked up at the end of the Church Street line, and carried into North Rosedale; 213 passengers were carried westbound from Keele and Dundas Streets, and 108 northerly on the Weston Road, while 72 were carried along the Lake Shore Road from Roncesvalles Avenue toward the Humber.

The significance of the spots may be summarized as follows:—Forty-nine thousand five hundred people were carried out of the business centre of Toronto, by street cars, during the evening rush period, under average mid-week conditions in August, 1915, the vast majority of whom, it is safe to assume, were homeward bound. Of this number, 33,500 or 67.7% left on cars westbound or northbound, and 16,000 or 32.3% on cars bound northeast and east, respectively. This is in fairly strict relation to the population of these divisions. For instance, in the area bounded on the west by Victoria Street, and its production from the Bay northerly to Bloor Street, on the north by Bloor to Jarvis, thence northerly on the production of Jarvis Street to the Canadian Pacific Railway tracks, thence easterly by an irregular line to the eastern City limits, there reside 156,700 persons, or 31.8% of the population of Greater Toronto.

The total traffic deposited east of Yonge Street was as follows, viz.:—

East and northbound from central business area.	16,000	
Originating Outside Central Business Area		
East and northbound.....	6,500	
West and southbound.....	3,500	
Eastbound from west of Yonge Street...	2,879	12,879
Total		28,879

Of the foregoing, 2,421 people left at the terminus of the Broadview line and were distributed easterly along the Danforth Civic car line. Five hundred persons westbound were fed to the Toronto Railway Company at Danforth and Broadview by the Civic car line; 538 persons delivered by the Parliament cars at Greenwood Avenue used the Gerrard Street Civic cars easterly, and 398 transferred to the Kingston Road radial from the King Street line at the Woodbine.

The total traffic deposited west of Yonge Street was as follows, viz.:—

West and northbound from central business area.	33,500	
Originating Outside Central Business Area		
West and northbound.....	10,000	
East and southbound.....	9,000	
Westbound from east of Yonge Street....	2,304	21,304
Total		54,804

Two thousand one hundred and ninety people debarked from the terminus of the Avenue Road line, and continued on St. Clair Avenue Civic line, while but 569 made the transfer in reverse direction. Five hundred and twelve people left the Toronto Street Railway at Dundas and Bloor Streets, and continued on the Bloor Street Civic line. Nine hundred and three passengers utilized the Toronto Suburban Railway, after leaving the Toronto Street Railway at Dundas and Keele Streets; 500 alighted from the King and Queen lines at Sunnyside and boarded the Lake Shore radial cars.

Altogether, the plan shows a net loading movement of 78,500 people, while 77,500 are shown unloading, i.e., 1,000 persons are unaccounted for. This is practically one and one-quarter per cent. of the total traffic actually counted.

**PLAN EXEMPLIFYING CONDITIONS ARISING FROM THE CON-
FINEMENT OF THE TORONTO RAILWAY COMPANY'S
LINES WITHIN, AND THE GROWTH OF TORONTO
BEYOND THE CITY LIMITS OF 1891**

In 1891, the present franchise of the Toronto Railway Company was granted by the City, giving the Railway Company for thirty years from September 1st, the sole right, subject to certain reservations, to operate surface car lines upon the public streets within the City limits.

In 1899 an agreement was entered into by the Town of Toronto Junction, the Toronto Suburban Railway and the Toronto Railway Company, by which the Toronto Railway cars were to operate on Dundas Street, from Humber-side Avenue to Keele Street within the then Town of Toronto Junction.

By special agreement between the Railway Company and the City, the Avenue Road line was extended in 1907 beyond the City limits of 1891, to St. Clair Avenue. Requests for further extensions by the Company, beyond the limits of 1891 had meantime been refused. In the same year, the Imperial Privy Council sustained the Company's contention, that by their franchise, they were not compelled to make extensions beyond the limits of the City of 1891.

The result of this decision has been to provide the Railway Company with a very lucrative short haul traffic. It has proven a great inconvenience to citizens residing or doing business in the outlying portions of the City, in compelling them to walk from the terminals of the Toronto Railway lines to their destination, or putting them to the expense of an additional fare on Civic car lines, for a partial amelioration of conditions. It has increased and consolidated sentiment of the City, on the question of civic operation after 1921, and has compelled the building and operation by the City, of the disconnected routes included in the term "Civic Car Lines."

Drawing No. 13 shows in graphic form the conditions arising to the citizens from the adverse decision of the Privy Council in 1907, by representing to scale for the routes primarily affected, the actual extent of the unloading from the cars, between the business district and the terminals of the lines, together with the actual unloading at the ends of the lines.

Of the two blocks shown for each line, the larger, in every case, represents the all-day movement, while the smaller, colored red, represents the movement in the evening rush period from 4.30 to 7.00 p.m. Both represent midweek conditions of normal travel during August, 1915.

The following explanation illustrates the application of plan:

Considering the all-day movement, i.e., the mottled gray blocks, and taking the Carlton line for a particular example, the total height of the block represents the number of passengers, who alighted from the Carlton cars west of Yonge Street, including the terminus at Lansdowne and Royce Avenues, between the hours of six in the morning and twelve midnight, while the portion cross hatched, in black, represents the actual number of passengers riding to the end of the line and there alighting.

Undoubtedly, a large majority would take advantage of the cars for a considerable distance further, were it possible to do so. The part of the block above the black hatching represents the passengers naturally served by the Carlton line, between the terminal of the line and the downtown central district.

The lines shown are the main traffic routes of the City, and all have their termini at points which virtually represent the City limits of 1891, except as aforementioned, and at points, beyond which the adjacent areas are thickly populated.

In the case of the Dundas line, during the whole day, 20,971 persons alighted from cars outbound from the centre of the City, between and including Terauley and Albert Streets, and Keele and Dundas Streets, of which number 6,705 or 32% alighted at the latter corner, and either walked to their destination or paid an additional fare to the Toronto Suburban Railway, or to jitneys, for further transportation. During the evening rush period, 7,769 persons got off the cars after leaving Queen Street, 2,233 or 28.7%, a slightly lesser proportion than the all-day movement, were "dumped" at Keele Street. Beside this terminal unloading, during the day 1,567 persons alighted at Bloor Street and boarded the Civic cars. During the evening rush period 512 persons availed themselves of this Civic line.

On the Carlton line during the day, 12,388 persons alighted from the cars after leaving Yonge Street, and of this number 2,813, or 22.7% left the cars at Royce Avenue. From 4.30 to 7.00 p.m., passengers off west of Yonge Street were 3,776, of which 1,011 or 26.8% did not alight until reaching Royce Avenue.

On the Dovercourt line, 7,784 passengers alighted from northbound cars during the day, and of these 3,258 or 41.9% alighted at the terminus at

Van Horne Street. During the evening rush period, of the 3,213 passengers off after leaving King Street, 1,250 or 38.9% rode to the extreme end of the line.

The terminus of the Bathurst and Dupont lines is virtually the same, and for graphic purposes these lines were combined. During the whole day, of 14,635 persons leaving northbound cars, outside the central downtown area, 4,550 or 31.1% debarked at the termini, while during the evening rush period when the total passengers alighting outside the downtown area was 5,597, 1,828 or 32.7% alighted at the end of the line.

On Avenue Road, of the 11,333 persons who during the day left the cars north of Queen Street, 6,800 or 60% did not alight until St. Clair Avenue was reached. During the evening rush period these numbers were respectively 3,987 and 2,728 or 68.4%.

These large percentages, were due to the fact that Avenue Road and St. Clair Avenue is the only point common to the St. Clair Avenue Civic line and the Toronto Railway Company lines. Of the 6,800 persons alighting during the day at this point, 5,959 boarded the Civic cars, i.e., 87.6% and of the 2,728 persons alighting from the Avenue Road cars during the evening rush period, 2,190 or 80.3% continued their journey on the St. Clair Avenue Civic cars. The passengers continuing on the Civic cars are represented by green hatching on the drawing.

From the Yonge Street cars northbound from Queen Street, 9,254 people alighted during the day, of whom 3,587 or 38.8% debarked at Price Street, while during the evening rush period 3,140 persons left the cars above Queen Street, of whom 1,385 or 44.1% were unloaded at the terminus.

From Church Street cars, during the day, 3,669 persons left the cars somewhere north of Queen Street, and of these 1,533 or 41.8% alighted at North Glen Road Bridge, Rosedale. During the evening rush period, this percentage decreased to 38.5%, when of a total 1,217 persons debarking north of Queen Street, 470 alighted at the aforesaid bridge.

The Broadview line shows another remarkable example of terminal unloading, partly on account, of its being the only point of contact between the Toronto Railway lines and the Danforth Avenue Civic lines. Thirteen thousand, nine hundred and twenty-nine passengers left the eastbound Broadview cars after passing Church Street; of these, 8,122 or 58.3% alighted at Danforth Avenue, of which 5,621 or 69.2% continued to their destination by paying the additional fare on the Civic cars. During the evening rush period, 5,815 passengers left the cars east of Church Street, 3,492 or 60.1% of these, alighting at Danforth Avenue, and 2,421 or 69.3% used the Civic car line.

The Parliament line, during the day, had 15,021 persons off eastbound cars east of Church Street. Of these, but 3,253 or 21.7% left at Greenwood Avenue, of whom 1,645 or 50.6% boarded the Civic cars. Similar characteristics for the evening rush period, show 5,530 persons off east of Church Street, and 1,400 or 25.3% at the terminus, with 538 of this number or 38.4% continuing on the Gerrard Street Civic line.

The King east line is peculiarly situated in relation to the limits of 1891. It extends a full two miles east of Greenwood Avenue, with the northerly city limit of 1891, lying but 200 feet to the north of Queen Street. Therefore, in the built-up territory to the north of this 1891 limit, there is no trackage of the Toronto Railway Company, with the result that an excessive traffic is placed on the King line.

The total passengers carried on the King line during 18 hours, who alighted between Church Street and Neville Park Boulevard were 15,780, of whom 8,800 or 55.8% alighted east of Greenwood Avenue. From investigation, we estimate that the King line east of Greenwood Avenue serves a population of 16,800, of which population, 9,400 or 56% reside outside, and 7,400 inside the limits of 1891. The assumption is warranted, that the riding necessity and habit of the populations is the same; in other words, that of the passengers riding east of Greenwood Avenue, 56% or 4,930 live outside the limits of 1891, and 44% or 3,870 live inside. These relative proportions are indicated on the plan by the yellow and red hatching. The passengers alighting from cars east of Greenwood Avenue, and proceeding to their destination outside the limits of 1891, are shown by yellow hatching, while those persons whose destination is within the limits of 1891, are represented by red hatching.

During the evening rush period 6,145 persons alighted from the King cars east of Church Street, of whom 4,123 or 67.1% got off east of Greenwood Avenue. As above, we assume that 56% or 2,310 persons represented by the yellow hatching, live outside the limits of 1891, and 44% or 1,813 as shown by red hatching, live within those limits.

The downtown central district, beyond which the counts were taken, is shown colored gray on drawing.

EFFECT OF CAR LINES ON REAL ESTATE VALUES

Investigation in Toronto and American cities, notably New York and Philadelphia, has demonstrated that the institution of transportation service, leads almost immediately, to largely increased population in the territories served and largely enhanced real estate values.

Between the five years comprising 1910 to 1914, inclusive, the City of Toronto constructed approximately 18.28 miles of single track railway on Gerrard Street, Danforth and St. Clair Avenues, and Bloor St. West. An examination of the Registry Office records, shows that in the area within the City limits which one might reasonably estimate as being benefited by transportation, fifteen hundred and twenty-five representative property transfers, were abstracted, which show, in comparison with the sale figures of 1910, an increase of 134 per cent. in property values, integrated over the aforesaid period. During this term the average assessment per acre of the City shows an increase of approximately 66 per cent. Deducting this figure from the 134 per cent., leaves an increase in value of 68 per cent. attributable mainly to Civic car line operation.

It may be argued, that the widening of Danforth and St. Clair Avenues, respectively, is responsible for a portion of this latter increment, but in compiling these figures, we have been careful to ignore transactions covering properties fronting on the aforementioned thoroughfares, the values of which, were without doubt, largely augmented by reason of the widening. If the cost of the car lines, excluding the frontage on Gerrard Street, Danforth and St. Clair Avenues, had been assessed by local improvement over the properties directly benefited thereby, the entire levy, exclusive of added charges on account of the extended life of the bonds, would have amounted to about 6% on the original investment as of 1910, or 4½% upon the increase in value during the 1910-1914 period.

During the last mentioned period, the population in the districts aforementioned increased 131 per cent.

It is not within the province of this body, to make extended examination and report, upon this phase of transportation extension, but we recommend it to the serious consideration of the municipality.

PLANS ILLUSTRATING THE PAST AND PROBABLE FUTURE GROWTH OF TORONTO

1. Annexation map, Drawing No. 1 showing districts annexed from 1883 to 1915.
2. Map showing limits of built-up area for 1879, 1889, 1899, 1909, 1914 respectively, and the relation of the direction of growth to the topographical barriers surrounding Toronto. Drawing No. 3.
3. Diagrams showing distribution of population in and surrounding the City of Toronto, 1879 to 1914, inclusive. Drawing No. 4.
4. Study showing growth of central business, manufacturing and warehouse area from 1879-1899 and 1899-1914, together with a key plan showing the existing relation of central business, manufacturing and warehouse area, to that of the whole city. Drawing No. 7.
5. Plan showing development of property in and surrounding the City of Toronto, 1914. Drawing No. 6.
6. Diagram showing isometric projection of the density per acre of the 1914 population, for the built-up portion of each block within the existing city limits. Drawing No. 5.
7. Map showing estimated extent and character of occupancy of the area required for Toronto, with a population of 1,500,000 without existing barriers broken. Drawing No. 16.
8. Map showing estimated extent and character of occupancy of the area required for Toronto, with a population of 1,500,000 assuming the existing barriers broken by adequate means of transportation. Drawing No. 17.

The city of 1834 had a population of 9,200, and was bounded by the Island, Ashbridge's Bay Marsh, Queen Street, the Don River, Bloor and Dufferin Streets, and excluding the Island and the Marsh, had a land area of 5,565 acres, or nearly nine square miles.

By 1879 the population had increased to 75,100, and there was a built-up area of 3,105 acres, which was bounded by a line skirting along the waterfront, north up the Don River and the Rosedale Ravine to Bloor Street, thence along Bloor Street to the east limit of the University grounds, thence south and westerly along the east and south side of the University grounds and Queen's Park to College and Bathurst Streets, from which point it continued southwesterly to the intersection of Queen Street and Dovercourt Road, thence southeasterly along the line of the former Toronto, Grey and Bruce, (now C.P.R.) Railway to the waterfront.

In 1883, the boundaries were enlarged by the annexation of the Town of Yorkville, containing an area of 547 acres, and a population of over 5,000.

By 1889 the City had further enlarged by the additions of Brockton, Riverdale, North Rosedale, a strip of land north of Queen Street, annex west of Yorkville, North Yorkville, Rathnally, Seaton Village, Sunnyside and Parkdale, and contained a total land area of 10,475 acres.

With these annexations and continued growth, the population increased to 160,100, and the built-up area to 4,855 acres.

Factors of increase for period 1879-1889:—

Population 2.13
Built-up area 1.56

Between 1889 and 1899, but two small annexations were made, viz.:— Greenwood Side Line, 33.6 acres, and Lake Shore Road, 12.0 acres. The population increased to 192,900 and the built-up area to 5,785 acres.

Factors of increase for period 1889-1899:—

Population 1.20
Built-up area 1.19

The decade 1899-1909, witnessed the greatest expansion up to that time in Toronto's history, twelve additions being made to the City, the most important in point of population being East Toronto, the Midway, Wychwood, Bracondale and West Toronto.

The land area in 1909 comprised some 15,642 acres. The built-up area embraced 9,469 acres, while the population had increased to 325,300.

Ratio of increase for period, 1899-1909:—

Population 1.68
Built-up area 1.64

During the past five years, 1909-1914, Toronto added North Toronto, Earls court and Dovercourt, so that by the end of 1914, we had a population

of 470,100, with a built-up area of 15,679 acres, out of a total land area of 19,551 acres. This area is exclusive of the Island, containing some 620 acres, and the Toronto Harbor Industrial District, 957 acres.

In addition to the foregoing, there is a built-up area of some 4,724 acres contiguous to the City, and containing 31,400 people.

Statement Showing Actual Occupancy of Areas in the City of Toronto, for 1914, as Shown on the "Development of Property" Plan, Drawing No. 6.

LAND AREA:—

Main Land:—

Built-up Area:—	Acres
Residential.....	11,868
Heavy Manufacturing.....	502
Light Manufacturing.....	238
Wholesale and Storage.....	459
Retail Business.....	412
Utilized by Railways.....	655
Public Parks.....	1,189
Amusement Parks.....	108
Cemeteries.....	248
	————— 15,679
Vacant land and areas less than 70% occupied..	3,872
	————— 19,551
Toronto Island.....	620
Fisherman's Island.....	212
	————— 20,383
 Water Area:—	
Toronto Harbor.....	1,758
Ashbridge's Bay and Water lots, including Island Lagoons....	3,154
	————— 4,912
Total Acreage.....	25,295

Note:—Of the water area, 1,770 acres approximately are to be reclaimed as part of the Toronto Harbor Development.

Land is considered as "Built-up," when it is 70% occupied.

SUMMARY

Year	Land Area	Built-up Area	Population
1834	5,566 acres		9,200
1879	5,566 "	3,105 acres	75,100
1889	10,475 "	4,855 "	160,100
1899	10,521 "	5,785 "	192,900
1904	10,524 "	6,870 "	226,400
1909	15,642 "	9,469 "	325,300
1914	19,551 "	15,679 "	470,100

Built-up area outside 1914 municipal boundaries, 4,724 acres, with population of 31,400.

STREET TRAFFIC DIAGRAM

Observations plotted from actual survey, on Drawing No. 8 show the number of street cars and other vehicles between 5.00 p.m. and 6.00 p.m. in the downtown district. Like records, tabulated for the twelve-hour period from 7.00 a.m. to 7.00 p.m., show the traffic to be at maximum during the first named period.

Street railway traffic is shown in yellow and vehicular traffic in black, all to scale. Comparison is instituted of traffic conditions, in streets of other cities, with varying width of roadways.

The traffic passing the following intersections between 5.00 p.m. and 6.00 p.m. is shown by the following tables, viz.:—

	Simcoe	York	Bay	Yonge	Victoria	Church	Jarvis	Width of Road
Front.....	387	843	482	437	318	429	477	56 Feet
Wellington.....	526	636	634	673	301	494	...	42 "
King.....	533	616	782	774	484	566	477	42 "
Adelaide.....	585	574	668	826	460	592	316	42 "
Richmond.....	441	593	475	743	488	500	261	42 "
Queen.....	581	759	624	810	540	540	696	42 "
Width of Road...	42'	42'	42'	42' 4''	42'	42'	42'	
		McCaul		University		Terauley		Width of Road
Queen.....		375		605		532		42 Feet
Agnes.....		431		736		434		46 "
College.....		467		722		300		42 "
Width of Road.....		37'5''		79' and 82'		46'		
		Yonge		Church		Jarvis		Width of Road
Queen.....		810		540		696		42 Feet
Shuter.....		677		287		308		28 and 35'5''
Wilton.....		603		415		548		30 Feet
Carlton.....		511		314		403		40 "
Bloor.....		740		336		374		46 "
Width of Road.....		42'		40'		36'		

The total number of vehicles entering the district bounded by John, Queen, Jarvis and Front Streets in a twelve hour period was 19,505, and the

total number of vehicles entering the area bounded by Bay, Adelaide, Victoria and Wellington Streets was 13,978, or 72% of the total traffic entering the first mentioned district.

The traffic survey during a twelve hour period demonstrates, that in the area enclosed by Queen, Jarvis, Front and John Streets, the roadways are subjected to a traffic movement of 325,315 vehicles. This is cited to illustrate the use made of thoroughfares in the central business district, but it must be borne in mind that each vehicle was counted at each intersection through which it passed.

The following illustrates the application of the data shown on Drawing No. 8 for traffic between 5.00 and 6.00 p.m.

	YORK TO BAY		BAY TO YONGE		YONGE TO VICTORIA	
	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles
Queen.....	147	253	117	217	117	175
Richmond.....	41	190	42	165	42	184
Adelaide.....	74	269	82	210	70	222
King.....	160	168	152	261	152	177
Wellington.....	64	225	26	304	91	224
Front.....	246	195	186	116	169	136

(See Table following page)

It will be readily seen by reference to the use of roadways in other cities, that Toronto, on its most heavily travelled thoroughfare, namely, Yonge Street, has not yet reached the point of what may be termed heavy traffic, and it will be many years before the point of congestion or saturation is attained.

STREET	FRONT TO WELLINGTON		WELLINGTON TO KING		KING TO ADELAIDE		ADELAIDE TO RICHMOND		RICHMOND TO QUEEN		QUEEN TO SHUTTER		WILTON TO COLLEGE	
	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles	Street Cars	Vehicles
Yonge.....	206	134	206	98	206	247	206	298	206	294	206	333	202	256
Church.....			84	143	84	195	88	239	97	185	66	166	35	141
Jarvis.....			0	105	0	219	0	257	0	243	0	217	0	254
Victoria.....	65	95	0	129	0	154	24	199	106	210				
Bay.....	59	138	105	234	95	295	87	219	170	84				
York.....	118	135	134	162	117	154	111	149	152	215				
Simcoe.....	0	239	0	256	0	248	0	245	0	241				
John.....	0	26	0	49	0	57	0	53	0	64	Queen to Agnes to			
University.....											Queen to Agnes			
Terauley.....											Agnes	0	355	0
												139	56	47
														80

The following table makes a comparison of other cities for the period of heaviest traffic, with that on Yonge Street:—

STREET	TOTAL VEHICULAR AND STREET RAILWAY TRAFFIC	WIDTH OF ROADWAY
Kennington Park Road.....	1,500	50 ft.
Tower Bridge (Vehicular only).....(London, Eng.)	1,300	35 "
London Road.....	1,050	36 "
Jackson Boulevard (Vehicular only).....(Chicago, Ill.)	890	38 "
Dearborn Street.....	760	38 "
Piccadilly.....	910	44 "
Market.....(Manchester, Eng.)	720	38 "
Cross Street.....	690	32 "
Oxford Street.....	670	37 "
Portland Street.....	620	42 "
Yonge St., between Queen and Albert Sts.(Toronto, Ont.)	539	42 "

ANALYSIS OF POPULATION DISTRIBUTION

A cursory study of distribution of population, makes it evident that if permitted to develop in a natural manner, the growth would take place in a northwesterly direction, between the valleys of the Humber and Don Rivers, which form effective barriers to proper growth.

If these barriers are allowed to remain unbroken, it will result in increased congestion of the central residential districts.

Plate No. 1 shows the average density of population for past and present conditions in mile zones from the centre of Queen and Yonge Streets. On this diagram is also projected the probable future densities within these zones, provided the aforementioned barriers are not broken, for populations of 750,000, 1,000,000 and 2,000,000.

Plate No. 2 shows the same information as Plate No. 1 as to densities of population for past and present conditions in mile zones from the corner of Queen and Yonge Streets, and has thereon projected curves for densities, for the same zones, representing probable future densities for a population of 750,000, 1,000,000 and 2,000,000 with aforementioned barriers broken.

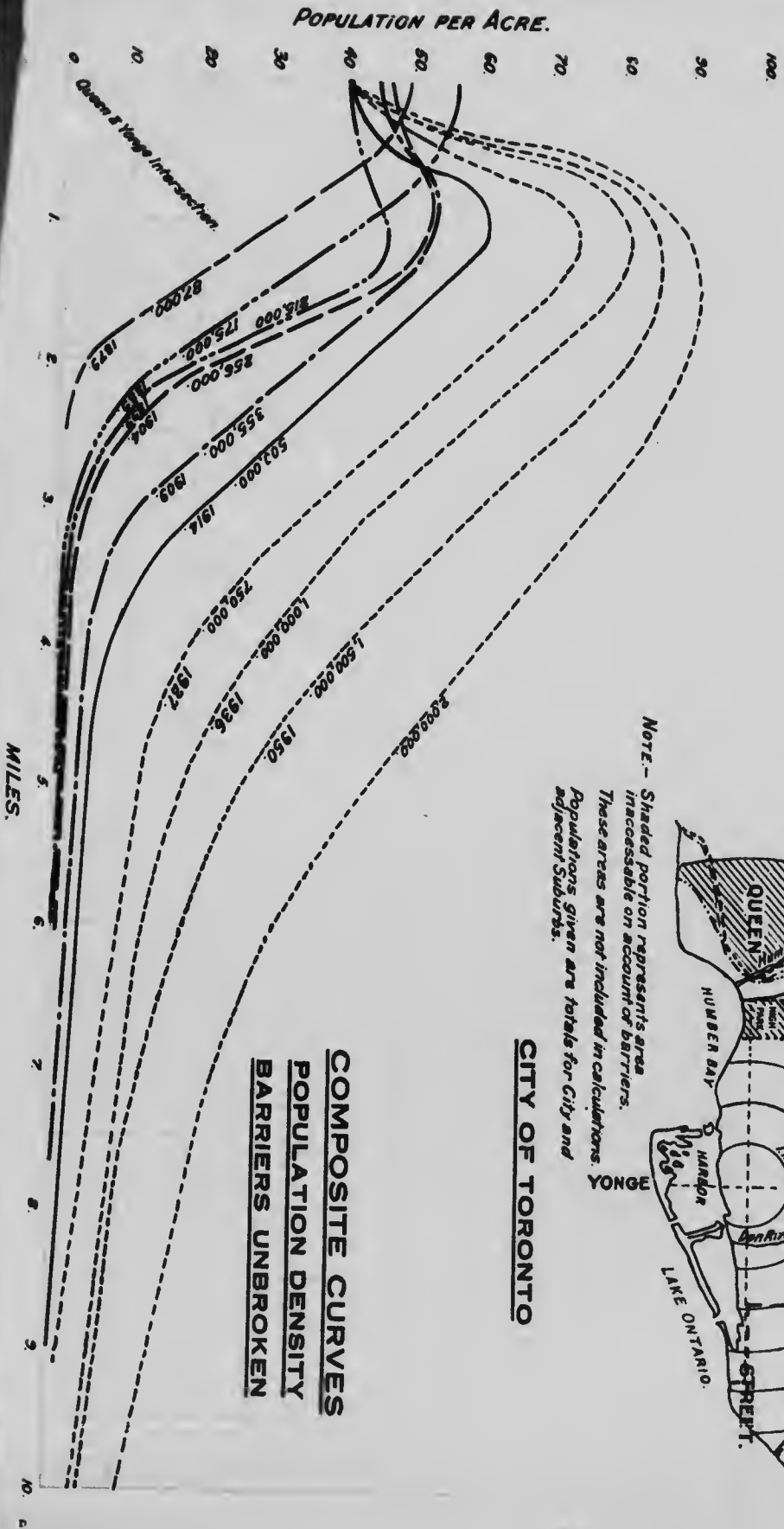
Plates Nos. 3, 4 and 5 show the density per acre in mile zones from the corner of Queen and Yonge Streets, for the zones divided into three sections as shown.

Plate No. 6 shows comparison of density of population per acre in mile zones, for the cities of Chicago, Brooklyn, Philadelphia, Boston, Detroit, Toronto, Pittsburgh and Ottawa. The dates and population for each city are shown in tabulated form on diagram.

The careful study of the relation of density per acre to total population, in numerous municipalities, over a number of years, and their increase in population during the periods studied, resulted in the establishment of a definite relation between density and population. From this information, probable future densities per acre were plotted for increasing population, as shown on Plates Nos. 1 and 2.

As a result of the above, it was determined advisable to provide for a future average density of approximately forty people per acre, which will be readily obtainable by providing proper transportation facilities, and regulations as to housing conditions.

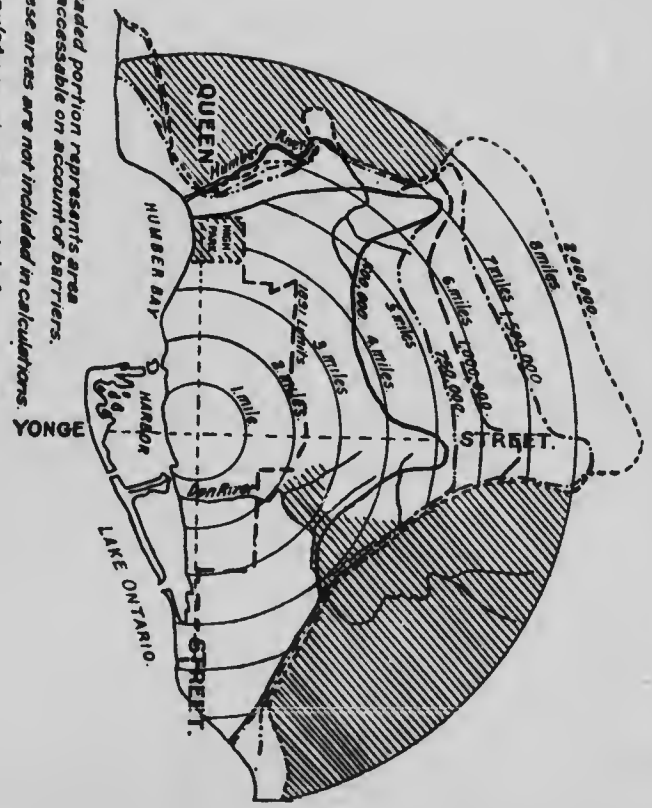
With this information as a basis to work from, the probable future extent and character of occupancy maps were prepared.



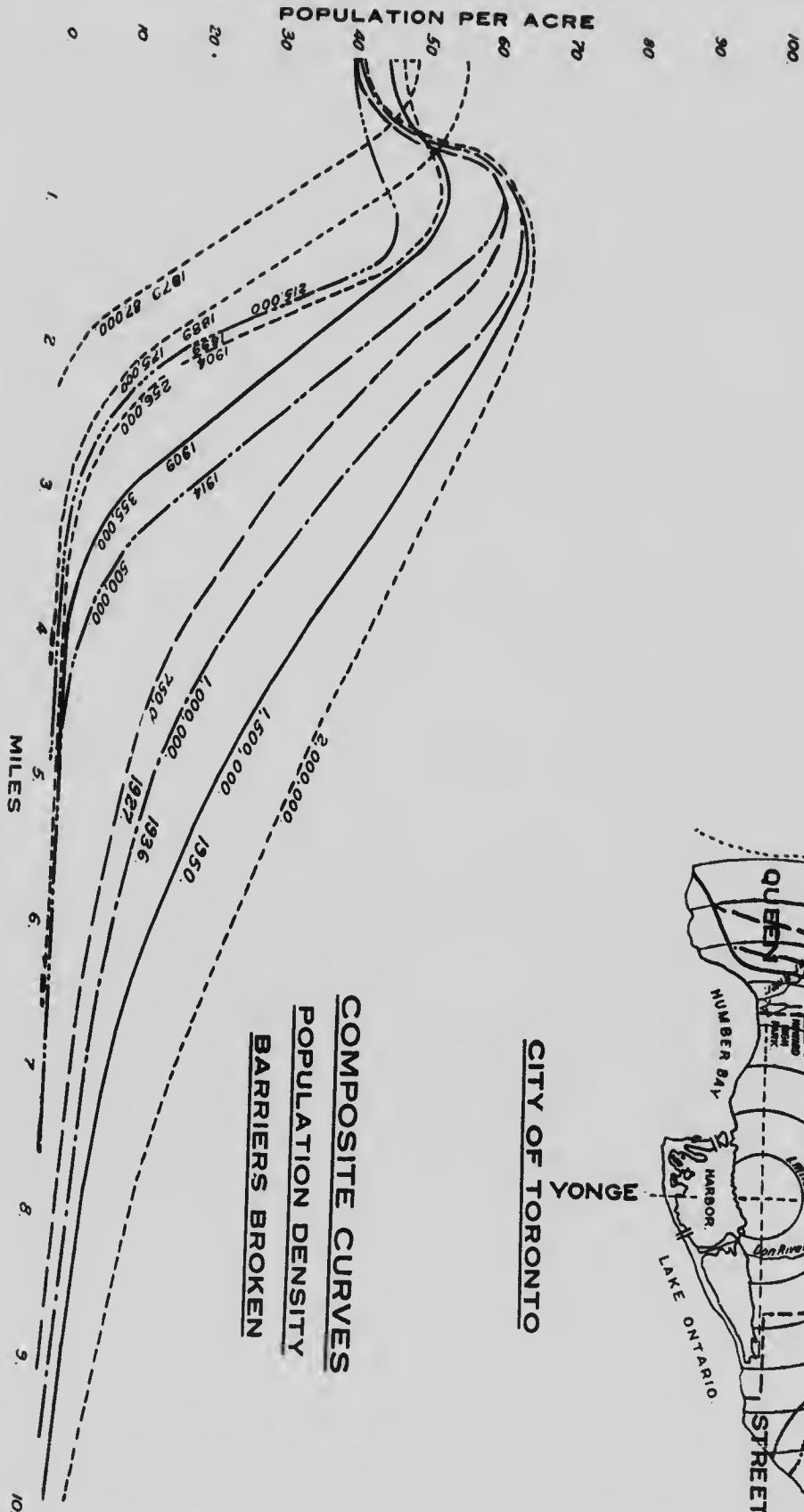
**COMPOSITE CURVES
POPULATION DENSITY
BARRIERS UNBROKEN**

NOTE - Shaded portion represents area inaccessible on account of barriers. These areas are not included in calculations. Populations given are totals for City and adjacent Suburbs.

CITY OF TORONTO

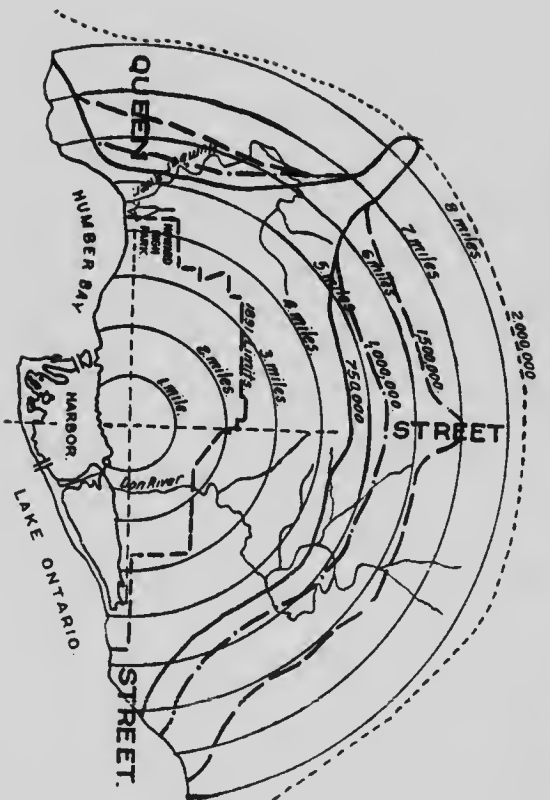




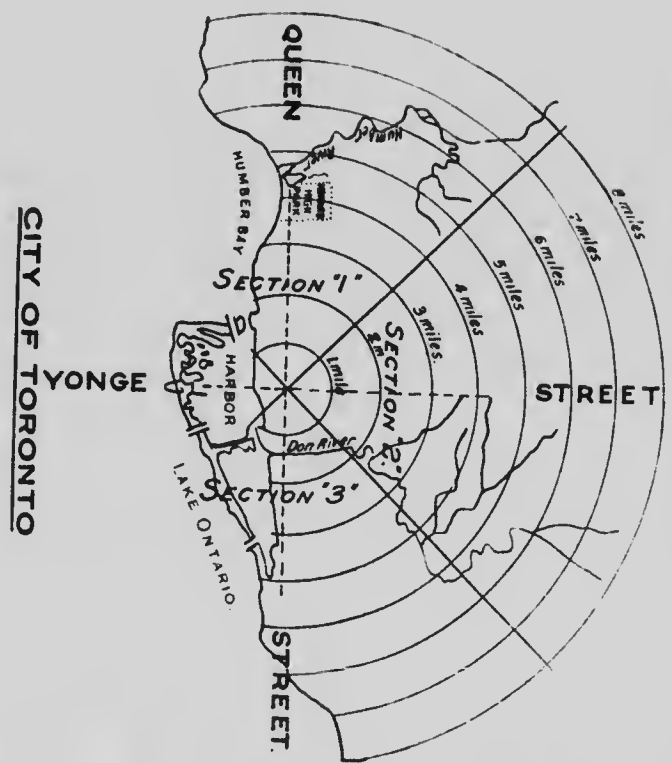
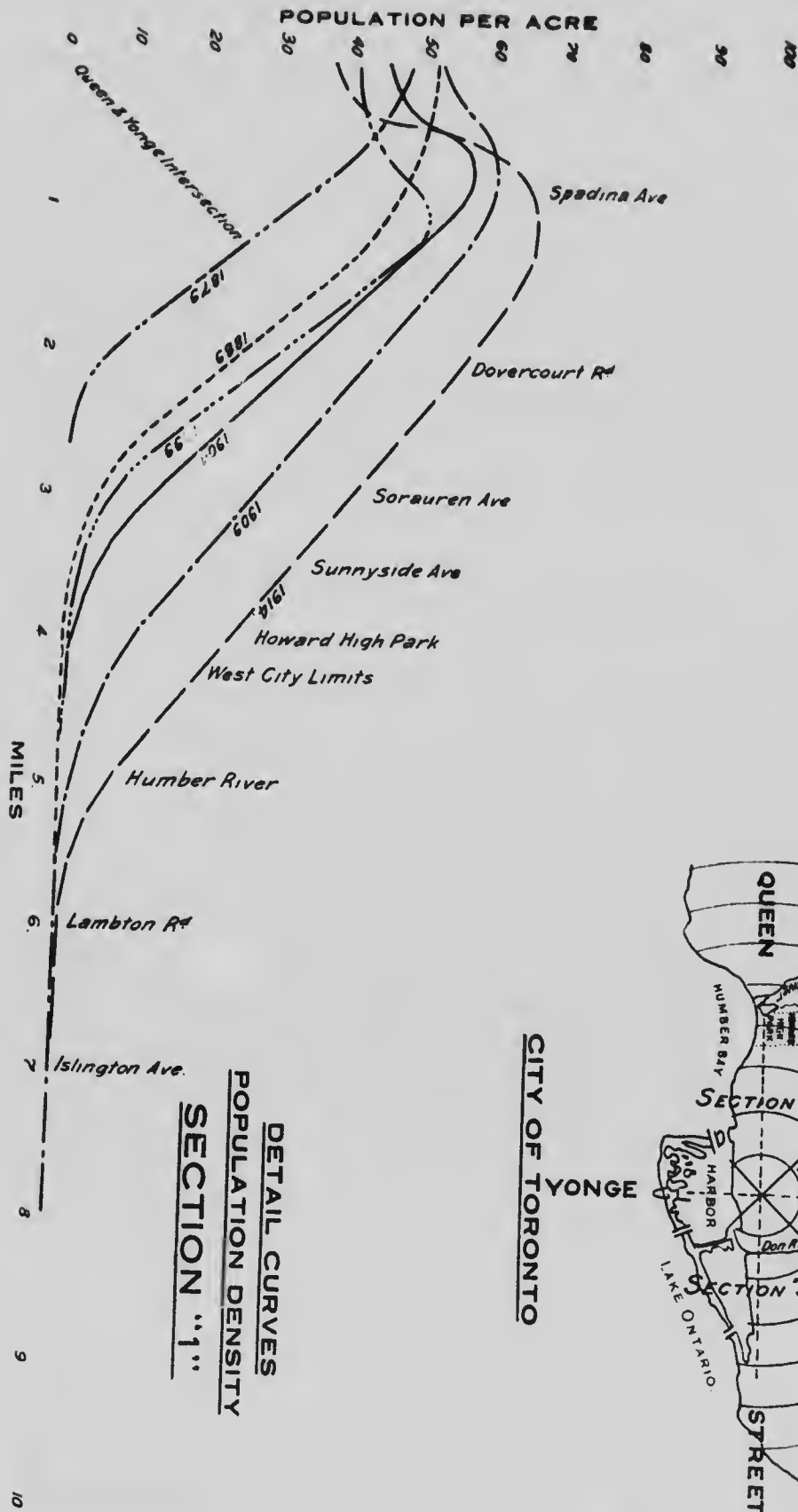


**COMPOSITE CURVES
POPULATION DENSITY
BARRIERS BROKEN**

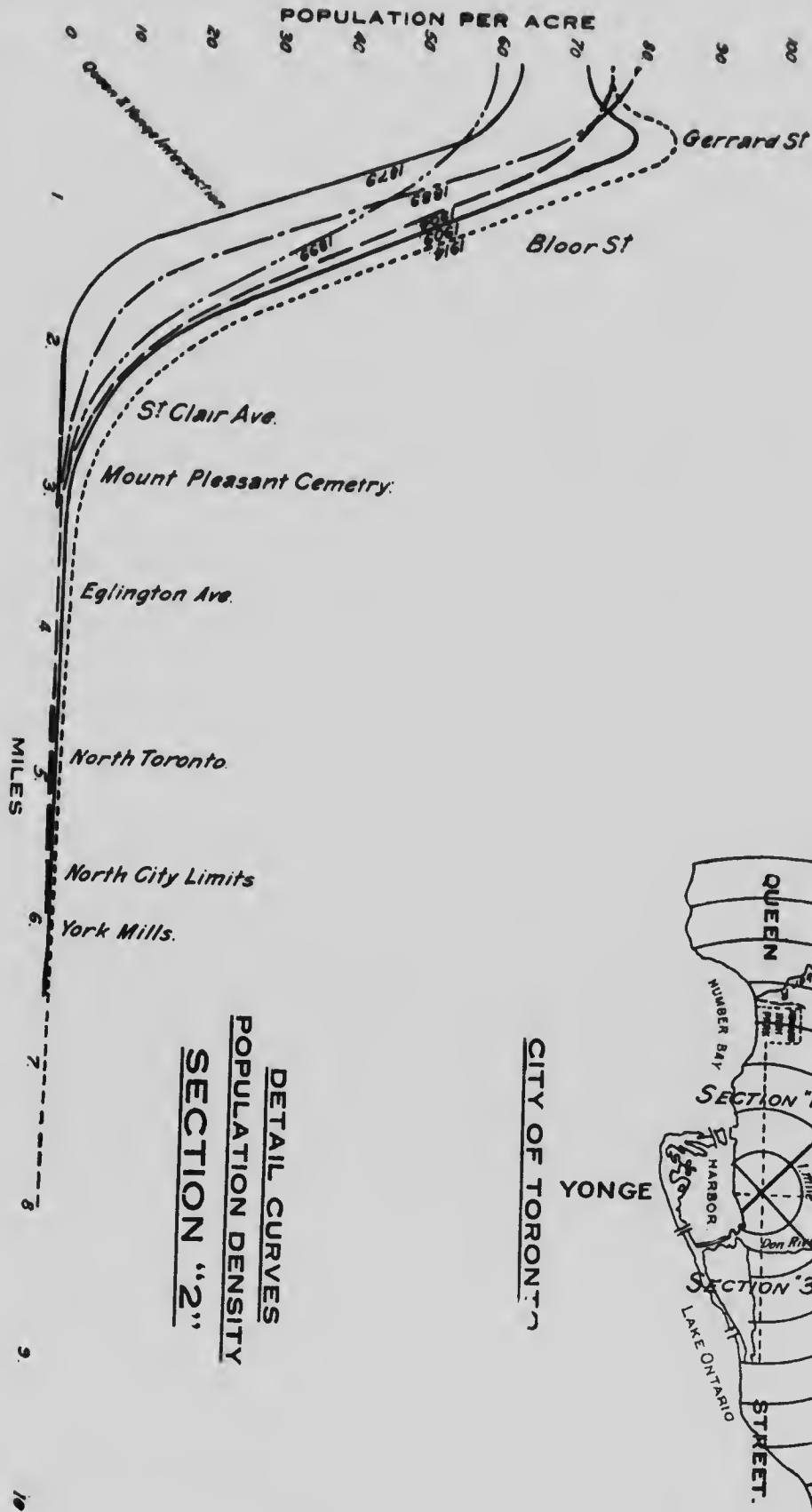
CITY OF TORONTO



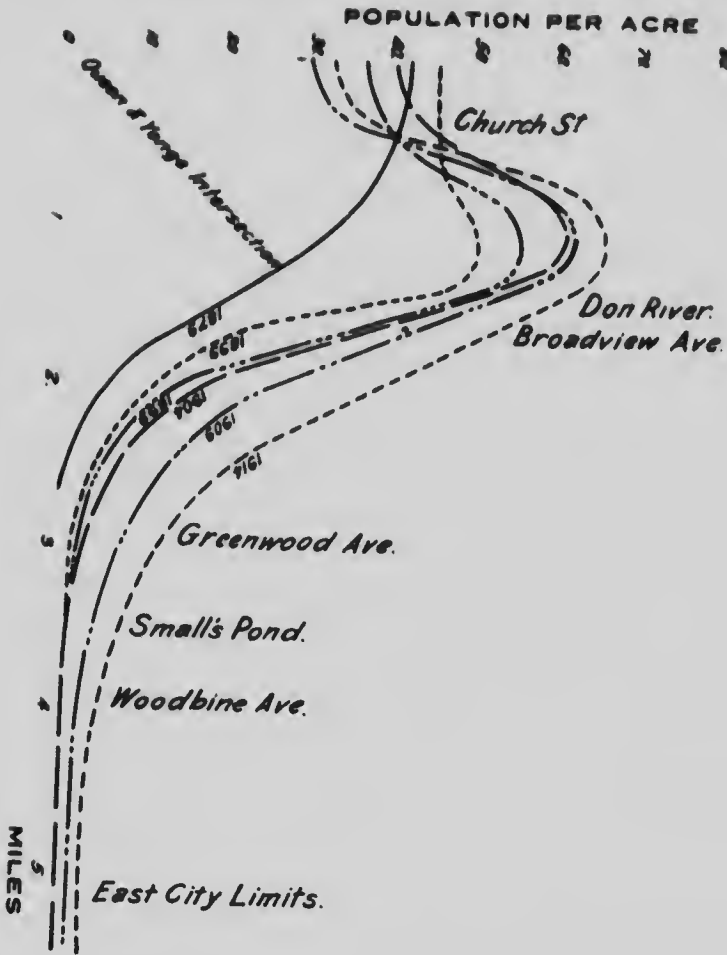




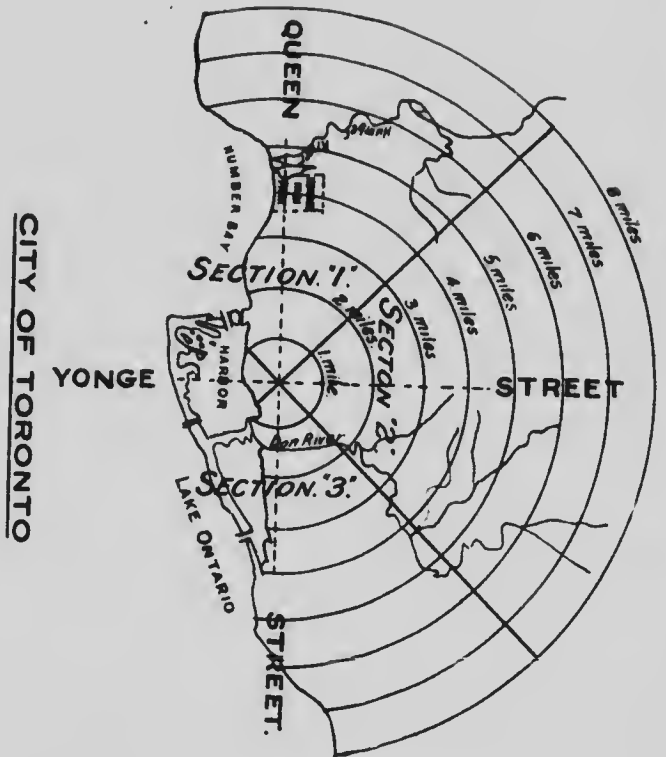




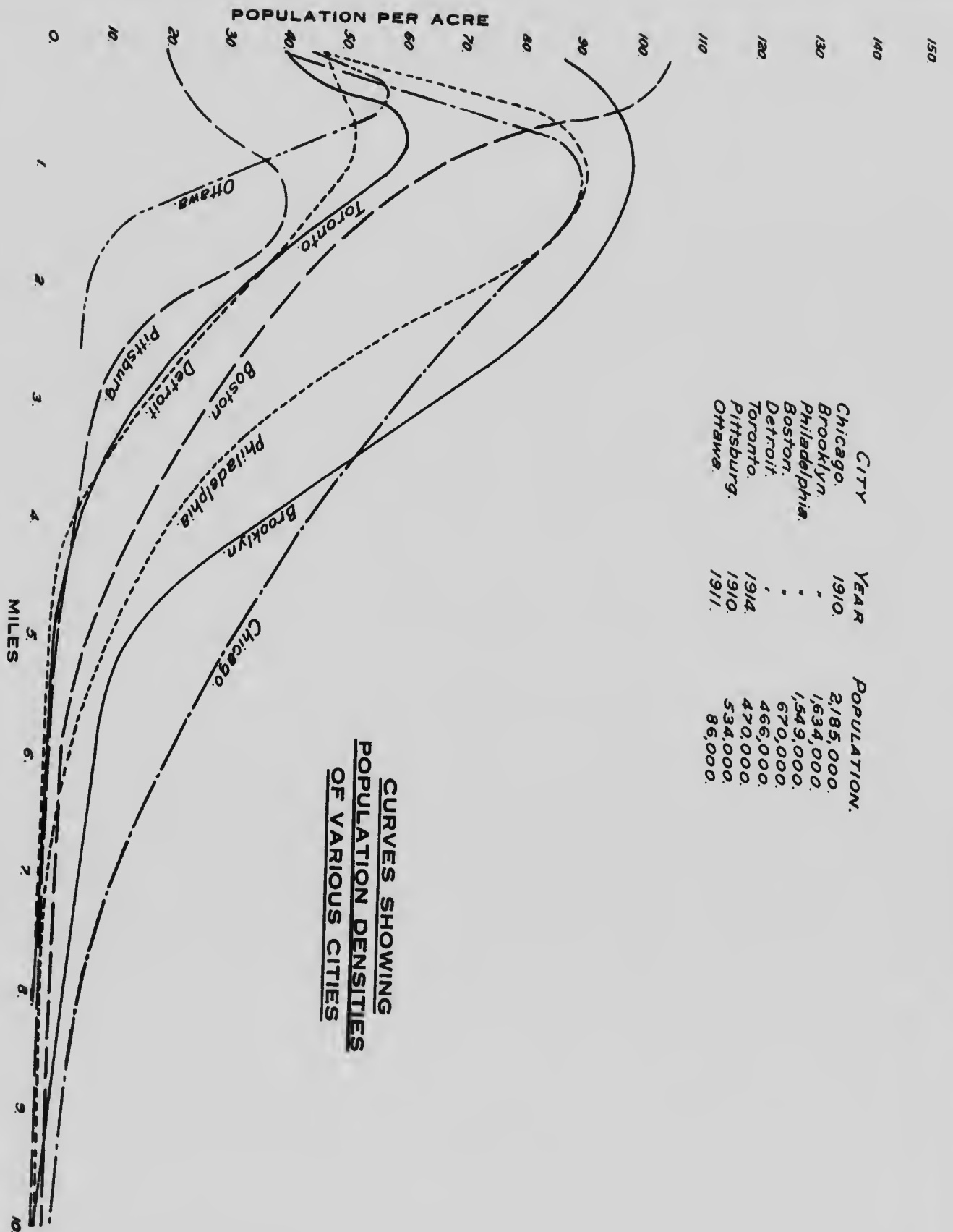




DETAIL CURVES
POPULATION DENSITY
SECTION "3"







**CURVES SHOWING
POPULATION DENSITIES
OF VARIOUS CITIES**



GROWTH OF STREET RAILWAY TRAFFIC IN RELATION TO POPULATION

It is evident that the total street railway traffic in any city is a function of the population, as is also the fact that there is a limit to the riding that any one person may conveniently do; or in other words, after a city has reached a certain period in its growth, the number of rides per capita will tend to become constant.

Estimates of future traffic have formerly been based largely, and in our opinion, falsely, upon the "Law of Squares," which is, that "revenue rides increase as the square of the factor of increase of population."

While this has held, and even up to a critical point in population, it has exceeded in many cities, consideration shows the fallacy of such assumption as applied throughout the total length of the population scale.

The law manifestly cannot be admitted except as an approximation applied to a city in its earlier periods of growth. The problem is to determine empirical formulæ, which, while covering past conditions, give results which may be reasonably applied to the future.

The increase of riding habit in a growing city, assuming that the facilities for transportation keep pace with requirements, may be divided into two independent factors:—

(a) The normal increase due to an increasing proportion of the city's total population, who, because of distance, ride each day, to and from the central business district, together with the increase due to those who ride for social, shopping or other purposes.

(b) The increase in the actual habit of riding, cultivated by improved transportation.

When population is contained within a circle, of say one mile radius, a street railway is unnecessary, but as the city grows, and people settle outside this zone, a street railway system becomes essential. The effect of this continued growth is to increase the proportion of those living without the central area, and thus of those who daily ride to such district. While

it is a fact that the inner zone usually becomes more densely populated, the actual population added to this area is comparatively small, and for the purposes of this investigation it may be assumed without sensible error, that the whole increase is in the outer zone.

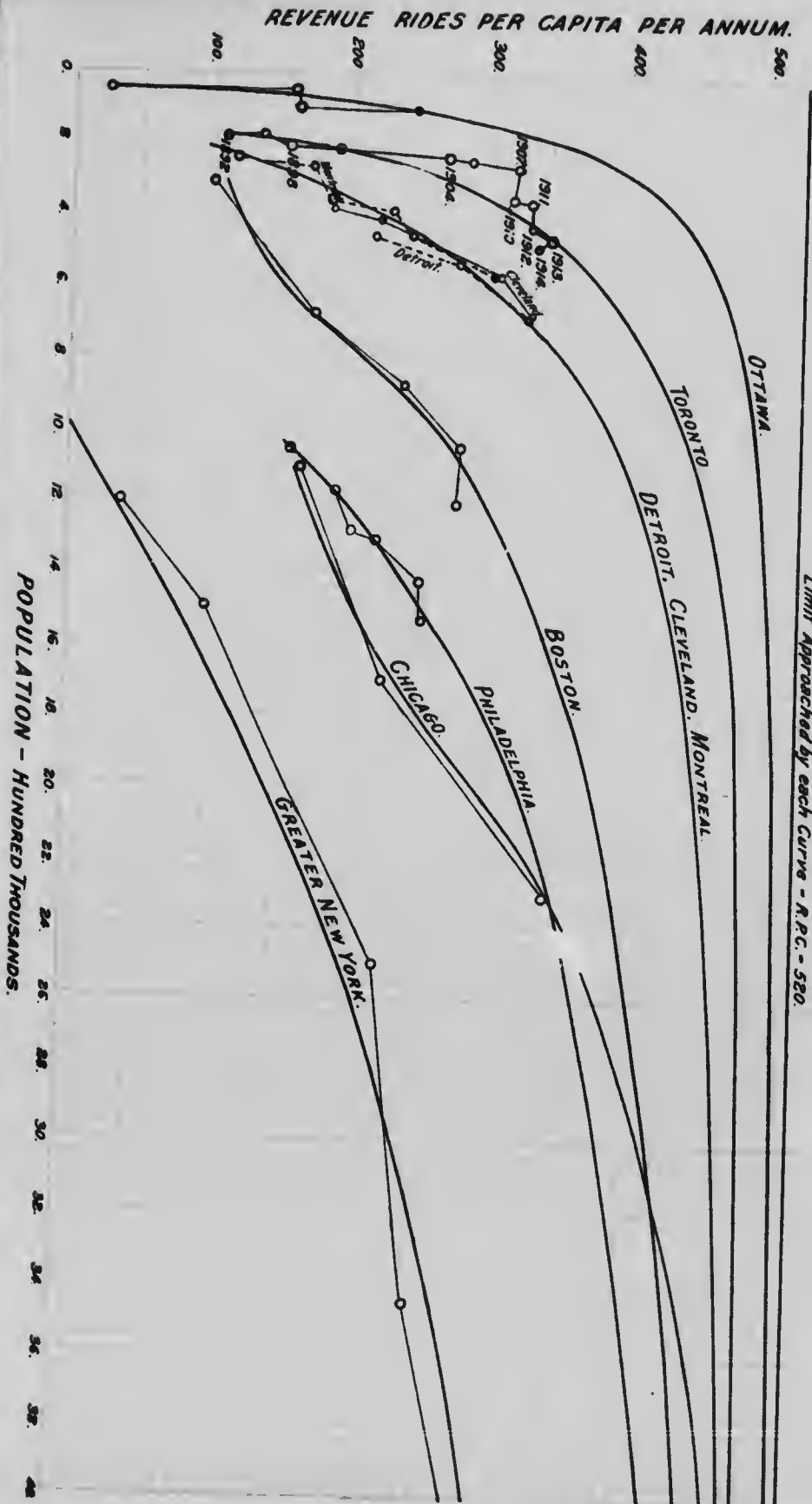
It can be demonstrated, however, that the growth of the total traffic with the increase of population in outlying sections, together with proper transportation facilities, follows a well defined law, which indicates that about 520 is the limit of rides per capita per annum. This law applied to Greater New York, Chicago, Philadelphia, Cleveland, Detroit, Boston, Montreal, Ottawa and Toronto, gives the curves as shown on Plate No. 7. It will be observed that while the curve showing rides per capita increase at different rates in these cities, according to their size and physical peculiarities, they all show like graphic characteristics and approach the same limit, viz., 520, indicating that unless drastic change occurs in transportation methods, this limit will approximate the maximum obtainable.

Upon Plates Nos. 8 and 9 are plotted the total number of revenue passengers carried per annum, in the above mentioned cities, in relation to population thereof. These have been projected for future increase in population, on the law established.

Combining the information given by the revenue passenger and rides per capita curves for Toronto, with that given by the curve of population growth (discussed in the section on "Growth of Population"), the following table for the probable future passenger traffic conditions has been compiled, always assuming adequate development of transportation facilities.

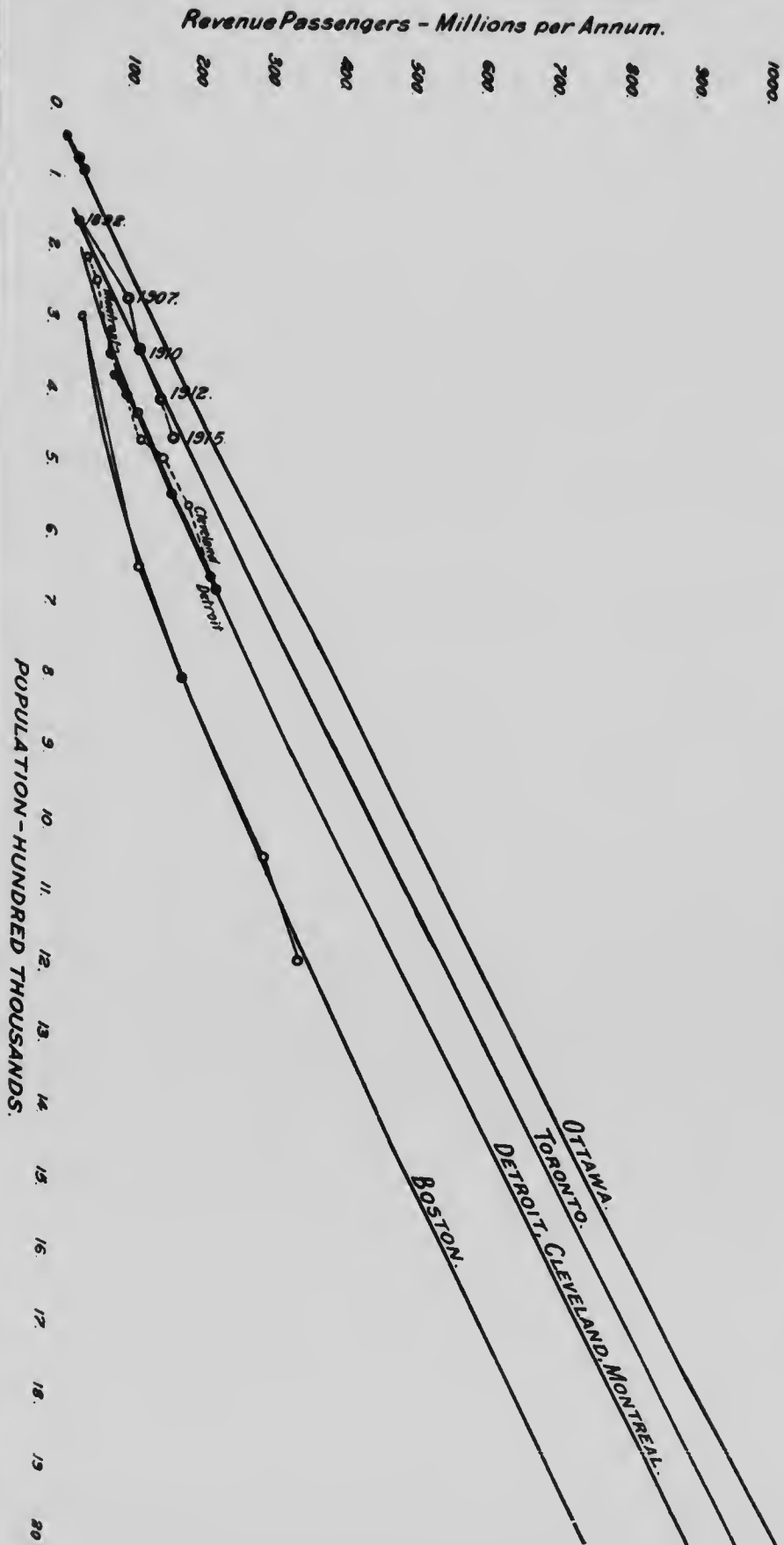
Year	Population	Revenue Passengers per Annum	Revenue Rides per Capita, per Annum
1914	470,000	153,000,000	325
1920	590,000	225,000,000	375
1925	705,000	282,000,000	400
1930	835,000	350,000,000	420
1935	975,000	425,000,000	435
1940	1,135,000	510,000,000	450

CURVES SHOWING
GROWTH OF RIDING HABIT.
CITIES OF CANADA AND
THE UNITED STATES

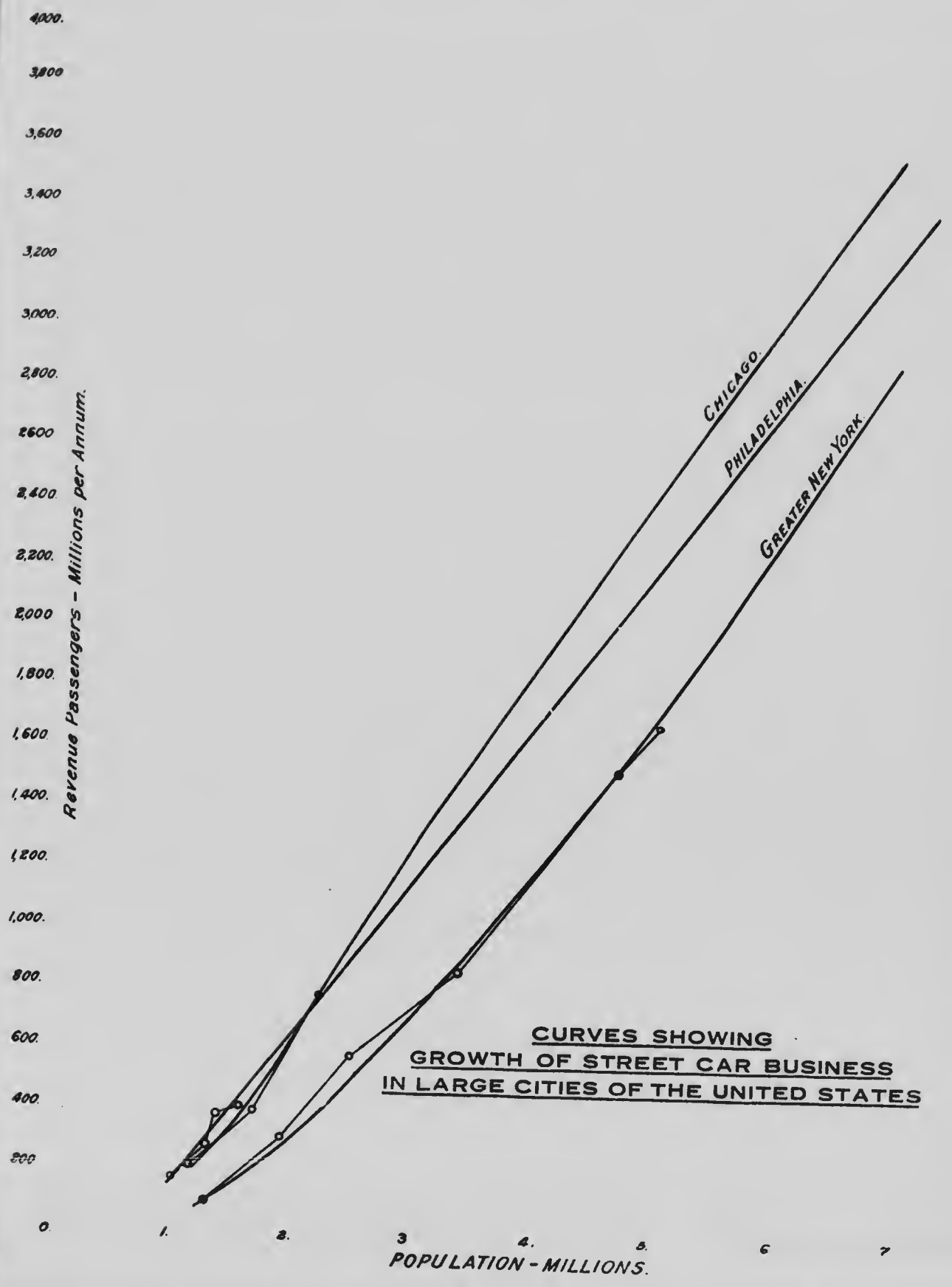




CURVES SHOWING
GROWTH OF STREET CAR BUSINESS
IN CITIES OF CANADA AND
THE UNITED STATES









GROWTH OF POPULATION TORONTO

A study of the growth of population, in the last 50 years, presents one outstanding feature, i.e., that the increase has taken place in periodic waves extending over 20 to 25 years. The first of these occurred from 1870 to 1890, and the second from 1890 to about 1915.

In the early part of these periods, the population of the city increased in strict relation, both as to proportion and volume with what can be called the static increase, (closely 2%) due to the excess of births over deaths, and to the normal influx to the metropolitan centre, which in the last century was a condition obtaining in almost all countries. During the latter half of these periods, the growth of population in the city was out of all relation and proportion to this static increase, a condition due largely to immigration.

From 1870 to about 1882, the increase in population was due to the excess of births over deaths, and rural immigration, which amounted to about 50%. From 1882 to 1890, a period of 8 years, an increase of 100% took place. From 1890 to 1900 the increase was entirely static, and amounted to about 20%, while from 1900 to 1915, a period of 15 years, the increase was 150%.

These periods and populations hereinbefore referred to, are shown on Plate No. 10. The thin irregular line on diagram indicates the actual population, while the broken lines, indicate what the population would have been, if the increase due to births and rural immigration had alone operated. Investigation made in many cities, shows that the constant increase from these causes is about 2% per annum. Projection from 1914 at this static rate of increase shows that the city would possess a population of 700,000 in 1935, and about 1,000,000 in 1950.

Plate No. 11 represents graphically the immigration to the Dominion of Canada, the Province of Ontario, and Toronto, respectively, and shows the causes for abnormal increases from 1882 to 1890 and from 1900 to 1915. It should be noted that Ontario has been receiving since 1900 about 25% of the immigration to Canada, and of this amount Toronto has been taking a large portion. In 1909, Toronto apparently absorbed practically the whole of the immigration into Ontario. In most years, it appears to have taken 50%, but in 1913, it fell to 15%.

On Plate No. 12 is plotted the annual increase of population. The broken line indicates the static increase.

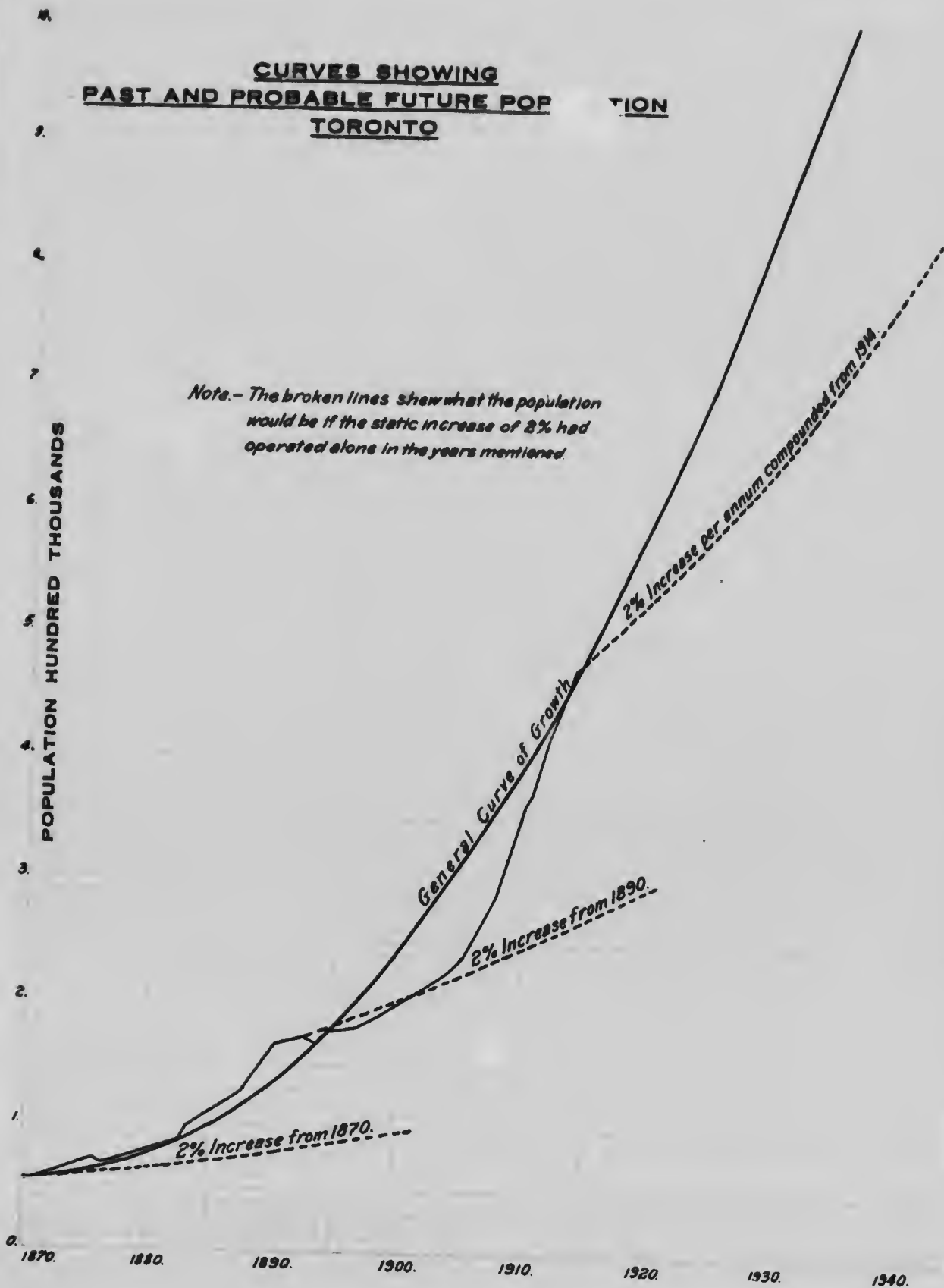
Plate No. 13 shows curves of population increase from 1840 to 1910 for Philadelphia, Brooklyn, New York, Cleveland, Detroit and Toronto.

Plate No. 14 shows curves indicating annual increase in terms of per cent. for Philadelphia, Brooklyn, New York, Cleveland, Detroit and Toronto.

The following table shows the estimated future population for Toronto:—

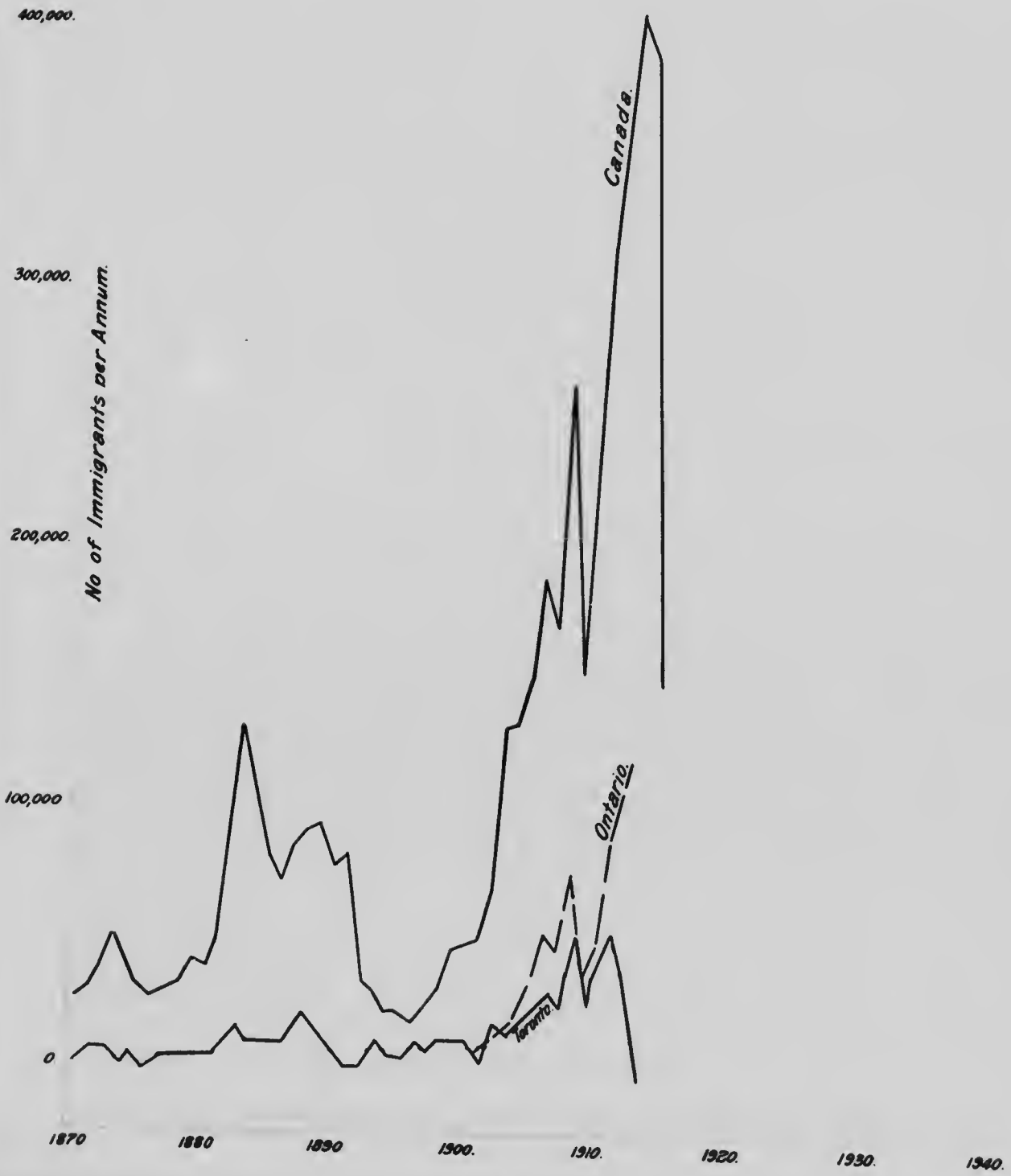
Year	Estimated Population
1914.....	470,000
1920.....	590,000
1925.....	705,000
1930.....	835,000
1935.....	975,000
1940.....	1,135,000
1945.....	1,310,000
1950.....	1,491,000

**CURVES SHOWING
PAST AND PROBABLE FUTURE POPULATION
TORONTO**



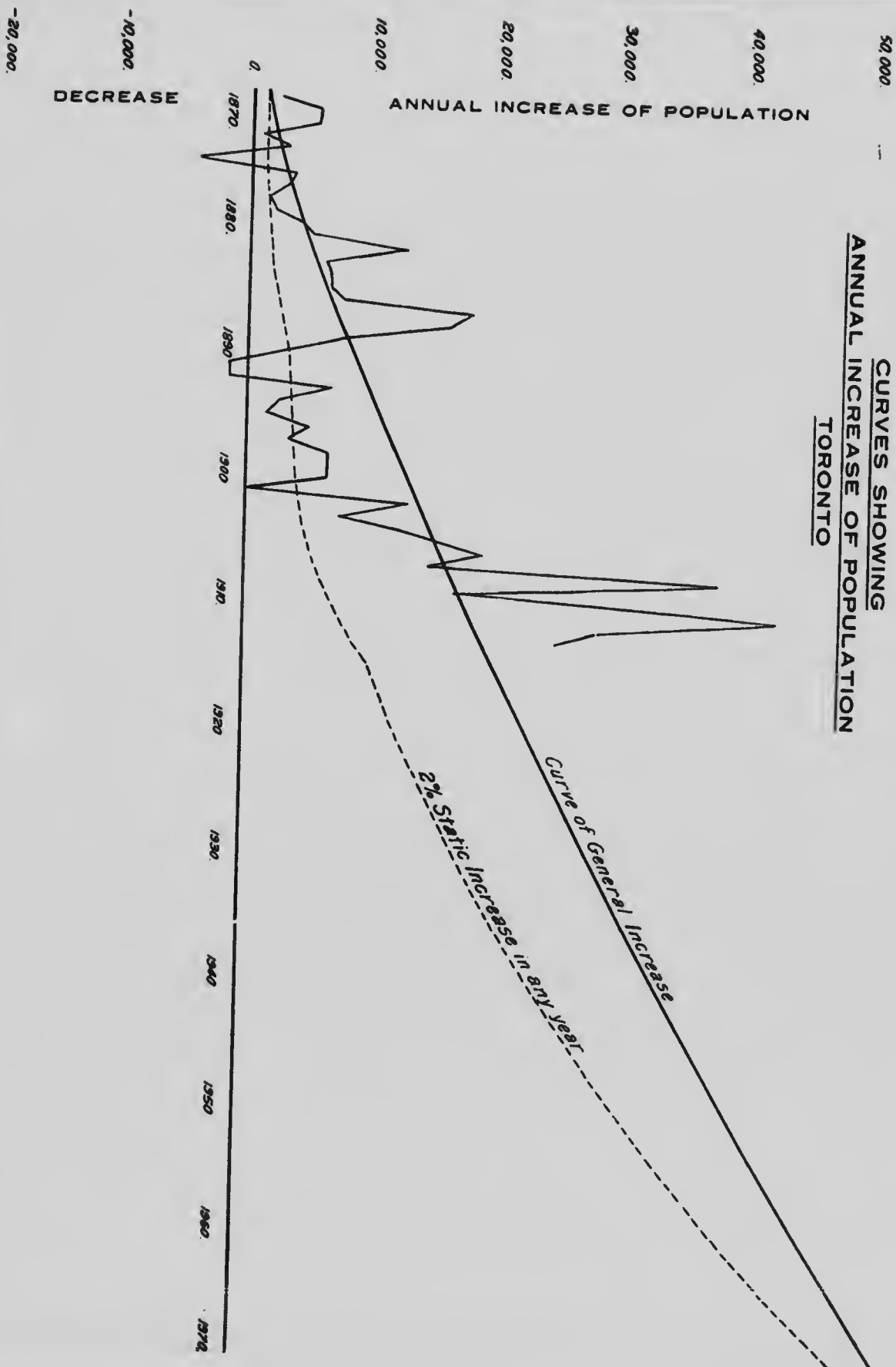


CURVES OF ANNUAL IMMIGRATION
OF CANADA, ONTARIO AND TORONTO



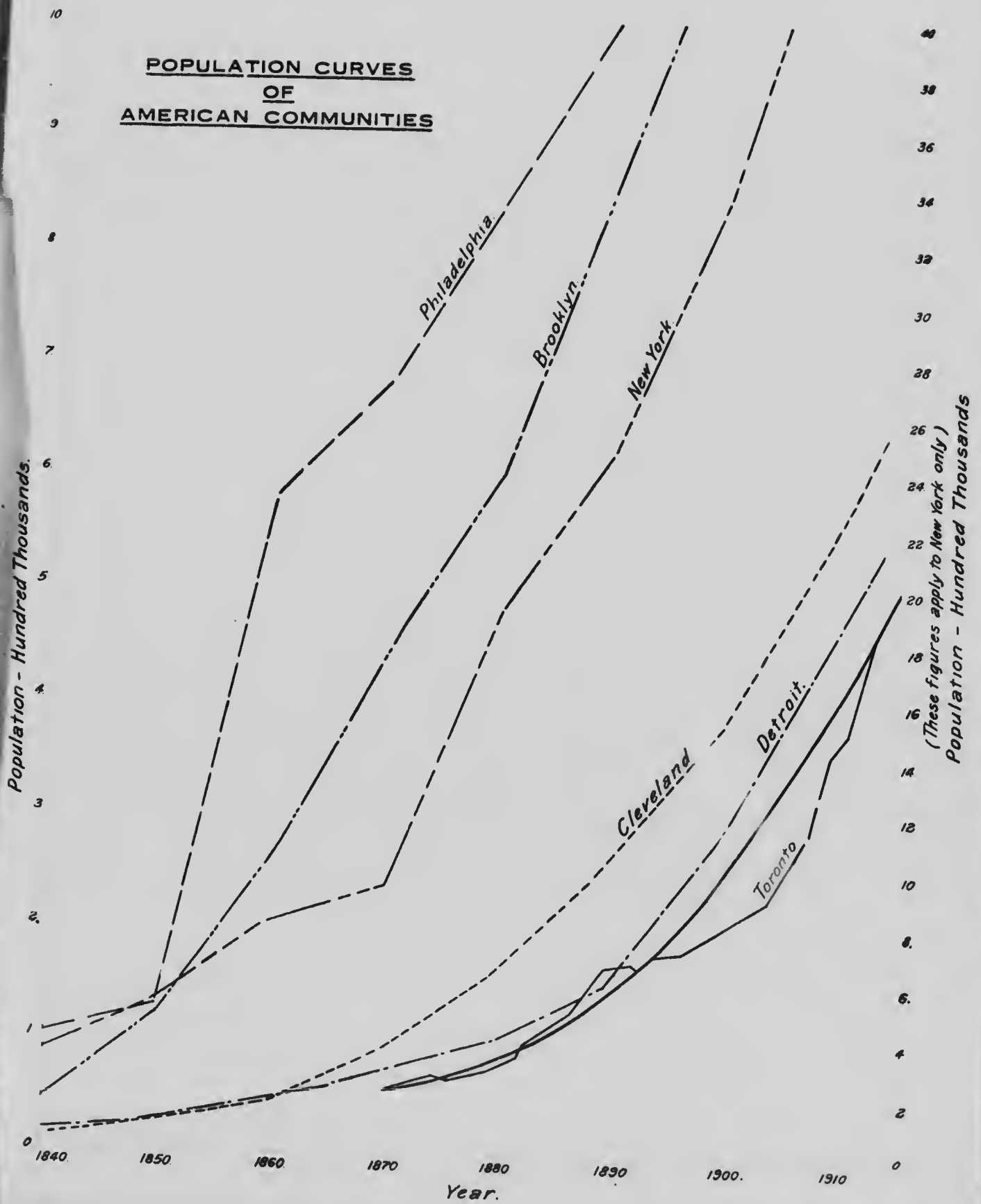


**CURVES SHOWING
ANNUAL INCREASE OF POPULATION
TORONTO**



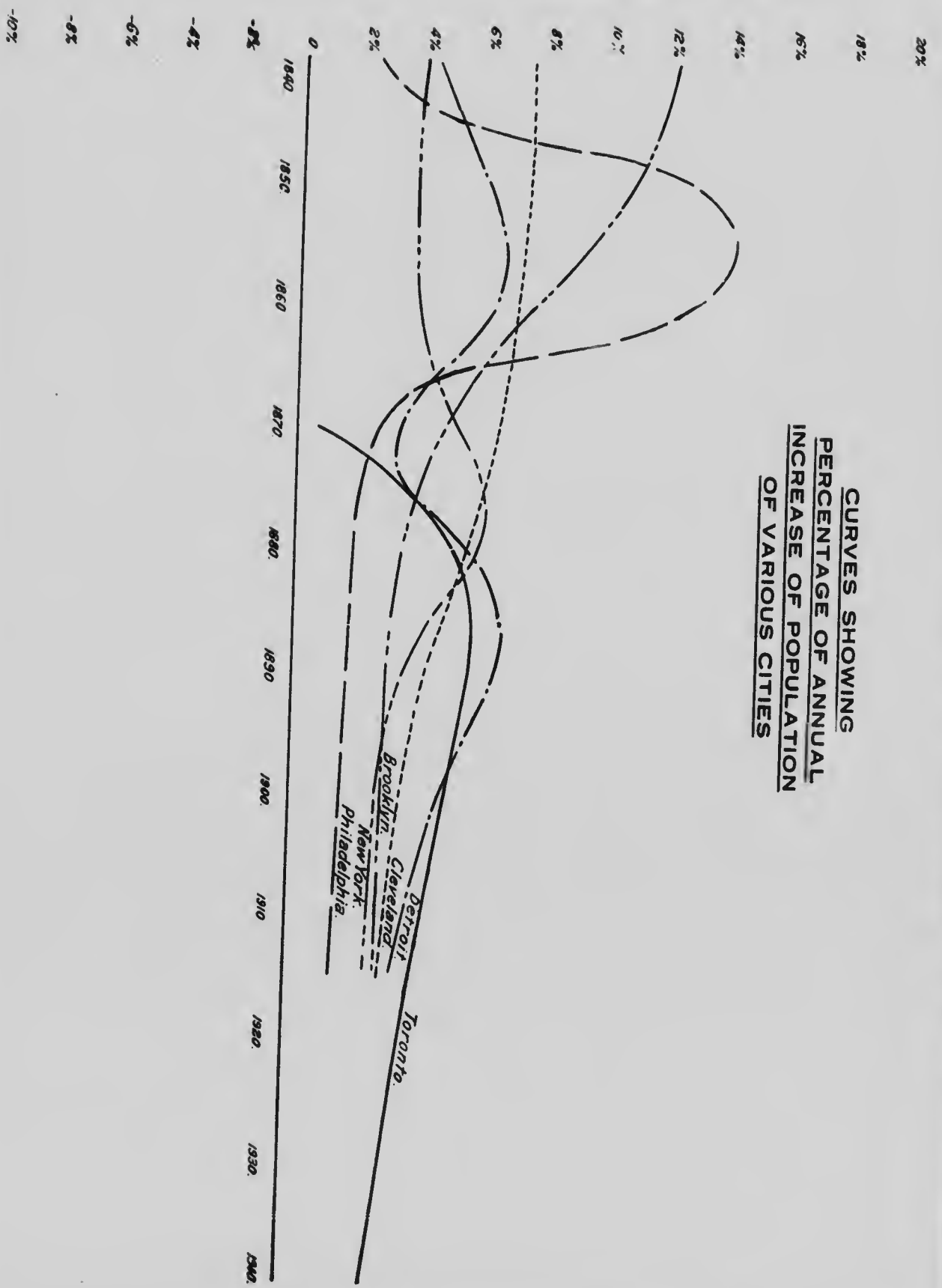


**POPULATION CURVES
OF
AMERICAN COMMUNITIES**





**CURVES SHOWING
PERCENTAGE OF ANNUAL
INCREASE OF POPULATION
OF VARIOUS CITIES**





**DIAGRAM SHOWING VOLUME AND DISTRIBUTION OF DAILY
PASSENGER TRAFFIC ON STREET CAR ROUTES
IN THE CITY OF TORONTO**

Drawing No. 11 shows the total combined inbound and outbound passenger traffic between 6 a.m. and 12 p.m. at every point along the routes of the Toronto Railway Company and the Civic car lines. It clearly shows the daily street car passenger traffic flow, and the relative importance of the various streets as traffic carriers. As a measure of absolute traffic density or overcrowding it is of little value, since it indicates only the total traffic for an eighteen hour period. It shows markedly, the excess loading on Yonge Street, compared with the minor loading on Church and Sherbourne Streets, and the very heavy traffic on Queen Street at the Don, compared with the little use made of Wilton Avenue.

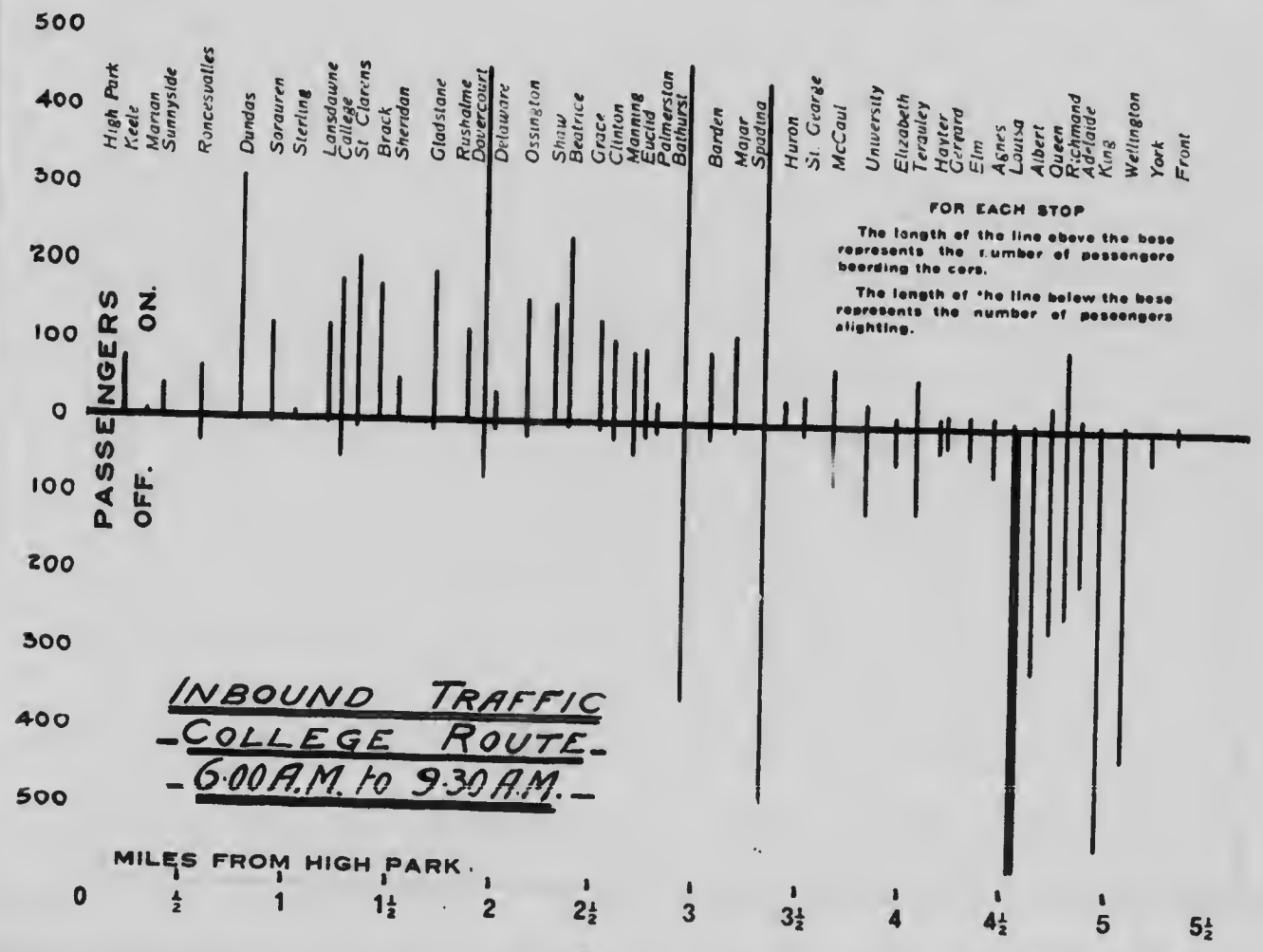
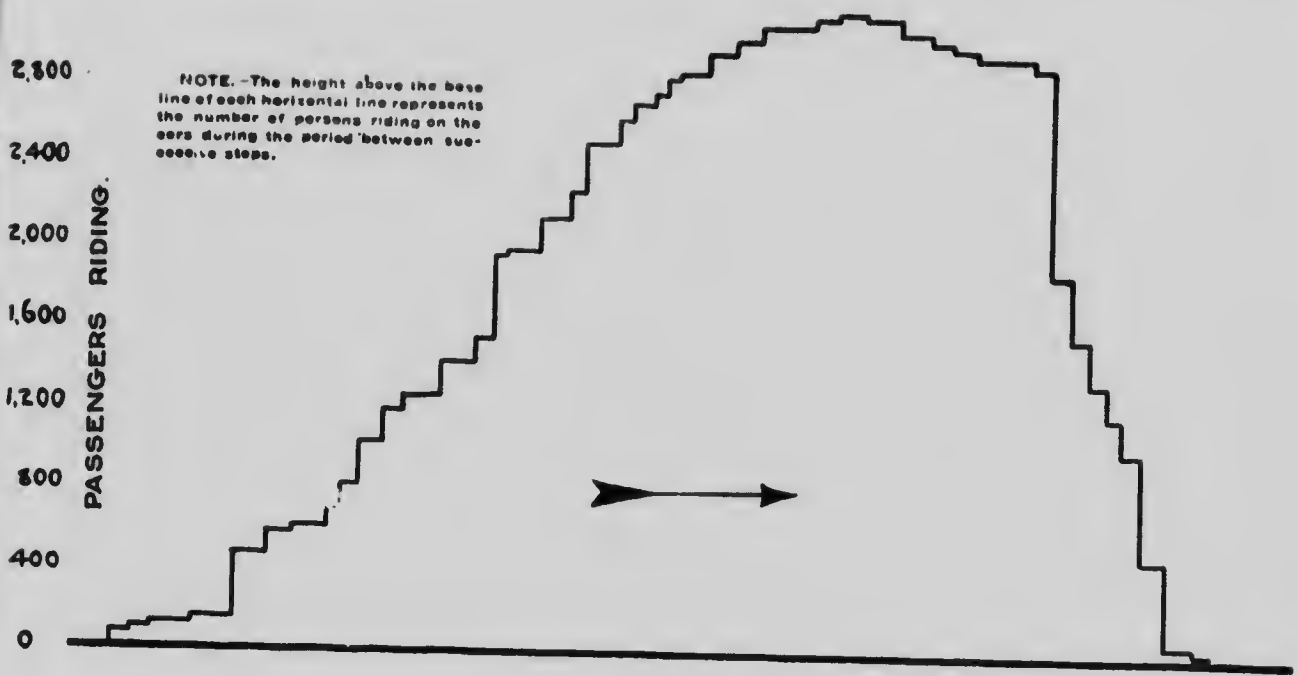
More particularly it shows that the general direction of traffic, is not north and south, but east and west and northwest, and that semi-rapid transit lines as a means of relief are most warranted running east and west and northwest. It demonstrates that the greatest need for further trackage is in West Toronto. At the time the traffic counts were taken, the Bloor Street Civic line was operating over temporary tracks and was, therefore, not fully used.

While the plan of the downtown district is on larger scale than the balance of the city, the loading and unloading ribbons are plotted to the same scale as the remainder of plan.

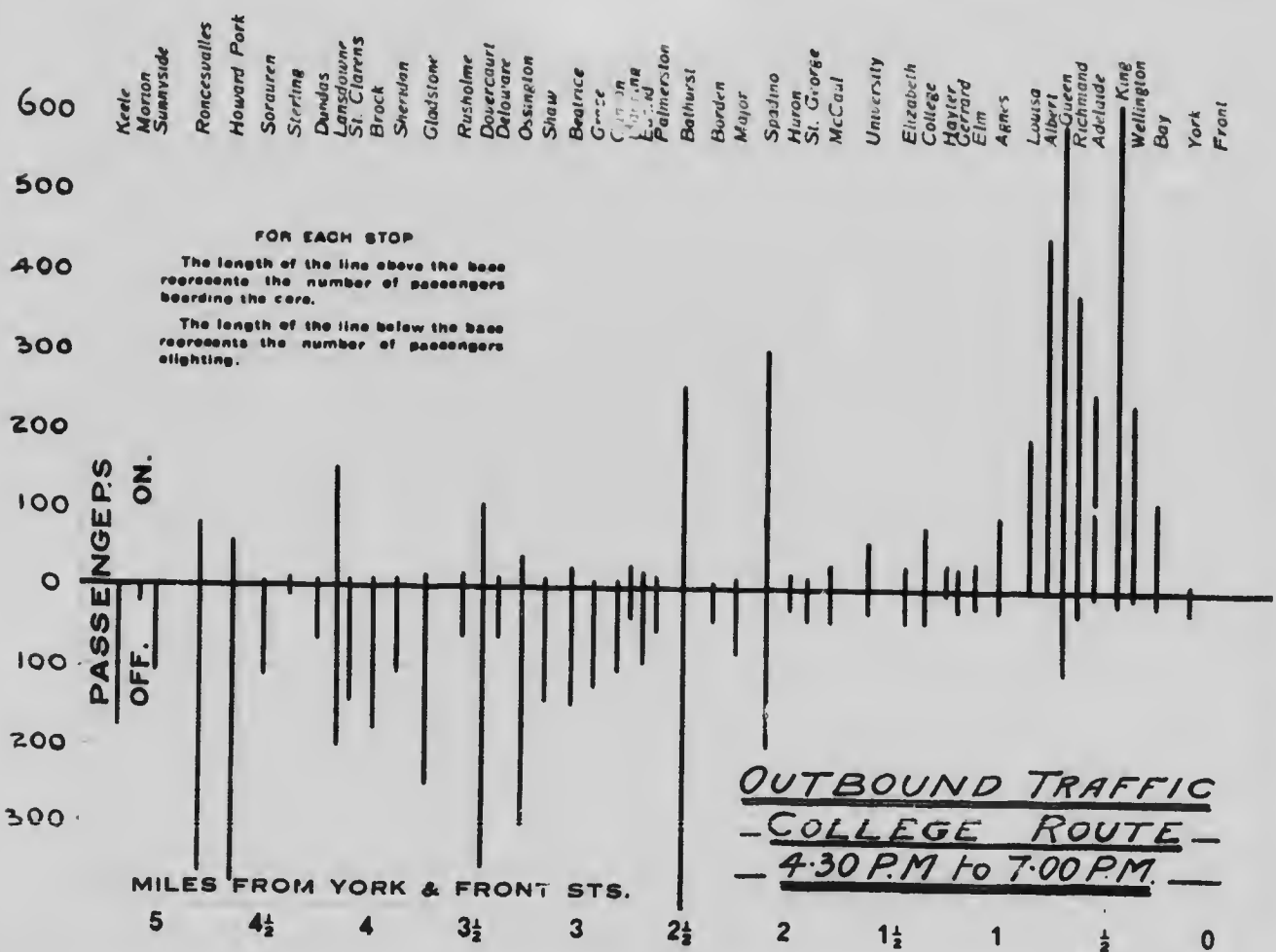
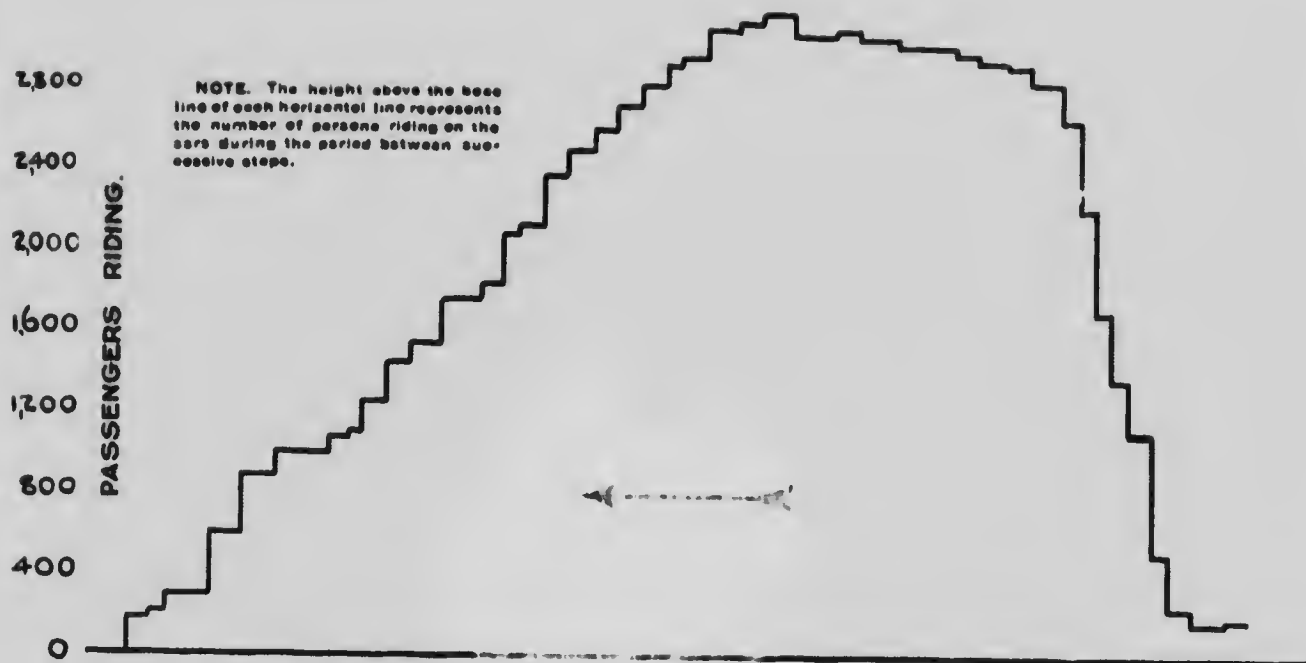
Approximately the following number of passengers cross these respective points daily:—

King and Yonge Streets.....	54,706
Queen and Yonge Streets.....	58,122
Queen Street, between Terauley and Bay Streets.....	53,599
Spadina Ave. and College Street.....	64,227
Yonge and Bloor Streets.....	43,177
Queen Street high level bridge at Don.....	54,253









3



TIME ZONE MAPS

Drawings Nos. 14 and 15 present a graphic comparison, of the minimum time required to reach any point in the city from the corner of King and Yonge Streets, using the present street car service as far as possible, and then walking to destination at the rate of 3 miles per hour, with that necessary, if all street railway transportation in the city were co-ordinated, and the track and equipment brought to conform to modern specifications and standards.

The territory embracing all points which may be reached within the first five minutes travel from King and Yonge Streets, is colored deep blue, ten minutes travel a light blue, and so on in irregular zones, each representing five minutes, until the sixty minute zone is reached. The charts are only colored within the built-up area. Minimum time is represented in every case.

The speeds of car travel used on Drawing No. 14, showing present conditions, are those found by actually timing the cars over the several routes, both through the business and residential districts.

Drawing No. 15 portrays the time saving possible, if the existing surface systems, were provided with improved equipment and operated at higher service efficiency.

Within the limits of the downtown district a speed of 7 miles per hour has been assumed, for the area included between Simcoe Street, Louisa Street, Shuter Street and Jarvis Street.

The second speed zone consists of the area outside the district aforementioned, and included within the boundaries of Spadina, College, Carlton, Sherbourne, Queen Street and the Don River, together with Queen Street west as far as Gore Vale Avenue, Queen Street east to De Grassi Street and Yonge Street to Davenport Road. Within the limits of this zone the schedule speed to be maintained is 10 miles per hour.

The third speed zone is the remainder of the city, for which a schedule speed of 14 miles per hour has been assumed. This zone being by far the largest, the effect of this increased speed is very marked.

The following table gives a comparison of the time required under present surface system, and that attainable with the surface system operated as hereinbefore outlined, all based from corner of King and Yonge Streets as starting point.

Location	Present	Attainable
Lawrence Park.....	50 Minutes	35 Minutes
Fairbank.....	55 "	30 "
Weston.....	65 "	50 "
Lambton.....	55 "	35 "
Todmorden.....	35 "	20 "
Dawes Road.....	35 "	30 "
Munro Park Avenue.....	30 "	27 "
Annette and Runnymede Rd..	45 "	30 "
Vaughan Road.....	25 "	19 "
Yonge and Eglinton.....	28 "	20 "
Glen Road and Summerhill...	30 "	18 "
Gerrard and Main St.....	24 "	19 "

To accomplish this attainable schedule would require considerable additional trackage.

It will readily be seen by reference to Drawing No. 15 that it is possible to provide service to every portion of the city in 30 minutes from the corner of King and Yonge Streets.

**ANALYSIS OF PASSENGER MOVEMENT DURING MORNING RUSH
PERIOD, SHOWING THE DIFFERENT REQUIREMENTS FOR
CAR SERVICE IN THE VARIOUS SECTIONS OF THE
CITY**

Drawing No. 9 shows in diagrammatic form the following information for sixteen divisions of the city:—

1. Number of passengers boarding inbound cars.
2. Number of passengers boarding outbound cars.
3. Number of passengers alighting from inbound cars.
4. Number of passengers alighting from outbound cars.

These four movements are given for each half-hour during the morning rush period from 6.00 a.m. to 9.30 a.m. It is fair to assume that loading in any district during this period, is largely made up of the residents of that district, proceeding to their daily avocation. By far the greater part of the unloading in any district during this period, will be that of persons employed in that district. Thus, to a considerable, though indeterminate extent, the character of each section of the city may be read by the relative amounts of the loading and unloading in the several half-hour periods.

The unloading in each district provides some criterion of the business and industry carried on within its borders, both in amount and kind, and from what direction it draws its workers.

Taking the loading and unloading diagrams in Parkdale for an example, it is seen that the great majority of people board cars bound toward the centre of the city, though a few travel northward toward West Toronto. The passengers leaving the district are much greater in number than those entering it, thus indicating that the district is mainly residential.

The following tables show the loadings and unloadings in the various districts for the various half-hours. The names of the districts are more or less arbitrary, and are in the order as outlined on the plan, reading from left to right, taking the top tier first and the lower tier second.

Boarding Inbound Cars in the Various Sections of the City

	6.00-6.30 A.M.	6.30-7.00 A.M.	7.00-7.30 A.M.	7.30-8.00 A.M.	8.00-8.30 A.M.	8.30-9.00 A.M.	9.00-9.30 A.M.
West Toronto.....	781	932	1,592	1,458	1,044	812	653
Dovercourt-Earlscourt	555	757	1,210	1,266	763	597	472
Bathurst.....	522	750	1,259	1,604	1,065	1,039	680
Yorkville-North Toronto	274	420	781	1,337	1,006	1,127	625
Rosedale.....	32	66	130	219	220	214	120
North Riverdale.....	258	502	959	861	634	372	115
North Midway.....	69	53	92	88	21	27	24
East Toronto.....	233	221	395	265	71	103	85
Parkdale.....	336	402	938	1,410	935	859	427
Brockton.....	269	562	897	1,292	820	610	402
Southwest Central....	559	765	1,024	1,616	892	736	488
Central.....	237	323	419	593	469	386	330
Southeast Central....	406	384	479	602	421	335	243
South Riverdale.....	622	878	1,261	1,391	981	634	430
South Midway.....	359	331	567	524	267	146	69
Beaches.....	273	405	1,064	1,114	875	721	215
	5,785	7,751	13,067	15,640	10,484	8,718	5,378

Total, 66,823.

Boarding Outbound Cars in the Various Sections of the City

	6.00-6.30 A.M.	6.30-7.00 A.M.	7.00-7.30 A.M.	7.30-8.00 A.M.	8.00-8.30 A.M.	8.30-9.00 A.M.	9.00-9.30 A.M.
West Toronto.....	29	55	84	86	58	50	63
Dovercourt-Earlscourt	54	99	60	30	30	54	38
Bathurst.....	61	72	120	105	145	161	99
Yorkville-North Toronto	91	83	116	290	152	170	128
Rosedale.....	19	39	26	104	49	34	30
North Riverdale.....	26	47	13	98	33	48	10
North Midway.....	5	1	4	6	1	13	4
East Toronto.....	3	8	2	2	2	2	2
Parkdale.....	133	206	172	139	124	100	94
Brockton.....	247	255	281	237	137	99	130
Southwest Central....	381	439	349	372	231	165	165
Central.....	207	306	294	544	392	435	322
Southeast Central....	126	169	232	300	198	225	157
South Riverdale.....	127	81	85	131	85	36	63
South Midway.....	3	14	19	18	10	14	11
Beaches.....	13	4	21	15	7	1	15
	1,525	1,878	1,878	2,477	1,654	1,607	1,331

Total, 12,350.

Grand total of passengers boarding inbound and outbound cars, 79,173.

Alighting from Inbound Cars in the Various Sections of the City

	6.00-6.30 a.m.	6.30-7.00 a.m.	7.00-7.30 a.m.	7.30-8.00 a.m.	8.00-8.30 a.m.	8.30-9.00 a.m.	9.00-9.30 a.m.
West Toronto.....	48	103	125	80	96	91	54
Dovercourt-Earlscourt	35	48	24	36	50	28	39
Bathurst.....	75	90	104	196	105	91	78
Yorkville-North Toronto	179	114	178	250	188	209	185
Rosedale.....	8	40	27	42	29	22	14
North Riverdale.....	12	16	30	18	11	6	7
North Midway.....	6	5	7	3	1	9	0
East Toronto.....	1	3	5	3	0	1	2
Parkdale.....	81	200	119	172	108	109	61
Brockton.....	86	559	241	307	168	132	105
Southwest Central....	281	719	721	1,629	860	535	322
Southeast Central....	197	728	508	408	231	181	157
South Riverdale.....	45	132	106	179	91	68	55
South Midway.....	3	9	21	33	4	4	4
Beaches.....	2	3	15	25	14	8	3
Total, 13,976.	1,059	2,769	2,231	3,381	1,956	1,494	1,086

Alighting from Outbound Cars in the Various Sections of the City

	6.00-6.30 a.m.	6.30-7.00 a.m.	7.00-7.30 a.m.	7.30-8.00 a.m.	8.00-8.30 a.m.	8.30-9.00 a.m.	9.00-9.30 a.m.
West Toronto.....	403	962	407	596	491	337	307
Dovercourt-Earlscourt	84	150	124	174	190	123	155
Bathurst.....	154	225	136	216	217	189	125
Yorkville-North Toronto	145	326	275	425	453	335	259
Rosedale.....	42	43	43	134	64	59	51
North Riverdale.....	59	18	15	76	30	55	47
North Midway.....	41	32	10	26	9	12	9
East Toronto.....	65	80	78	67	39	75	27
Parkdale.....	194	267	221	278	207	154	141
Brockton.....	225	750	355	434	288	183	181
Southwest Central....	135	421	379	974	607	335	"
Southeast Central....	172	574	422	356	226	165	;
South Riverdale.....	97	210	166	234	155	171	;
South Midway.....	79	57	57	72	52	37	60
Beaches.....	30	50	45	121	122	78	113
Total, 20,641.	1,925	4,165	2,733	4,183	3,150	2,308	2,177

The total number of passengers alighting in the central district was as follows:—

	6-6.30 A.M.	6.30-7 A.M.	7-7.30 A.M.	7.30-8 A.M.	8-8.30 A.M.	8.30-9 A.M.	9-9.30 A.M.
Central District.....	950	2,826	4,095	10,583	10,712	7,118	4,681

Total, 40,965.

Grand Total of passengers alighting throughout the city, 75,582.

The total count of passengers boarding cars was, 79,173, and total count of passengers unloading from cars was 75,582, which shows a discrepancy in the counts of but 4.4%.

**PLAN SHOWING THE RIDING NECESSITY OR HABIT OF THE
POPULATION OF TORONTO IN VARIOUS PORTIONS OF
THE CITY**

In the attempt to analyze the riding habit of the citizens, the City was necessarily divided into a number of more or less arbitrary divisions in such a way, that there could be little question but that persons resident in each district would board cars at stops within that district.

Reading from left to right on Drawing No. 12, and beginning with the upper tier, these sections together with their populations are as follows:—

District	Population
West Toronto.....	54,700
Dovercourt-Earlscourt.....	46,700
Bathurst.....	37,000
Yorkville-North Toronto.....	42,900
Rosedale.....	10,100
North Riverdale.....	18,400
North Midway.....	3,500
East Toronto.....	4,400
Parkdale.....	29,300
Brockton.....	36,800
Southwest Central.....	61,900
Central.....	45,200
Southeast Central.....	42,200
South Riverdale.....	33,300
South Midway.....	12,000
Beaches.....	15,300

The downtown central business area is not included in the central section.

These districts are compared on the basis of passengers boarding cars per thousand of population, resident within the district, during five periods of the day, and again on the basis of outgoing rides per thousand of population per hour during these periods.

The periods chosen are from 6.00 a.m. to 8.00 a.m.; from 8.00 a.m. to 9.30 a.m.; from 9.30 a.m. to 4.30 p.m.; from 7.00 p.m. to 12.00 midnight. Passengers boarding the cars in these four periods are, at least in the outer

areas, for the most part residents of the district; on the other hand, of the passengers boarding between 4.30 p.m. and 7.00 p.m., the majority are probably non-residents.

Several reasons are given for varying rates in different districts, viz.—

(1) Proximity to the centre of the City means little necessity to ride.

(2) Districts inhabited largely by the working classes provide a greater proportion of riding than other districts, where there is a smaller proportion of downtown workers.

(3) The middle districts contain boarding house population, which means a greater proportion of adults, and a much greater theatre and other evening movement, than is the case in districts farther from the centre where the proportion of adults per thousand is less.

(4) Good car service induces a greater riding habit. That is, the number of rides for pleasure purposes per thousand people, will be greater in the districts well served by the Toronto Railway Company.

(5) Certain districts are not so dependent upon the cars, the residents having private means of transportation.

(6) Certain districts have local industries within walking distance of where the workers live. This is true in West Toronto, in the Southeast Central district and in the North Midway, in which latter district market gardening is carried on to an appreciable extent.

On the plan within each of the districts named, there is plotted a square of standard size, representing one thousand persons in the district. This is subdivided into 100 smaller squares, each of which accordingly represents 10 persons.

By significant hatching and color placed over the required number of smaller squares, the number of persons per thousand of population, loading within the district at various periods throughout the day is denoted, in accordance with the legend on the drawing. All the statistics shown are from actual counts of persons boarding cars.

The hourly rate of persons boarding cars in each period, per thousand of population, is represented by the band of heavier color.

The following table gives the rates of loading per thousand of population for the various districts during the several periods of the day:—

District	6 a.m. to 8 a.m.	8-9.30 a.m.	9.30 a.m. to 4.30 p.m.	7 p.m. to 12 Mid.	4.30 p.m. to 7 p.m.	All Day
West Toronto.....	107	52	175	107	102	543
Dovercourt-Earlscourt	87	43	120	78	64	392
Bathurst.....	119	84	252	140	88	683
Yorkville-North Toronto	82	87	214	102	144	629
Rosedale.....	57	52	129	81	58	377
North Riverdale.....	194	87	215	142	189	827
North Midway.....	51	67	110	82	64	374
East Toronto.....	198	114	294	179	144	929
Parkdale.....	126	88	256	172	245	887
Brockton.....	115	66	240	140	143	704
Southwest Central ...	75	41	196	236	159	707
Central.....	62	37	333	194	313	939
Southeast Central....	66	41	172	155	123	557
South Riverdale.....	141	68	196	136	115	656
South Midway.....	128	47	163	150	99	587
Beaches.....	175	124	189	112	62	662

RADIAL RAILWAY ENTRANCE PLAN

Drawing No. 18 shows three focal points, situated east, west, and north, at which radial railways may enter. It also indicates approximate routes from the aforesaid focal points to the waterfront terminal, and illustrates the future possibilities of a downtown loop.

The buff colored section, indicates the area of the City in 1891, when the Toronto Railway franchise was granted; that colored green embraces the area added between 1891 and 1915.

The locations shown on this plan are purely approximate, others having been surveyed which would serve equally well. This plan provides for absolute grade separation. The right-of-way provides for ultimate four track construction.

The lines of the Toronto Railway Company, Civic car lines, and suburban lines, as of 1915, are shown identified by legend.

The black dots signify population in units of 100. These show the total population without the municipal boundaries of 1891, served by existing traction systems to approximate 116,600, of whom 85,200 reside without the limits of 1891, but within those of 1914, and 31,400 outside the City, but adjacent thereto.

Eastern Entrance

From the focal point located in the vicinity of Coxwell and Danforth Avenues, the line runs in a southerly and southwesterly direction to the Toronto Harbor Commission property, thence westerly along the northerly limits of this property to Cherry Street, and then by the marginal way to the main terminal between Yonge and Bay Streets. This line is in open cut from Danforth Avenue to a point near the Grand Trunk Railway, and elevated from this point to the Terminal.

Northern Entrance

For lines from the north, the focal point is in the neighborhood of the intersection of Duplex Avenue with the G.T.R. Belt Line; from this point the plan indicates a two-track subway, except at Ramsden Park, which would be crossed by elevated structure.

Western Entrance

From the focal point in the vicinity of the Lake Shore Road at the Humber, the plan provides for tracks at the same elevation as the Grand Trunk

Railway, which it parallels to the Exhibition Park, then by subway through the Park, emerging at the elevation of the C.P.R. tracks near Strachan Avenue, and from there, at same elevation, on Harbor Commission property, to a point near Bathurst Street. Elevated construction is provided from here along the Harbor Commission marginal way, to the terminal.

**Downtown
Loop**

Until 1921 the radial railways will be restricted to the use of the waterfront terminal. The future will demonstrate the advisability of a downtown loop, somewhat as shown on plan, operated initially as a surface line, pending the time traffic warrants other construction. This will enable radial passengers to reach the central business district by way of Richmond Street.

**Terminal and
Yards**

This plan provides for the location of terminal on the waterfront, ultimately making use of all property between Bay and Yonge Streets, south of the steam railway viaduct to be constructed, with the southerly limit of terminal at the north side of the Harbor Commission marginal way, comprising in all, about 12 acres. This will be the central focal point for all radials.

As hereinbefore indicated, it is proposed to erect this terminal building on the unit plan, meeting needs as they develop. It is intended that it shall comprise a combination business and terminal structure; the front facade on the marginal way, (See Drawing No. 19) with provision for main station and car storage building to the north. In its ultimate development, it will cover the entire future requirements of the radials. All revenue derived therefrom will operate in reduction of the liability of the contributors.

Provision has been made for present and ultimate requirements for team track, freight sheds, and sorting yards on the Harbor Commission property, east of Bathurst and Cherry Streets, respectively.



THE ENTRANCE OF RADIAL ELECTRIC RAILWAYS AND THEIR IMPORTANCE TO THE CITY OF TORONTO

This report provides for the construction of entrances for high-speed radial electric railways, with complete grade separation, and terminal in the downtown district, giving ideal conditions for efficient operation.

The Hydro Electric Power Commission of Ontario, on the request of 300 municipalities in Western Ontario, is preparing estimates, and will submit reports, upon the construction of radial electric railways, of which Toronto forms an important terminal. Fifteen hundred miles of line has been surveyed, for cost of construction and traffic, and during the coming year, reports will be completed on 300 miles of line. The inset on Drawings Nos. 20 and 21 shows the routes and surveys which have been made; when reports are completed, the recommendations respecting these lines may vary from the routes shown, but they indicate in general, the manner in which the district is covered.

The relative importance of the various municipalities in Southwestern Ontario, as regards population and value of production, is shown graphically on Drawings Nos. 20 and 21. Drawing No. 20 refers particularly to population, and shows the relative number of municipalities interested in the proposed system of municipal electric railways. Approximately 57% of the municipalities in this district, have made application by resolution of Council for estimates and reports. The population of townships has been indicated by colors, and where the area is hatched it signifies that the municipality has applied for a report. Circles indicate cities, towns and villages, and the area the population of each, according to scale shown in the legend. The black dot in the circle denotes that the municipality has applied for a report.

Drawing No. 21 refers particularly to the value of products in each municipality, the value of agricultural products being shown in the Township by colors. Value of manufactured products for cities, towns and villages, are shown by cubes, the height of which is a measure of the value, and in the case of four of the larger cities the amount is inserted in

figures. A comparison of the existing purported radial service of the City of Toronto with that of other municipalities, discloses the fact that Toronto does not possess radial service. This is illustrated by the following table:—

Radial Railways Entering Municipalities and their Relation to Population.

District	Route Miles	AVERAGE POPULATION PER MILE		
		Rural	Urban	Total
Milwaukee.....	448	131	1,240	1,371
Detroit.....	793	129	352	481
Cleveland.....	515	264	744	1,008
Boston.....	1,453	2,190	1,023	3,213
Toronto.....	82	271	473	744

RADIAL ELECTRIC RAILWAYS WITHIN 25 MILES OF CENTRAL MUNICIPALITIES FOR YEARS 1910-1911

District	POPULATION			Miles of Line	POPULATION PER MILE		
	Civic	Adjacent	Total		Civic	Adjacent	Total
Toronto.....	327,753 72%	127,912 28%	455,665 100%	60	5,462	2,132	7,594
Indianapolis..	233,650 63%	138,051 37%	371,701 100%	310	754	445	1,199
Dayton.....	116,577 39%	179,200 61%	295,777 100%	254	259	705	1,164
Cleveland....	560,663 73%	208,464 27%	769,127 100%	217	2,584	961	3,542
Toledo.....	168,497 60%	113,138 40%	281,635 100%	250	674	443	1,126
Milwaukee...	373,857 64%	211,253 36%	585,110 100%	165	2,264	1,280	3,546
Boston.....	670,585 33%	1,342,562 67%	2,013,147 100%	762	880	1,762	2,641
Detroit.....	465,766 77%	141,209 23%	606,975 100%	187	2,491	775	3,245
Cincinnati....	363,591 39%	573,427 61%	937,018 100%	226	1,608	2,537	4,146

Plate No. 17 shows the existing Radial Electric Railways operating in the Indianapolis, Dayton, Cleveland, Toledo, Detroit and Cincinnati districts.

The development of long distance transmission of power, and improvement in the art of electric traction, have made possible the construction and efficient operation of radial electric railways, between centres of population, filling in the gaps between surface street railways, rapid transit systems, and rural highway lines on the one hand, and steam roads on the others, offering many advantages to the districts through which they are constructed, some of which are as follows:

Influence on the Evolution of Large Cities

A high speed electric radial railway enables suburban and rural districts adjacent to large cities, to be measured in terms of time rather than distance, and makes these districts accessible for daily passengers to and from commercial centres.

The construction of radial electric railways with their improved service at lower rates increases the riding habit of residents in rural and suburban districts, and augments travel between these districts and the centres of population.

The following table illustrates the marked increase of the riding habit in a few of the many districts in the United States as compared with steam service.

	Passenger Rides per Day Steam	Electric
Ann Arbor and Detroit.....	200	4,000
New Britain and Hartford.....	400	2,000
Cleveland and Lorain.....	116	8,493

Improved Social Conditions

The radial electric line enables the wage-earner, and others of limited means, to possess in the suburban and outlying districts, more commodious homes, and greater opportunities for outdoor recreation. It also enables dwellers in the congested city districts, to travel to the country with convenience, speed, and at low rates. Statistics show, that in the cases of the large European and American cities, about four-fifths of the workmen travel at least $7\frac{1}{2}$ miles to their places of employment, and the remaining fifth, from twenty to twenty-five miles, with a limit of about one hour of travel each way. The rapid and more frequent service, encourages travel, from rural and suburban districts to the cities, for business and amusement.

Improved Market Conditions

By providing an efficient and rapid service, at reasonable rates, the radial electric railway effects an improvement in market conditions, and facilitates the handling of food stuffs, by expediting transfer from producer to consumer. Frequent express service, at freight rates, with convenient stops, enables merchants to supply their customers in suburban and rural districts, promptly, with fresh material and with a corresponding reduction in dead stock carried.

The Chicago Municipal Markets Commission, reporting in 1914, states that "trolley freight service with its cheap rates and practically house to house collection of farm products should be of enduring interest to the city, consumer and to the producer."

General merchants from thirty-nine towns in Eastern United States, reporting to the Census Bureau in 1907, were unanimous in stating that the net result of their business has been increased. Those towns adjacent to large cities such as Cleveland, Chicago and Detroit, found that whatever business was lost to those cities, was more than made up by the gain to smaller places. In practically every case, increased business was done with the farmers, in spite of competition of adjacent large cities, and the general opinion of the merchants is well summed up in one expression, "Want all Electric Railways we can get." Most of the merchants were of the opinion that electric lines as facilities, were of increased benefit to them.

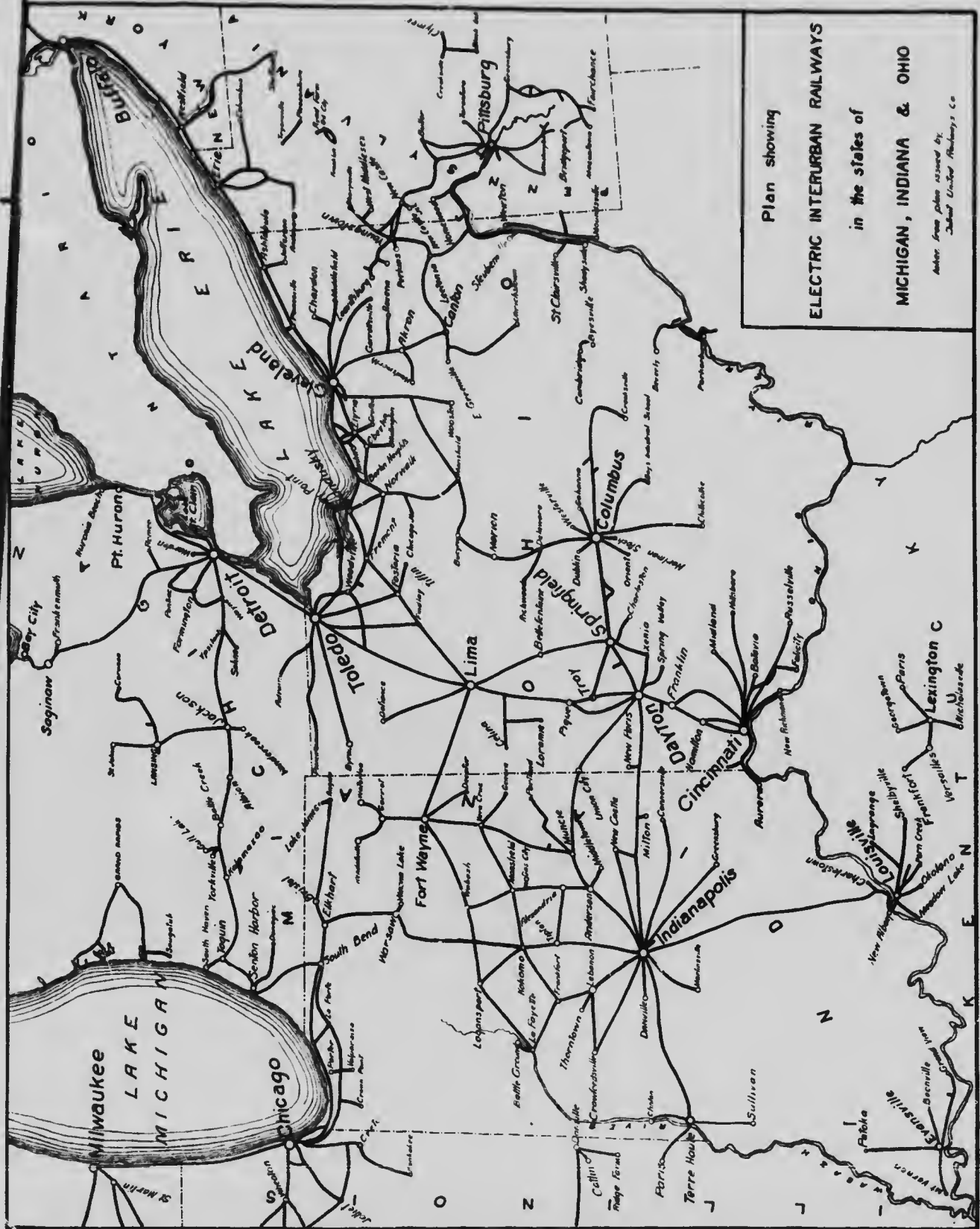
As an evidence of what the radial electric line has done for central municipalities, the following comments regarding Indianapolis, by the St. Louis Republic, are quoted, viz.:—

"The growth of Indianapolis increased 38 per cent. and that of St. Louis by 19 per cent. during the last census decade. A number of railroad systems are managed from St. Louis, while not one road of any size is managed from Indianapolis. St. Louis lies just across the Mississippi from the greatest deposit of good steam coal adjacent to any American city; Indianapolis gets its coal from considerable distances. St. Louis has a river channel connecting it with the sea; Indianapolis has no navigable water. St. Louis is located on rolling hills of great scenic beauty, giving ideal drainage; Indianapolis is flat. St. Louis is far from any other large city; Indianapolis has achieved its remarkable growth within 183 miles of Chicago. St. Louis has two important universities; Indianapolis has none. St. Louis is a wealthy city; Indianapolis has almost no large fortunes. St. Louis is the world's centre in a number of lines of manufacture; Indianapolis has many small, prosperous shops, but few large ones. Fast interurban trolley lines have made it easy for the people of a circle of 250 miles in diameter to visit Indian-

apolis. A trolley map of Indiana looks like the spokes of a wheel whose hub is the city of Indianapolis. The city without great wealth, without large industries, without a university, without navigable water, without coal, without natural beauty of site, has grown because it made it easy for its neighbors for 100 miles around to drop in before dinner, per trolley car, and leaving after an early supper, to get home by bedtime."

Schedule Speeds on Various United States Electric Railways

Detroit United Ry.—Detroit to Toledo.....	60	miles	2 hrs.	30 m.p.h.
Detroit United Ry.—Detroit to Jackson.....	76	"	2 hrs. 55 min.	26 m.p.h.
Michigan United Ry.—Jackson to Kalamazoo.....	68.4	"	2 hrs. 25 min.	28 m.p.h.
Aurora, Elgin & Chicago Ry.—Chicago to Glen Ellen.....	23	"	45 min.	30.5 m.p.h.
Aurora, Elgin & Chicago Ry.—Glen Ellen to Elgin.....	13.5	"	27 min.	41 m.p.h.
Chicago, Lake Shore & South Bend Ry.—South Bend to Pullman.....	76	"	3 hrs. 30 min.	21 m.p.h.
Evansville Ry Co.—Evansville to Rockport.....	20.73	"	50 min.	24.8 m.p.h.



Plan showing
ELECTRIC INTERURBAN RAILWAYS
 in the states of
MICHIGAN, INDIANA & OHIO
 Author from plan prepared by
 United States Railway Co.

