

CITY OF CHATHAM



TRANSPORTATION PLAN REVIEW

FINAL REPORT

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April 1988



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TRANSPORTATION PLAN
REVIEW
FINAL REPORT

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DELKAN CORPORATION

07-1545-A-00

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Our Ref.:

Mr. Walter E.C. Coulter
Chairman
Technical Co-ordinating Committee
City of Chatham
Transportation Plan Review Study
Chatham, Ontario

Dear Sir:

Re: City of Chatham Traffic Operations Study

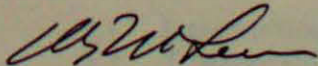
We are pleased to submit our final report on the City of Chatham Transportation Plan Review Study.

This report fulfills the requirements as stated in the Terms of Reference for the Study and provides recommendations for dealing with the current transportation issues facing the City.

We would like to stress the need to assess this plan periodically with a comprehensive review in the next ten years based on a monitoring program outlined in the report. As well, there is a need to undertake some specific, more comprehensive studies as recommended in the report.

It has been a pleasure working on this project and we would like to commend you, your staff and the staff of the Ontario Ministry of Transportation for the high level of co-operation received throughout the project.

Yours very truly,



K.G. McLean, P.Eng.
Chief Transportation Engineer

KGM:sb

Encl.

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EXECUTIVE SUMMARY

The objective of the Transportation Plan Review is to address a number of transportation issues and develop a road plan to be incorporated in the new 1988 version of the Chatham Official Plan.

The issues which have been addressed are:

- the development of a short-term (5 to 10 year) and long-term (20 year) transportation plan identifying arterial roads, collector roads and the proposed right-of-way and pavement width for all classes of roads.
- the identification of a preferred by-pass road system, around the east and west limits of the City, that may be used by trucks and traffic not destined for the City of Chatham.
- the identification of policy statements with regard to the transportation plan that may be incorporated into the Official Plan; for instance, changes to the transportation plan would require an amendment to the Official Plan.
- a review of the feasibility and need for extending Keil Drive south of Richmond Street to Park Avenue across the CN tracks and the determination of the need for a grade separation at this location.
- the development of a road network for the newly annexed land in southwest Chatham south of Park Avenue. The extension of Keil Drive south of Park Avenue is to be investigated.
- the determination of the alignment and road classification of Keil Drive north of McNaughton Avenue if future annexation is to occur.
- the determination of the need to widen Sandys Street from Grand Avenue to McNaughton Avenue from two lanes to four lanes.
- the development of a road network in north Chatham north of McNaughton Avenue that will accommodate future annexation and existing development south of Gregory Drive from Bearline Road to the Hydro right-of-way east of the City limits.
- a review of the conversion of Queen Street and Centre Street from one-way traffic to two-way traffic and the improvements that may be required in the road network to accommodate the change in traffic patterns.

- the determination of any changes that are required in the existing highway connecting link system throughout the City.
- a review of the impact, on traffic patterns within the City of Chatham, of the proposed intersection improvements for Highway 40 and Communication Road.

A "strategic overview" provided the perspective within which the various issues were addressed.

Some of the foregoing issues arise from proposals contained in previous traffic studies (Traffic Planning Study, 1962⁽¹⁾ and Traffic Planning Study 1968⁽²⁾) and some were raised by the Consultant (MacLaren Plansearch) retained by the City of Chatham to assist in the review and updating of the 1974 Official Plan.

Increases in travel on the road network are reflective of increases in the Chatham population (and where these increases will occur) and, to a significant extent, the places where the residents of Chatham and others are employed.

This study is based on a forecast increase in population prepared by the Chatham Planning Department of approximately 12 400 persons - approximately 7 200 south of the Thames River and approximately 5 200 north of the Thames River.

The forecast provided, with respect to employment, is for a total growth of approximately 5 800 - 4 500 south of the Thames River and 1 300 north of the Thames River.

Over the next 10 years it is expected that North Chatham will experience much more growth in population than will South Chatham with the emphasis shifting to South Chatham in the subsequent 10 year period.

Growth in employment in South Chatham will predominate in both the next ten years and the subsequent ten years to the horizon year for this study - 2006.

The forecasts of future traffic have been developed based on traffic growth factors related to the population growth with specific impact analyses in those parts of the City where concentrated increases in population would result in impacts greater than would be represented by the application of a traffic growth factor.

- (1) Traffic Planning Study, 1962. De Leuw Cather, Canada Ltd.
- (2) Traffic Planning Study, 1968. De Leuw Cather, Canada Ltd.

Cognizance must be given to the fact that the current population forecast to 2006 is essentially the same as was forecast (in 1966) for 1986 in North Chatham and only 4000 more than was forecast (in 1966) for 1986 in South Chatham. Beyond the planning period (to 2006) the potential growth in South Chatham (in the southwest quadrant of the City) is significantly greater than is forecast for the next twenty years.

Accordingly, in the early part of the twenty year planning period, road improvement requirements are expected to be in the area north of the Thames River. Later, the emphasis will be in the area south of the Thames River and will continue to be influenced by future growth in this area.

Since previous traffic planning studies were based on levels of population forecasts which differ only slightly from those which are now forecast for 2006, it would not be expected that significant new facilities would be foreseen. Of more importance is the need to provide for long-term future growth despite its uncertainties at this time.

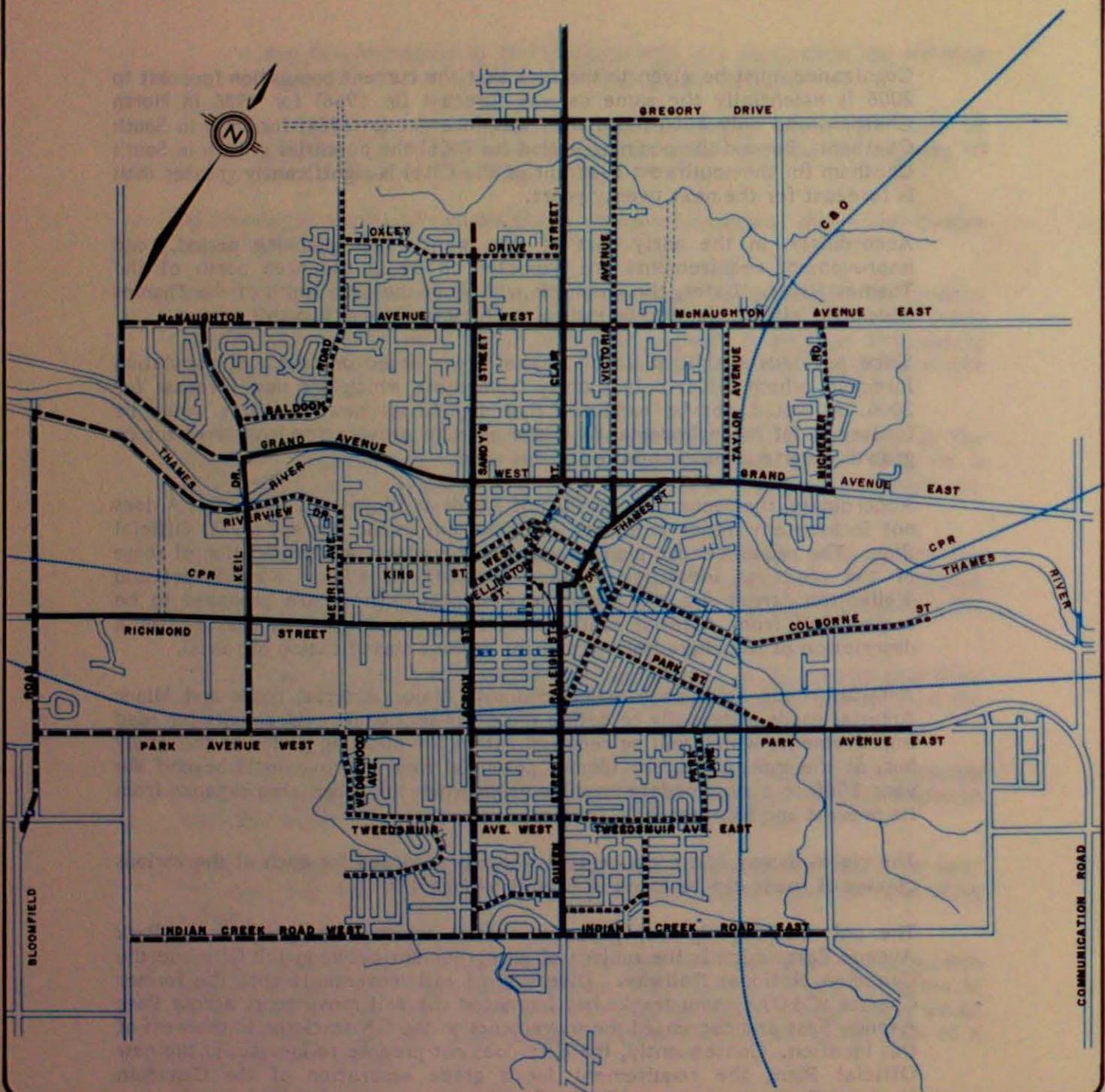
Accordingly, the recommended Plan of Roads as illustrated on Exhibit A does not include any major facilities which are not in the current (1974) Official Plan. The recommended plan of roads downgrades the classification of some of the roads as identified in the 1974 Official Plan. King Street and Wellington Street are two notable examples. These are proposed to be reclassified from Arterial roads to Collector roads (See Section 3.7 for a description of the characteristics of the various classification of roads).

Arterial roads have been subdivided into Major Arterial roads and Minor Arterial roads principally to define the cross-sectional requirements for road improvements which will be required within the planning period of this study but, at the same time, provide for potential road improvements beyond the year 2006 to accommodate possible needs when the urban area expands from its present and forecast 2006 form.

The right-of-way and cross-section which is proposed for each of the various classes of roads can be found in Exhibit 6 (page 48).

The only railway-highway grade separation which is proposed is on Park Avenue East which is the subject of an agreement between the City and the Canadian National Railway. Diversion of rail movements onto the former Chessie (C&O) system tracks has increased the rail movements across Park Avenue East and decreased the movements on the CN trackage to the west of this location. Consequently, the City does not propose to include, in the new Official Plan, the requirement for a grade separation of the Canadian National Railway tracks and Queen Street.

EXHIBIT A



LEGEND

- MAJOR ARTERIAL ROAD
- MINOR ARTERIAL ROAD
- COLLECTOR ROAD

**CITY OF CHATHAM
TRANSPORTATION PLAN**

**RECOMMENDED
PLAN OF ROADS**

EXHIBIT B

In the review of the City of Chatham Official Plan, MacLaren Plansearch identified, in concept form, an eastern "bypass" and a western "bypass" as illustrated on Exhibit B - Long Range Plan of Roads. These "bypasses" involve roads and land not currently within the City of Chatham. An integral component of the western "bypass" is a new bridge across the Thames River. There is no justification, at this time, for a new bridge across the Thames River to provide additional road capacity to serve the needs of the City of Chatham within the 20 year planning period of the study.

There is insufficient information to establish the need and benefits of the implementation of either the eastern or western "bypass" system at this time. Nevertheless, these "bypasses" should be recognized in the Official Plan as part of a 'long range' road network.

An alignment study should be undertaken in the immediate future to select a location for the western "by-pass" and the related new bridge location on the Thames River to the west of the existing bridges in order that a right-of-way can be protected, as development proceeds in West Chatham and in those parts of Raleigh Township and Dover Township which would be affected.

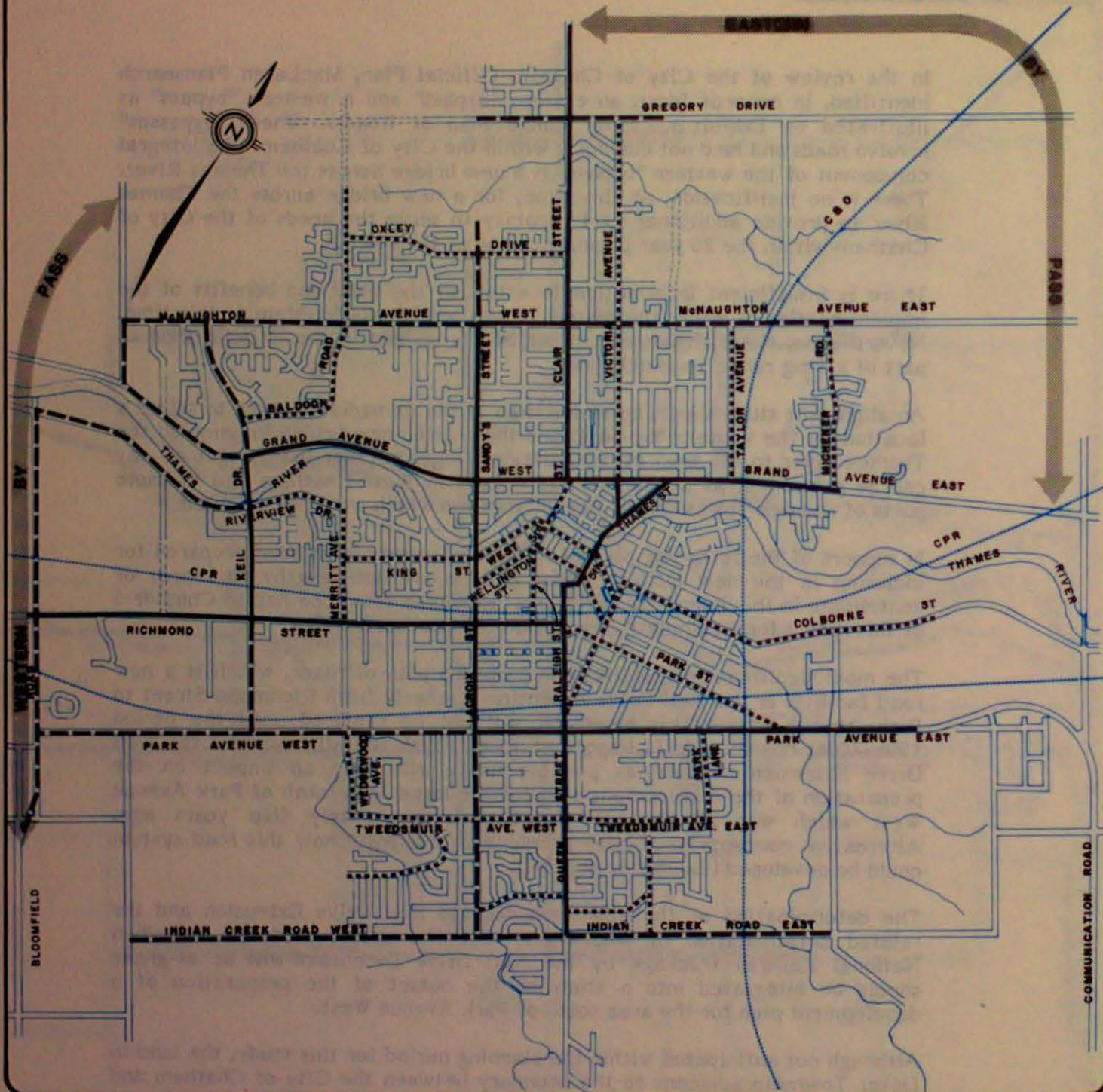
In support of the foregoing plan of roads, statements have been prepared for inclusion in the new Official Plan. These are too lengthy to repeat or consolidate in this Executive Summary. Recourse should be had to Chapter 5 of this report for a complete description of these statements.

The most significant element of the proposed plan of roads, which is a new road facility, is the Keil Drive Extension southerly from Richmond Street to Park Avenue East. This extension will not be required until the period 1996-2006; however, it is important to establish the alignment of the Keil Drive Extension as soon as possible as it will have an impact on the preparation of the development plan for the large area south of Park Avenue West which was annexed to the City approximately five years ago. Alternative concepts have been provided to illustrate how this road system could be developed (Exhibit 8, page 82).

The determination of the alignment for the Keil Drive Extension and the related determination of whether or not the crossing of the Canadian National Railway trackage by the Keil Drive Extension will be at-grade should be integrated into a study at the outset of the preparation of a development plan for the area south of Park Avenue West.

Although not anticipated within the planning period for this study, the land in Dover Township adjacent to the boundary between the City of Chatham and the Township of Dover in the northeast quadrant of the City could, in the long-term future, be developed, likely for residential purposes. Should this occur and in order to avoid possible costly property acquisition in the future,

EXHIBIT B



LEGEND

- MAJOR ARTERIAL ROAD
- - - MINOR ARTERIAL ROAD
- COLLECTOR ROAD

CITY OF CHATHAM TRANSPORTATION PLAN

LONG RANGE PLAN OF ROADS

it is proposed that the City protect a right-of-way northerly from McNaughton Avenue to the City limits. This right-of-way should be defined by a northerly extension of the existing right-of-way limits of Keil Drive, south of McNaughton Avenue.

The configuration of the intersection of Queen Street and Richmond Street/Park Street creates some difficult traffic movements; however, no improvements are likely to be required in this area for some time. In the longer term, traffic in the Queen Street/Centre Street corridor could grow to a level which, under the present street system configuration, may cause problems on Queen Street and impair the ability of Queen Street to serve the dual function it now performs - carrying traffic travelling through the area as well as traffic travelling to and from the City Centre.

Accordingly, the City should monitor the traffic conditions and the development in the area for the purposes of taking action in acquiring property to build the Richmond Street extension if the circumstances are appropriate and favourable arrangements can be made to ultimately implement the entire scheme (roadways, parking, landscaping) as illustrated on Exhibit 11, page 93.

In North Chatham, the major issue is the role of Sandys Street and the related development of a road network which considers possible long-term growth to the north of the City Limits in North Chatham.

There is a short-term need to widen Sandys Street to Minor Arterial road standards. This is principally due to the present structural deficiencies but the widening should be sufficient to provide the road capacity which will be required before the end of the planning period of the study. The capacity needs can be met by a three-lane (10 metre/33 feet) cross-section.

The road network in the section of North Chatham west of St. Clair Street includes Orangewood Boulevard (as an extension of Sandys Street) and its planned northerly extension to Gregory Drive West. The future development of the area north of Chatham will determine the future role of the Sandys Street-Orangewood Boulevard extension. Should the area to the north of Chatham develop extensively over the next 20-50 years, the Sandys-Orangewood route may have to become a Primary Arterial road connecting to a road extension north of Gregory Drive West perhaps extending in a curvilinear pattern to the west thus serving the area from a more central location and complementing Baldoon Road, functioning as a collector road. If development to the north of Gregory Drive West is never going to be extensive, the Sandys Street-Orangewood Boulevard route can function as a Secondary Arterial road which is essentially the same as a collector road.

The Highway Connecting Link system in the City of Chatham currently meets the Ontario Ministry of Transportation criteria and should be retained until the City deems it appropriate to initiate changes based on future improvements to the road system. If, in the future, a bypass system is developed, it would be expected that Highway 40 would not exist within the City of Chatham (unless the physical limits of the City are extended) and therefore there would not be a Highway 40 "Connecting Link".

The Ontario Ministry of Transportation intends to reconstruct the Highway 40 - Communication Road intersection in the near future (Exhibit 14, page 105 illustrates the proposed intersection design). The changes in traffic patterns which have occurred over the past few years (since the opening of the Sherman Brown Bridge) support the reconfiguration of the intersection as proposed.

Without the benefit of a survey which would involve interviews with the drivers currently using the intersection and an attempt to establish their likely change in behaviour with the intersection reconfiguration, it is difficult to predict, with certainty, the impact that the reconfiguration will have; however, it would appear that it alone is unlikely to result in any significant changes in the existing traffic volumes on Park Avenue East and Grand Avenue East. Growth in north-east Chatham is likely to result in additional trips on Grand Avenue East and Park Avenue East.

The proposed reconfiguration is compatible with the development of an eastern "bypass" as illustrated on Exhibit B.

The following improvements, with the associated class 'D' cost estimate (1987 dollars), as provided by the City of Chatham, are considered to be necessary to provide an effective road network in the City:

- Sandys Street - the widening of Sandys Street, although not required for the purposes of providing additional road capacity until the 1996-2006 period, should be undertaken in the next five years to provide a 3 lane - 10 metre (nominally 33 feet) - roadway between Grand Avenue and McNaughton Avenue to improve its structural condition. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$1,600,000.
- Park Avenue and Canadian National Railways - a grade separation which is the subject of an agreement between the City of Chatham and the Canadian National Railways, should be constructed. The cost of the grade separation structure and the approach roads is estimated (Class D) at \$5,320,000.
- Lacroix Street/Sandys Street and Grand Avenue - an eastbound right-turn lane should be added within the next 5-10 years and included in the project to widen Sandys Street as described in the foregoing. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$50,000.

- Keil Drive Extension (south of Richmond Street) - this new link should be provided initially in the 1996-2006 period as a two-lane roadway designed to be widened to four lanes in some subsequent time period (assuming development in southwest Chatham occurs as forecast). The cost of this new two-lane link, excluding utilities and property and, based on an at-grade crossing of the CNR tracks, is estimated (Class D) at \$1,000,000.
- St. Clair Street - the widening and the creation of a "fifth" lane to allow "two-way left turns" and separate left turn lanes on St. Clair Street between McNaughton Avenue and a point north of McFarlane Avenue, although not required for the purposes of providing additional capacity should be undertaken to provide improved traffic operations on St. Clair Street. This project was proposed as part of the program developed in the Traffic Operations Study in 1981. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$110,000.
- Grand Avenue - the widening and creation of left turn lanes on Grand Avenue between Thames Lea Plaza and the Kent County Building, although not required for the purposes of providing additional capacity should be undertaken to provide improved traffic operations on Grand Avenue. This project was proposed as part of the program developed in the Traffic Operations Study in 1981. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$230,000.

A structured program should be developed to monitor population and employment changes and traffic growths (or declines) in key areas of the City to relate any increases or decreases in population and employment to changes in the traffic volumes. Principal among the locations to be monitored are the bridges across the Thames River to provide a basis for determining the timing for a new bridge west of the Keil Drive (Parry) Bridge as the need for this bridge becomes more clearly defined.

An intermediate review of the entire road system should be undertaken based on the data collected over the next five years and a comprehensive review of the system should be undertaken in ten years.

More comprehensive studies are required to deal with:

- the rationalization of the rail system within the City
- the future construction of the Keil Drive extension and its integration into the road system which will be part of the secondary plan which must be prepared for the area south of Park Avenue West in south-west Chatham

- the selection of locations for routes for the eastern and western "by-pass" facilities in order to ensure that a right-of-way is available for the approach roads when a decision is made to provide these facilities. It is imperative that a route be selected for the western "by-pass" in the immediate future. Otherwise, development may occur which could frustrate the implementation of an optimum location for the "by-pass" route.

1.0 INTRODUCTION

The City of Chatham initiated a review of the City's transportation plan for the purposes of addressing a number of current issues that require resolution and, as well, to develop a road plan that could be incorporated in the new Official Plan for Chatham which is being prepared by the Planning Department of the City.

The Terms of Reference for the study identified the following issues and requirements:

- the development of a short-term (5 to 10 year) and long-term (20 year) transportation plan identifying arterial roads, collector roads and the proposed right-of-way and pavement width for all classes of roads.
- the identification of a preferred by-pass road system, around the east and west limits of the City, that may be used by trucks and traffic not destined for the City of Chatham.
- the identification of policy statements with regard to the transportation plan that may be incorporated into the Official Plan; for instance, changes to the transportation plan would require an amendment to the Official Plan.
- a review of the feasibility and need for extending Keil Drive south of Richmond Street to Park Avenue across the CN tracks and the determination of the need for a grade separation at this location.
- the development of a road network for the newly annexed land in southwest Chatham south of Park Avenue. The extension of Keil Drive south of Park Avenue is to be investigated.
- the determination of the alignment and road classification of Keil Drive north of McNaughton Avenue if future annexation is to occur.
- the determination of the need to widen Sandys Street from Grand Avenue to McNaughton Avenue from two lanes to four lanes.
- the development of a road network in north Chatham north of McNaughton Avenue that will accommodate future annexation and existing development south of Gregory Drive from Bearline Road to the Hydro right-of-way east of the City limits.

- a review of the conversion of Queen Street and Centre Street from one-way traffic to two-way traffic and the improvements that may be required in the road network to accommodate the change in traffic patterns.
- the determination of any changes that are required in the existing highway connecting link system throughout the City.
- a review of the impact, on traffic patterns within the City of Chatham, of the proposed intersection improvements for Highway 40 and Communication Road.

Before any one of these issues was analyzed, a "strategic overview" of the past and current transportation network was undertaken to put each issue in the proper perspective. The overview is presented in the next following chapter. Subsequent chapters, are devoted to the foregoing issues (or two related issues).

The report concludes with a chapter describing the road improvements necessary in the next twenty years, with preliminary costs, where appropriate, and an implementation strategy including priorities. Procedures for monitoring the transportation system and updating the study are also provided in the concluding chapter.

This report does not contain a discussion of the issue related to the conversion of King Street and Wellington Street between William Street and Third Street from two-way traffic to one-way traffic. This issue was dealt with in the 1981 Traffic Operations Study Report. At the outset of this study, it was established, in consultation with the elected and appointed officials of the City, that this was not a significant issue. Since the principles enunciated in the earlier study still apply, it was decided that this matter did not require further study.

The transportation plan and its associated road improvements are based on the development of the City as forecast in 1986. Since it is development and the associated traffic growth which gives rise to road improvement needs, it

is important to recognize that any change in development trends from those used in this study will give rise to the requirement to review the proposed road improvement program and its related implementation staging with a view to adjusting the program.

The study was guided by a Technical Coordinating Committee comprised of the following members:

Chairman: Mr. Walter E.C. Coulter, P. Eng.
City Engineer
City of Chatham

Secretary: Mr. Blair Anderson
Traffic Coordinator
City of Chatham
(replaced Mr. Graham Vincent)

Members: Mr. Max Howell
Director of Planning
City of Chatham

Mr. Wayne McEachern, M.C.I.P.
Intermediate Policy Planner
Ontario Ministry of Transportation

Mr. Jeff Brown
Traffic Analyst
Ontario Ministry of Transportation

Mr. Rick Hue, P. Eng.
District Municipal Engineer
Ontario Ministry of Transportation
(alternate: Mr. John De Vries,)

This study was carried out by Mr. Keith McLean, P. Eng., Chief Transportation Engineer, Delcan, Consulting Engineers and Planners.

2.0 OVERVIEW

The first major traffic planning study was undertaken by the City of Chatham in 1961-62⁽¹⁾. Shortly thereafter, significant unforeseen industrial and commercial development took place within the City with the concomitant increase in traffic volumes.

The City of Chatham authorized a further study to review and update the earlier study completed in 1962. The findings and recommendations from this review are contained in a report⁽²⁾ submitted in 1968.

The report contains a "Recommended Major Street Plan - 1986", the road network from which was embodied in Schedule E of the 1974 Chatham Planning Area Official Plan - the "Recommended Major Street Plan - 1986".

The program of road improvements of the City has been based on this plan. The number of traffic lanes on the major roads which form Schedule E of the Official Plan are consistent with the proposals contained in the recommended plan in the Traffic Planning Report. The following elements of the plan have not been implemented:

- the extension of Keil Drive southerly from Richmond Street to Park Avenue West as a two-lane road;
- the widening of Park Avenue West between the Keil Drive Extension and Lacroix Street to a four-lane road;
- the widening of Sandys Street to four lanes between Grand Avenue and McNaughton Avenue;
- the extension of Sandys Street northerly from McNaughton Avenue to connect with Highway 40 north of the current city limits as a two-lane road;
- the widening of Queen Street from Park Avenue to Indian Creek Road to a four-lane road;
- the railway grade separation at the CNR crossing of Queen Street;

(1) Traffic Planning Study, 1962. De Leuw Cather, Canada Ltd.

(2) Traffic Planning Study, 1968. De Leuw Cather, Canada Ltd.

- the widening of short sections of Thames Street, Wellington Street and William Street to provide four lanes on each of these streets.

Accordingly, many of the roads which comprise the "recommended major street plan" for 1986 now provide the capacity which was envisaged in this plan.

The dominant mode of travel in Chatham is by automobile. The City of Chatham has successfully provided a relatively high level of transportation service for the movement of vehicles within the City through the implementation of a program based on the Chatham Planning Area Official Plan (1974).

As part of the program, the City recently constructed a major river crossing facility - the Lacroix Bridge - which has provided significant additional road capacity across the Thames River. Since river crossing traffic is a major consideration in the Chatham transportation network, this new bridge, joining Lacroix Street south of the river with Sandys Street north of the river, is a significant factor in considering the adequacy of the major road network. Sandys Street and its extension northerly and the southerly extension of existing Keil Drive are other important elements of the arterial road network, contained in the Chatham Planning Area Official Plan (1974), which have not yet been implemented.

2.1 Official Plan Review

The City of Chatham has been reviewing and updating the 1974 Official Plan and has recently adopted a new Official Plan.

As part of the review, the transportation network of the City has been evaluated. The Consultant (MacLaren Plansearch) report "Secondary Analysis and Background Report, Official Plan Review and Update" raised a number of issues in this regard. MacLaren Plansearch's assessments of each of the issues which have been identified are summarized in the following.

Sandys Street Extension (MacLaren Plansearch Assessment)

With the opening of the Lacroix Street Bridge, north-south traffic movement appears to have shifted away from the C.B.D. river crossings and is now utilizing, principally, the Lacroix Street Bridge and its approaches but also, to a lesser degree, Sandys Street. Traffic is collected or distributed along McNaughton Avenue, east of Sandys Street.

Currently, St. Clair Street, Grand Avenue (St. Clair Street to Lacroix Street) Lacroix Street and Park Avenue are signed as the Highway 40 (connecting link) route through Chatham. The connecting link designation is somewhat different from the 'signed' route in that the connecting link agreement defines the route as being northerly from the Lacroix Street Bridge along Sandys Street to McNaughton Avenue and then east to St. Clair Street.

A major issue arose recently with respect to the extension of Sandys Street north of Oxley Drive and in the classification of Sandys Street between Oxley Drive and McNaughton Avenue. In the existing (1974) Official Plan, Sandys Street is proposed to be extended further to the north into the Township of Dover as a two-lane arterial route, ultimately connecting to Highway 40 as a two-lane arterial road outside the City. Public concern has focused on the potential of heavy truck traffic and a high volume of vehicular traffic on Sandys Street. Subsequent to the submission of the MacLaren Plansearch "Secondary Analysis and Background Report, Official Plan Review and Update", City Council adopted a resolution that the Official Plan be amended to delete the future designation of Sandys Street north of McNaughton Avenue as Highway 40 and that such amendment be directed to the Official Plan Review being carried out by MacLaren Plansearch thus resolving the "issue" to the extent of the use of the Sandys Street extension, north of McNaughton Avenue, as a highway connecting link.

Based on a review of the area in question, the following observations are made in the MacLaren Plansearch report:

- i) Extension of Sandys Street north of McNaughton Avenue as an arterial route should be discouraged.
- ii) Extension of Sandys Street beyond Oxley Drive will result in an adverse impact on the residential area at the north end of the City and should similarly be discouraged.
- iii) Highway 40 designation should remain along Sandys Street north to McNaughton Avenue and then east to St. Clair Street. This will necessitate improvements to the Sandys Street-McNaughton Avenue and the McNaughton Avenue-St. Clair Street intersections.

(The Terms of Reference for the Transportation Study include the following issues to be addressed:

- . The need to widen Sandys Street from Grand Avenue to McNaughton Avenue from two lanes to four lanes.
- . The development of a road network in North Chatham north of McNaughton Avenue that will accommodate future and existing development south of Gregory Drive from Bearline Road to the Hydro right-of-way east of the City limits.)

Keil Drive Extension (MacLaren Plansearch Assessment)

The Keil Drive north-south route across the Thames River carries close to one-third of all river crossing traffic. Through extension via Richmond Street to Bloomfield Road access is provided to Highway 401. Connection to Highway 40 north of the City occurs via Grand Avenue or McNaughton Avenue easterly to St. Clair Street.

According to the existing (1974) Official Plan, Keil Drive is proposed as a four-lane arterial road between Grand Avenue and Richmond Street. The extensions to the north to McNaughton Avenue and south to Park Avenue West (as Industrial Street) are proposed as two-lane arterial roads. At present, all of this system is in place except for the extension of Industrial Street south to Park Avenue West.

By extending Keil Drive south to Park Avenue West, some relief would be provided to existing residential development south of Richmond Street along Bloomfield Road. This area bears the brunt of traffic to and from Highway 401 via Highway 7116 (Bloomfield Road). A key consideration with this proposed route (Keil Drive Extension) is the crossing of the Canadian National Railway and whether or not this crossing should be provided at-grade or as an underpass.

Recently, the Canadian National Railway proposed, as part of its acquisition scheme of portions of the Conrail System, to divert all east-west rail freight, via a new connection east of Whitehall Street south onto the Chessie (C & O) System. Freight traffic would continue south to Fargo Junction where it would join the existing Chessie System connecting to Windsor.

This diversion would substantially lessen the potential for traffic flow interruption on the Canadian National Railway trackage west of Whitehall Street. Subject to a more detailed traffic study, a grade crossing would appear to be sufficient at the intersection of the Canadian National Railway and Industrial Street.

The remaining question related to the southerly extension of Keil Drive is whether it should be extended to Indian Creek Road or southwest to join with Bloomfield Road. These two alternatives raise the following implications:

- i) Extension to Indian Creek Road, while having the effect of routing traffic away from the residential areas along Bloomfield Road, would ultimately require extension of Indian Creek Road into the Township of Raleigh to join Bloomfield Road. It would also likely result in additional industrial traffic on Indian Creek Road.
- ii) Extension to the southwest to Bloomfield Road would require relatively substantial modifications to the extension of Indian Creek Road. This route, however, would permit a complete by-pass of the Bloomfield Road residential area.

These two alternatives introduce several possible variations to future land use patterns in the recently annexed area south of Park Avenue West. Direct

extension of Keil Drive to connect with Indian Creek Road would tend to encourage industrial development of this area. The southwest route connecting to Bloomfield Road would reduce the industrial area, limiting it to an area between Park Avenue, Bloomfield Road, Indian Creek Road and the southwesterly extension of Industrial Street. This area, however, was annexed to the City on the basis of its being required to accommodate future residential development.

(The Terms of Reference for the Transportation Study include the following issues to be addressed:

- Determine the alignment and road classification of Keil Drive north of McNaughton Avenue.
- Review the feasibility and need for extending Keil Drive south of Richmond Street to Park Avenue across the CN tracks and determine the need for a grade separation.
- Develop a road network for the newly annexed land in southwest Chatham south of Park Avenue. The extension of Keil Drive south of Park Avenue should be investigated.)

Arterial Routes through the Downtown (MacLaren Plansearch Assessment)

The combination of the Keil Drive extension to McNaughton Avenue and the improvements to Lacroix Street have substantially reduced river crossing traffic on the Third Street and Fifth Street bridges. To be consistent with the City's objectives of improvements to the downtown, alternatives should be considered for the reclassification of arterial routes through the downtown.

Under the existing Official Plan, the following streets in the downtown are designated as "arterial":

- Wellington Street - Third Street (4/2 lanes)
- King Street (4 lanes)
- Queen Street (4/3 lanes)
- Centre Street - Fifth Street - Thames Street (4/3 lanes)
- William Street (4 lanes).

With the reduction in the need for through traffic carrying capacity, these streets now appear to be providing more of a collector street function. One alternative for consideration should be to down-grade these streets to collector status thereby permitting consideration of different approaches to street redevelopment, on-street parking and access which would be more in keeping with the objectives of downtown revitalization.

(The Terms of Reference for the Transportation Study include the following issues to be addressed:

- . The conversion of Queen Street and Centre Street from one-way traffic to two-way traffic and the improvements that may be required in the road network to accommodate the change in traffic patterns.
- . The impact of converting King Street and Wellington Street between William Street and Third Street from two-way traffic to one-way traffic.)

Communication Road Extension (MacLaren Plansearch Assessment)

Communication Road, at present, provides, via Highway 40, one of the two connecting routes to Highway 401 and, in addition, serves as the major traffic route south to Blenheim. From its intersection with Highway 40, Communication Road connects with Prince Albert Road via the Sherman Brown Bridge eventually terminating at County Road 29 at the 9th Concession of Chatham Township.

The southerly portion of Prince Albert Road between Highway 40 (Park Avenue West) and County Road 35 is designated as part of the Suburban Road System. This northerly extension to County Road 35 provides access to an improved east-west connection to Highway 40 north of the City.

Several transportation planning questions require resolution. Clearly, the Highway 40 extension via Prince Albert Road provides the eastern half of a long-range City By-pass route. The question yet to be resolved is the point of termination, i.e., should the east-west connection to Highway 40 north of the

City occur via County Road 29 or via a closer route such as the 4th Concession? The decision on the east-west connection could ultimately set the case in the future for a new northern City boundary.

(The Terms of Reference for the Transportation Study include the following issue to be addressed:

- Identify a preferred by-pass system around the east and west limits of the City that may be used by trucks and traffic not destined for the City of Chatham.)

Queen Street South (MacLaren Plansearch Assessment)

Queen Street (County Road 10) provides the historic southbound link to Charing Cross and ultimately Highway 3 and Lake Erie. The existing Official Plan designates this route as a four-lane arterial from Richmond Street southerly to the City's boundary. Further to the south, Queen Street becomes a two-lane road and crosses Highway 401 via a fly-over with no interchange connection being provided to Highway 401.

Development along Queen Street south of Park Avenue is a mixture of high quality residential uses with limited strips of highway commercial uses. Because of this mixture of land uses, heavy traffic flows and the arterial designation are controversial issues. Earlier, in discussing arterial routes in the downtown, it was suggested that Queen Street could be down-graded from arterial to collector status. Beyond the City limits southerly to Charing Cross, Queen Street is classified as a Suburban Road.

The question to be considered is the status of Queen Street from Park Avenue to the City limits. Should Queen Street be considered as a collector through its entire length or should only the southern section from Park Avenue southerly be designated as an arterial?

(The Terms of Reference for the Transportation Study include the following issue to be addressed:

- Develop a short-term (5-10 year) and long-term (20 year) transportation plan identifying arterial roads, collector roads and proposed right-of-ways and pavement widths for these roads.)

Rail System (MacLaren Plansearch Assessment)

In December 1984, the City received a report entitled "Transportation Impact Study" - a study designed to examine the impacts the City would likely confront as a result of the joint Canadian National Railway and C.P. Rail proposal to acquire certain facilities of the Consolidated Rail Corporation (Conrail) namely:

- i) the Detroit River Tunnel between Windsor and Detroit;
- ii) the Niagara River Bridge; and
- iii) the Canadian Southern Railway Company system.

The railway system provides a connection (between the Detroit River Tunnel and the Niagara River Bridge) across southern Ontario that generally avoids major urban areas and the associated costly train speed reductions. This proposal has received Canadian Transport Commission approval and the Canadian National Railway connection to the Chessie System has been completed.

The 1984 Study examined the Park Avenue East crossing and considered the grade separation that would be necessary to resolve the potential problem of increasing vehicular traffic tie-ups due to a much heavier rail use of the Chessie line. In reaching a solution to this rail/road intersection problem, a number of specific transportation policies in the existing Official Plan are now open to question. These include:

- . the arterial road system;
- . the C.P. Rail system.

In general, these policies identify the City's position with respect to the need for grade separations on Lacroix Street (since completed at the Canadian National Railway trackage) and on Queen Street. With the rerouting of major through freight, at-grade crossings may be adequate.

The Official Plan policies also stress the desirability of relocating a "substantial part of the trackage of C.P. Rail" as a long-term objective. Rerouting of through freight traffic may reduce or eliminate the basis for this objective. On the other hand, the removal of C.P. Rail trackage from the Chessie System to a point west of Lacroix Street would free the downtown and adjacent area of a number of at-grade road/rail crossings.

Trackage added to the system, based on these policies, would include connections from the C.P. system and the C.N. system to the Chessie (C & O) system. With the Canadian Transport Commission having reached a decision with respect to the C.N./C.P. application (referred to previously), the approved alignment and the proposal requires examination in some detail to determine its implications to the City's transportation system.

Removal of a major portion of the C.P. trackage in the downtown area, while unlikely to occur before 1990 or even before 2005, should probably remain as a City objective. By adhering to this objective, the City would place its priority on a joint C.N./C.P. development and use of the by-pass system.

(The Terms of Reference for the Transportation Study did not include an assessment of the railway system and its impact on the road system.)

Parking (MacLaren Plansearch Assessment)

Throughout Chatham, the provision of parking is currently regulated largely on the basis of standards for specific land uses. As an example, banks and finance companies are required to provide one space for each 18.6 square metres (193 sq.ft.) of gross leasable floor area with a minimum of ten spaces required for each development. The standard for hotels is based on the number of rooms and on a separate standard for public dining areas. For theatres, the standard relates to the number of seats with one space for every five seats.

In situations where a number of uses are combined on one property, such as a mall, a standard has been adopted which relates the spaces to the

accumulated gross leasable area of the total development. In this example, the off-street parking standard is one space for each 18.6 square metres of gross leasable floor area.

The same approach applies in residential areas such that a minimum standard is prescribed for various types of residential development.

For most areas of the City, these standards are capable of being achieved since each site has sufficient unoccupied land to permit the reserve for parking spaces.

In the downtown area, however, where older individual commercial structures represent the norm, the provision of parking at grade is strictly limited. Older structures often occupy the entire lot, or at least most of it and the provision of parking has become an impediment to change. Solving the parking problem only occurs when sufficient land is assembled to enable the development of large parking lots or parking garages. To resolve this dilemma (and it has been argued that it has only been partially successful), the City has developed a number of off-street municipal lots. These lots are generally located in areas where parking deficiencies have been recognized as the most serious.

These municipal lots have been developed by the City using funds derived from parking meter revenue. In addition to these lots, on-street metered parking is permitted on most of the downtown streets.

Under current regulations, new development in part of the downtown area is exempt from providing parking. New development is not exempt even if it is in close proximity to a municipal parking lot. The argument has been raised that this constitutes a severe constraint to downtown redevelopment.

Numerous cities across this Province have experienced this dilemma. To resolve it, many have opted for a "cash-in-lieu" approach. The principle behind this approach is similar to that now commonly used for parkland

dedications as a condition of the subdivision of residential land. The approach to parking is much the same and could involve:

- i) delineation of the area within which "cash-in-lieu" of parking is to be applied;
- ii) incorporation of a policy in the Official Plan which exempts development within the delineated area from the established parking regulations based on a formula to determine the amount of the "cash-in-lieu" payments;
- iii) establishment of a special reserve for monies contributed to the fund.

With respect to the City's downtown area, adoption of a "cash-in-lieu" approach should be considered. The existing by-laws already provide a relatively comprehensive set of standards that are capable of defining the required number of parking spaces.

Several questions must be resolved in Chatham in formulating a "cash-in-lieu" policy, namely:

- i) the area to which the exemption is to apply;
- ii) the cost portion to be assessed.

(The Terms of Reference for the Transportation Study did not include an assessment of the "cash-in-lieu" concept. Although it was proposed to be reviewed when the study design was prepared, it was subsequently decided that no investigation of this matter was required at this time.)

Staged Implementation of the Road System (MacLaren Plansearch Assessment)

As part of the Official Plan review, the Consultant (MacLaren Plansearch) has proposed what is considered to be a more realistic approach separating the development of the system into stages to provide a recognition of the major steps in the logical evolution of a long range arterial road network.

The following provides a discussion of the proposed network:

Present 1985

With the road improvements of the past 5 to 10 years, a relatively clear pattern now exists of the City's arterial road system. Some of the routes lie outside the City's boundaries. The extension of Highway 40 from Highway 401, first as Communication Road and then, without this designation, as Prince Albert Road serves as the eastern connection between the City and Highway 401. On the west side, Bloomfield Road connects Richmond Street and Park Avenue West to Highway 401.

Stage I Period 1985-1990

The first stage proposed in the future development of the City's road system would involve a simplification of the present system. The proposal removes the arterial road system through the downtown but continues to provide access to the downtown from a wide number of arterial routes. The downtown river crossings via the Third and Fifth Street bridges would function mainly as access links and not as through routes.

Keil Drive would be extended southerly to Park Avenue West with an at-grade crossing at the Canadian National Railway. This conclusion reflects the Canadian National Railway's proposal to route freight traffic away from the City to the south via the Chessie System to Fargo Junction.

Through the extension of Keil Drive, the use of the Bloomfield Road connection from Highway 401 (to north of Park Avenue West) to Richmond Street would be diminished. Traffic would be transferred to the Keil Drive extension via Park Avenue West. This modification would provide relief to existing residential areas along Bloomfield Road.

The northerly section of Keil Drive to McNaughton Avenue would provide some relief to the Lacroix Street-Sandys Street system. Improvements to McNaughton Avenue west of Sandys Street, however, would likely become necessary.

Stage II Period 1990-2000

The second stage in the evolution of the City's arterial route system would see the extension of a loop system around the City. On the east, Communication Road would be extended northerly via Prince Albert Road to the 4th Concession. The western loop would involve an extension of Bloomfield Road to an alignment along the most westerly City limit. A new crossing would be

constructed across the Thames River with the proposed route curving to the east, joining with an extension of Grand Avenue and then following a route along Bearline Road to the 4th Concession.

In determining the route to be followed for the western loop, it is recognized that a realignment to the west (of the City), as proposed, would impact on prime agricultural land beyond the City boundary. An alternative would be to maintain the Bloomfield Road route extending it ultimately across the Thames River. This alternative would not eliminate the potential for conflict with existing residential development along Bloomfield Road. The question to be considered is which land use impact is the more acceptable - residential or agricultural.

(The Terms of Reference for the Transportation Study include the following issue to be addressed:

- Develop a short-term (5-10 year) and long-term (20 year) transportation plan identifying arterial roads, collector roads and the proposed right-of-way and pavement width for these roads.)

Other Issues

In addition to the foregoing, there are other issues which are identified in the Terms of Reference and which must be addressed. These are the requirements to:

- review the impact on traffic patterns within the City of Chatham resulting from the proposed intersection improvements for Highway 40 and Communication Road.
- determine if any changes are required in the existing highway connecting link system throughout the City.

2.2 Strategic Overview

An integral component of the transportation planning process is a knowledge of the size and location of both existing and future population and employment areas. Knowing where people work and live and understanding

their daily travel needs is essential to ensure that the transportation requirements for the area are satisfied. The determination of the future land use, as it relates to where people will live and work, is also an integral part of the transportation planning process.

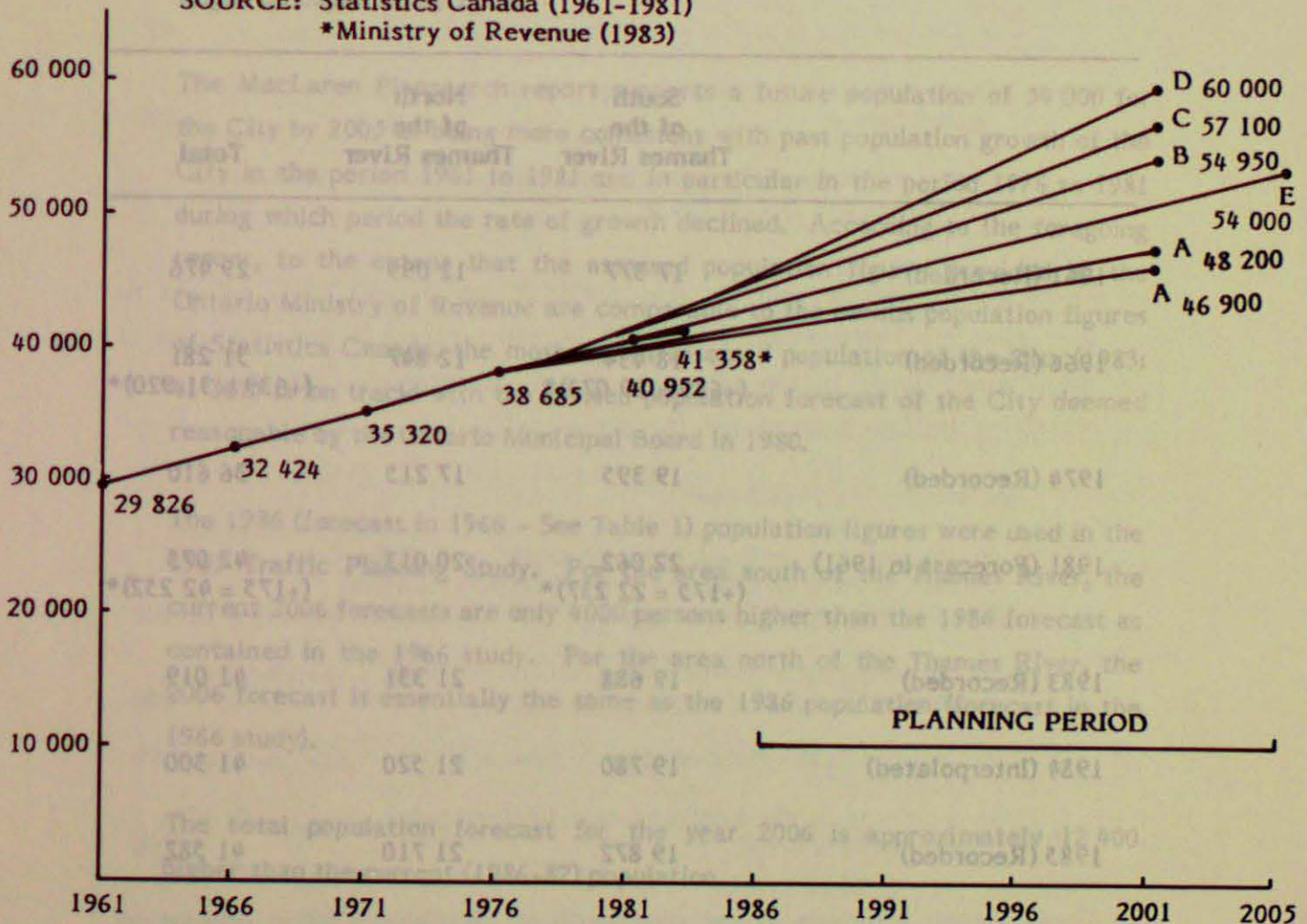
The process for this study provided for a strategic overview which is intended to place the issues which must be addressed in the study in perspective. This overview is based on a limited analysis of the data available and is largely subjective relying on judgment and experience rather than a detailed analysis of the data. It assesses, in general terms, the impact, on the transportation network, of the past and future growth of the City in terms of population and employment and the recent major change to the road network - the construction of the Lacroix Bridge.

The data on population and employment for various land use scenarios used by the Consultant in this study have been provided by the City of Chatham.

As indicated in the MacLaren Plansearch report, a number of population forecasts have been made for the growth in the City of Chatham since the adoption of the Official Plan in 1974 (See Exhibit 1). Recorded populations and forecasts are provided in Table 1. Some of the forecasts are those used in previous traffic planning studies. One of the population forecasts was prepared by the Ontario Ministry of Treasury, Economics and Intergovernmental Affairs. This forecast estimated the City's 1986 population at 42 300 and its 2001 population of 46 900 or 48 200 depending on whether the rate of increase of the City's share of the County population would have diminished or would have continued to increase.

A subsequent population projection of 60 000 by 2001 was the subject of an intensive examination at the Ontario Municipal Board hearing into the City's annexation application in 1980. The Board found, based on the evidence and its assessment of it, that a population of 60 000 for the City of Chatham in the year 2001 was "overly optimistic and overly generous for annexation

SOURCE: Statistics Canada (1961-1981)
*Ministry of Revenue (1983)



LEGEND

- A TREASURY ECONOMICS AND INTER-GOVERNMENTAL AFFAIRS (1976)
- B TREASURY ECONOMICS AND INTER-GOVERNMENTAL AFFAIRS (1978)
- C M. JONES (1978)
- D H. LUKIN ROBINSON (1980)
- E ONTARIO MUNICIPAL BOARD (1980)

**CITY OF CHATHAM
TRANSPORTATION PLAN
POPULATION GROWTH
AND PROJECTIONS
CITY OF CHATHAM
1961-2005**

TABLE 1
POPULATION
HISTORICAL AND FORECAST

	South of the Thames River	North of the Thames River	Total
1961 (Recorded)	17 377	12 099	29 476
1966 (Recorded)	18 434 (+639 = 19 073)*	12 847	31 281 (+639 = 31 920)*
1974 (Recorded)	19 395	17 215	36 610
1981 (Forecast in 1961)	22 062 (+175 = 22 237)*	20 013	42 075 (+175 = 42 252)*
1983 (Recorded)	19 688	21 331	41 019
1984 (Interpolated)	19 780	21 520	41 300
1985 (Recorded)	19 872	21 710	41 582
1986 (Forecast in 1966)	23 173 (+740 = 23 913)*	26 304	49 477 (+740 = 50 217)*
2006 (Forecast in 1986)	27 080	26 920	54 000

* includes population to the south of the City of Chatham

purposes", even when assuming the most generous of immigration and fertility factors, internal migration and ample vacancy margins. Rather, the Board concluded that a maximum projected population of 54 000 for the City might be expected by 2005.

The MacLaren Plansearch report supports a future population of 54 000 for the City by 2005 as being more consistent with past population growth of the City in the period 1961 to 1981 and in particular in the period 1976 to 1981 during which period the rate of growth declined. According to the foregoing report, to the extent that the assessed population figures provided by the Ontario Ministry of Revenue are comparable to the census population figures of Statistics Canada, the most recent assessed population of the City (1983: 41 358) is 'on track' with the revised population forecast of the City deemed reasonable by the Ontario Municipal Board in 1980.

The 1986 (forecast in 1966 - See Table 1) population figures were used in the 1965 Traffic Planning Study. For the area south of the Thames River, the current 2006 forecasts are only 4000 persons higher than the 1986 forecast as contained in the 1966 study. For the area north of the Thames River, the 2006 forecast is essentially the same as the 1986 population (forecast in the 1966 study).

The total population forecast for the year 2006 is approximately 12 400 higher than the current (1986-87) population.

Between 1974 and 1985, there has been only a minimal net growth (500 people) in the population south of the Thames River. North of the Thames River, the growth has been approximately 4500 people.

The Planning Department has forecast population declines and increases throughout the City. For the most part, these are distributed in a variety of areas with some of the more significant increases as follows:

North of the Thames River:

- in the northern section of the City north of
McNaughton Avenue 2050
- in the area north of Grand Avenue, west of Baldoon Road 450
- in the area south of McNaughton Avenue and west of
Sandys Street 480
- in the area east of Delaware Avenue between Grand Avenue
and the northerly City limits 2400

These growth forecasts in the area north of the Thames River amount to approximately 5400 persons. The total growth forecast in the area north of the Thames River is approximately 5200. Accordingly, there are some offsetting declines in population in some areas.

South of the Thames River:

- in the southern section of the developed part of the City
- south of Park Avenue and in the general vicinity of
Lacroix Street and Queen Street 1900
- in the area east of Bloomfield Road and north of
Richmond Street 950
- in the area in the vicinity of Park Avenue West 2600
- in proximity to the downtown area (including the
Riverside Park area) 1700

These growth forecasts in the area south of the Thames River amount to 7200 persons which is the total growth forecast in this area. Within the latter area (in proximity to downtown) there are some offsetting increases and decreases.

It can be seen therefore that the population growth is distributed throughout the City. This mitigates against the use of a "corridor" analysis (except to a limited degree) in which growth factors could be applied to forecast increases in traffic. The growth in traffic is likely to be generally distributed throughout the City.

Table 2 provides a summary of information which has been extracted from the earlier Traffic Planning Reports and the recorded 1986 employment as well as the forecast 1996 and 2006 employment as provided by the City of Chatham Planning Department.

TABLE 2
EMPLOYMENT
HISTORICAL AND FORECAST

	South of the Thames River	North of the Thames River	Total
1961 (Recorded)	7 278	1 743	9 021
1966 (Recorded)	8 917 (+54 = 8 971)*	2 534	11 451 (+54 = 11 505)*
1981 (Forecast in 1961)	11 877	2 653	14 530
1986 (Forecast in 1966)	12 871 (+118 = 12 989)*	4 100	16 971 (+118 = 17 089)*
1986 (Recorded)	17 600	5 210	22 810
1996 (Forecast in 1986)	20 730	5 740	25 870
2006 (Forecast in 1986)	22 115	6 505	28 620

* includes employment to the south of the City of Chatham

Employment growth, north and south of the Thames River, is expected to result in essentially the same proportionate relationship as existed in 1986.

While the application of some computer model may offer some benefit in forecasting traffic volumes, the cost of its development and calibration in the context of this study was not justified.

A practical and realistic expectation is that traffic volumes will grow generally throughout the network; although, in certain areas where new links are possible or where improved facilities would attract a greater amount of traffic than might otherwise be expected, an analysis of the impact of these links is necessary on a localized basis. Thus, the study has been based on the application of a general growth in traffic throughout the road network using a growth factor derived from historical and projected population growth. For specific areas which will have a more profound impact on road links in close proximity to a significant growth area, the traffic generated by the growth area has been assigned to the road links on a progressive basis moving remotely from the growth area until its magnitude is accounted for by the traffic volume increase derived from the application of the growth factor to the current traffic volumes.

This is the general approach which has been used in the development of the transportation plan and the related issues associated with the road network in North Chatham and Southwest Chatham as well as the By-pass Route, the Queen Street/Centre Street route, etc.

Where a road link is an element of a particular issue, and the road link will be impacted by traffic volumes that will be generated by a growth area, the assigned traffic volumes, if greater than the volumes resulting from the growth factor, have been used to evaluate the needs in the localized area of the road link at issue.

This approach has been used, in particular, to address the issues associated with the Keil Drive Extension and the Sandys Street Extension.

A detailed examination of river crossing volumes and particularly truck movements has been undertaken to address the need for a new bridge to the west of Chatham as part of the "by-pass" system.

3.0 THE TRANSPORTATION PLAN FOR CHATHAM

The previous chapter of this report provided a "strategic overview" of the past and current transportation network and the general impact of future growth in Chatham over the next twenty years. This chapter provides more detailed information on the forecast growth in population and employment and the attendant growth in traffic volumes.

Key intersections and links in the road network, from the standpoint of potential capacity deficiencies, are identified. Measures to overcome these deficiencies are proposed within the medium (up to 10 year) and long-term (10-20 year) time frame as required by the Terms of Reference for the study.

The study must, of necessity, consider the needs beyond the 20 year horizon for the study; although, there is no forecast of population and employment growth, other than in general terms, on which to base recommendations for road improvements beyond this horizon. It is important, however, to recognize potential growth in terms of protecting the necessary right-of-way for road widenings and new links in the road network. Accordingly, the right-of-way plan which is proposed is based on the longer term - in some cases, on the likely requirements beyond the twenty year planning period for this study.

3.1 Population and Employment Growth

As indicated in the previous chapter, the present population of Chatham is approximately 42 000 persons and is expected to grow to 54 000 persons by the year 2006. This is an increase of approximately 30 percent.

The current employment in Chatham is 22 810 which yields an activity rate of 54 percent. Employment is expected to grow to approximately 28 600 by 2006. Recent trends toward the 'part time' employment phenomenon and its impact on future employment trends is unknown. A conservative assumption has been made that the activity rate will remain reasonably constant declining slightly to 52% and subsequently increasing to 53%. It has also been

assumed that, while part time employment will have an impact on the number and temporal distribution of trips, these will not have any impact in terms of increasing or decreasing travel in the conventional peak period of travel - between 4:00 p.m. and 5:30 p.m. in the case of Chatham.

For the purposes of displaying the information on population and employment, the City has been divided into a number of zones which are based on polling subdivisions, since this zone system offered the benefit of tracking historical growth in population. By aggregating polling subdivision zones, an acceptable representation of past and future growth in population can be provided for the purposes of forecasting future travel.

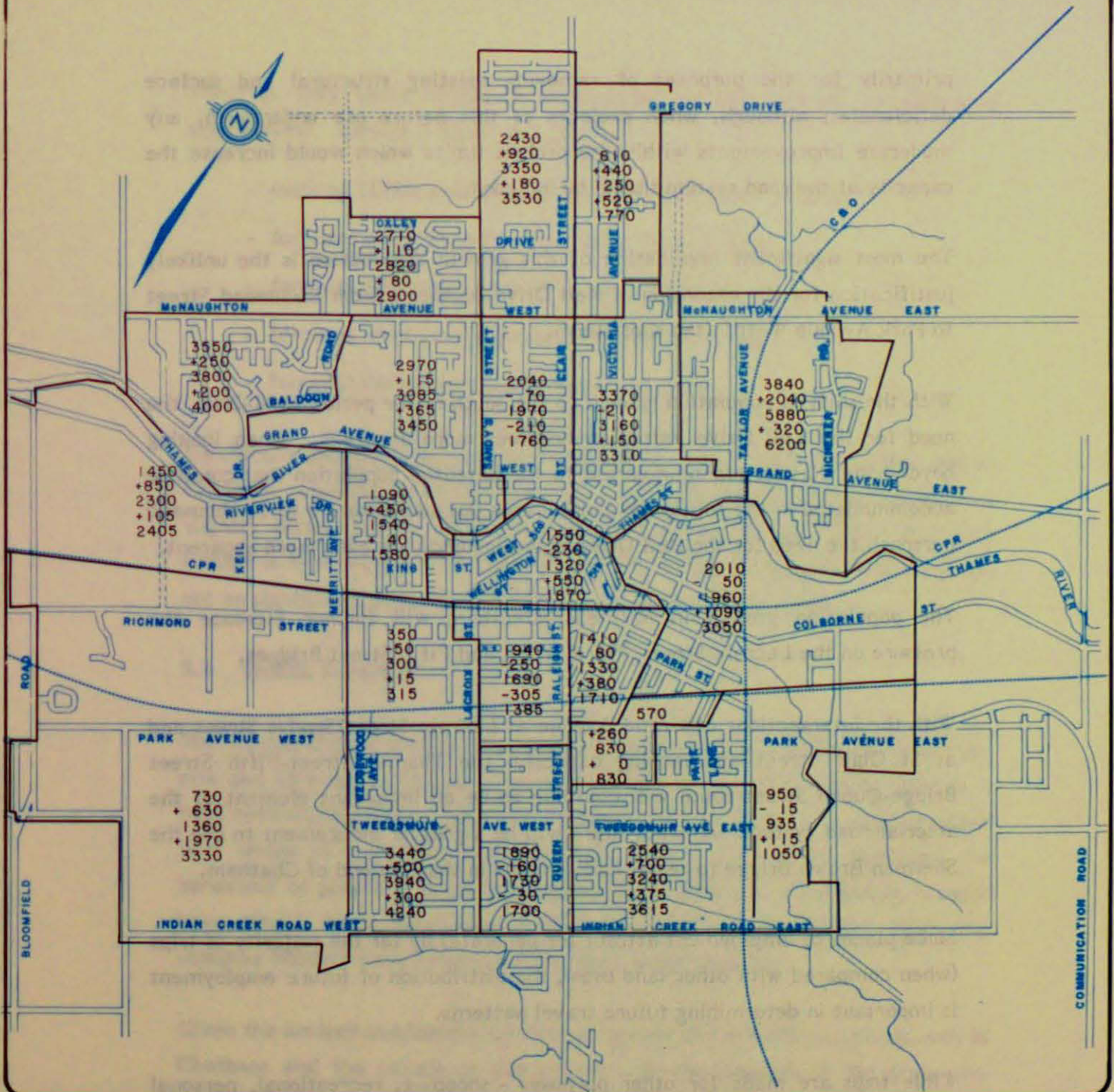
The growths and declines in the population in the various zones are presented in Exhibit 2 which illustrates:

- existing (1986) population (total - 41 580);
- forecast population growth 1986-1996 (7 920);
- forecast 1996 population (total - 49 500);
- forecast population growth 1996-2006 (4 500);
- forecast 2006 population (total - 54 000).

The dominant growth areas are:

- . in north Chatham in a zone centred on St. Clair Street north of Oxley Drive;
- . in northeast Chatham;
- . in south Chatham in a large zone centred on the Lacroix Street/Queen Street corridor; and
- . in southwest Chatham.

Over the next ten years, more growth is expected in north Chatham than in south Chatham. This has the obvious impact of focusing any identified improvement needs over the short term in the area north of the Thames River. The road improvement needs in the area south of the River will be



LEGEND

- EXISTING 1986 POPULATION
- FORECAST POPULATION GROWTH 1986-1996
- FORECAST 1996 POPULATION
- FORECAST POPULATION GROWTH 1996-2006
- FORECAST 2006 POPULATION

SOURCE: CHATHAM PLANNING DEPT.

CITY OF CHATHAM TRANSPORTATION PLAN POPULATION BY AREA CURRENT AND FORECAST

EXHIBIT 5

primarily for the purposes of removing existing structural and surface deficiencies; although, when projects of this nature are undertaken, any moderate improvements within the project limits which would increase the capacity of the road system should be included.

The most significant implication of this growth distribution is the unlikely justification for the extension of Keil Drive southerly from Richmond Street to Park Avenue West in the short term.

With the shift in population growth to the south in the period 1996-2006, the need for the Keil Drive extension becomes more apparent. When looking beyond the 20 year planning period to the potential population that could be accommodated in the southwest growth area (an additional 10 to 11 thousand persons), the need for the Keil Drive extension becomes even more apparent.

The population growth in northeast Chatham will further increase the pressure on the Lacroix Street, Third Street and Fifth Street Bridges.

With the intersections of Grand Avenue at Lacroix Street/Sandys Street and at St. Clair Street approaching capacity, the Thames Street-Fifth Street Bridge-Queen Street route will continue to be an important element of the arterial road system. As well, there will be a greater inducement to use the Sherman Brown Bridge to reach Park Avenue in the east end of Chatham.

Since places of employment attract (or generate) by far the majority of trips (when compared with other land uses), the distribution of future employment is important in determining future travel patterns.

While trips are made for other purposes - shopping, recreational, personal business, school, etc., the peak travel periods are dominated by the work related trip. Thus the distribution of employment can be used to provide a basis for the general distribution of future trips.

There is very little historical information on the location of places of employment. Exhibit 3 illustrates by zone:

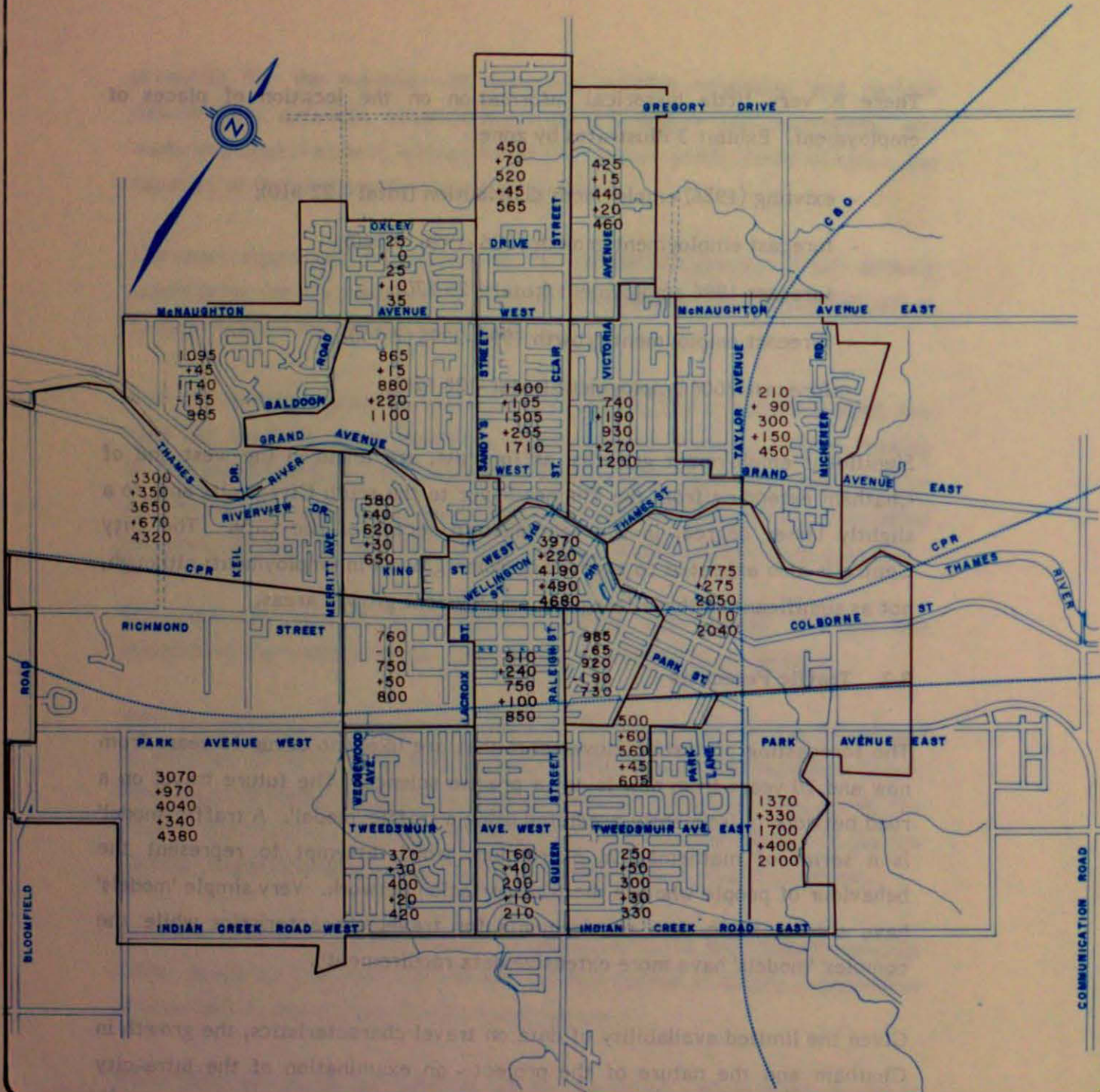
- existing (1986) employment distribution (total - 22 810);
- forecast employment growth 1986-1996 (3 060);
- forecast 1996 employment (total - 25 870);
- forecast employment growth 1996-2006 (2 750);
- forecast 2006 employment (total - 28 620).

Significant employment growths, as forecast, are found in the west end of Chatham extending from the Thames River to the south City limits and, to a slightly lesser degree, in the southeastern sector of the City. The City Centre is also expected to experience some growth in employment; although, not as significant as these foregoing employment growth areas.

3.2 Traffic Forecasts

The forecasting of traffic movements that are likely to occur 10 years from now and 20 years from now is not a precise science. The future travel on a road network is frequently predicted using a traffic 'model'. A traffic 'model' is a series of mathematical expressions which attempt to represent the behaviour of people who use the transportation network. Very simple 'models' have simple, basic data requirements for travel characteristics while the complex 'models' have more extensive data requirements.

Given the limited availability of data on travel characteristics, the growth in Chatham and the nature of the project - an examination of the intra-city traffic movements without the benefit of travel characteristics - a growth factor technique supplemented by a manually applied approach using the conventional process of trip generation, trip distribution and assignment was selected for application in this study.



LEGEND

- EXISTING 1986 EMPLOYMENT
- FORECAST EMPLOYMENT GROWTH 1986-1996
- FORECAST 1996 EMPLOYMENT
- FORECAST EMPLOYMENT GROWTH 1996-2006
- FORECAST 2006 EMPLOYMENT

SOURCE: CHATHAM PLANNING DEPT.

CITY OF CHATHAM TRANSPORTATION PLAN EMPLOYMENT BY AREA CURRENT AND FORECAST

The somewhat general distribution of future population in Chatham, as distinct from large concentrations of growth focused in a small number of areas, has influenced the decision to use a "growth factor" method as the basis for estimating the future traffic. For the roads in the vicinity of the various significant growth areas, the estimated increases will be larger than would result from the application of a growth factor. Accordingly, a more specific analysis has been undertaken of the impact of growth in these areas.

A growth factor of 15% has been applied to represent the increase in traffic volumes generally for the period 1986 to 1996. A growth factor of 30% has been applied to represent the increase in traffic volumes generally for the period 1986 to 2006.

The resulting traffic volumes have been surcharged, in the cases of those intersections and road links which would experience a more concentrated increase in traffic, as a consequence of the influence of the significant population growth which will take place in the various areas as described earlier.

The growth factors of 15% and 30% have been derived from the forecast increases in population as indicated in Table 3.

TABLE 3
POPULATION FORECASTS
1986-2006
PERCENTAGE INCREASES

	<u>South of the Thames River</u>	<u>North of the Thames River</u>	<u>Total</u>
1985	19 900	21 700	41 600
1996	22 500	25 500	48 000
% increase 1985-1996	13%	17.5%	15%
2006	27 080	26 920	54 000
% increase 1985-2006	36%	24%	30%

The small differences in the percentage increases, north and south of the Thames River are insignificant particularly when the traffic volumes resulting from the surcharging of road links and intersections in the vicinity of growth areas are taken into consideration.

The Ontario Ministry of Transportation provides a year-by-year summary of the annual average daily traffic (AADT), the summer average daily traffic (SADT), the summer average weekday traffic (SAWDT) and the winter average daily traffic (WADT). An analysis of these data provides another source of information which can be used to assess the historical growth of traffic in the area.

Data for the period 1980 to 1985 are provided in Table 4 and Table 5 for the following locations:

Highway 2 - West of Chatham (A)

Highway 2 - East of Chatham (B)

Highway 40 - South of Chatham (C)

Highway 40 - North of Chatham (D)

Information on the Summer Average Daily Traffic (SADT) is provided in Table 4 for the years 1980 to 1985 inclusive.

Information on the Annual Average Daily Traffic (AADT) is provided in Table 5 for the years 1980 to 1985 inclusive.

TABLE 4

SADT* VOLUMES - VICINITY OF CHATHAM

	A Hwy. 2 (West)	B Hwy. 2 (East)	C Hwy. 40 (South)	D Hwy. 40 (North)
1980	11 000	8 000	4 950	6 800
1981	11 100	8 000	5 100	6 800
1982	11 200	8 000	5 600	7 000
1983	11 200	8 100	5 600	6 900
1984	11 200	8 400	5 900	7 100
1985	11 400	8 400	6 300	6 600

* Summer Average Daily Traffic

Source: Ontario Ministry of Transportation

TABLE 5

AADT* VOLUMES - VICINITY OF CHATHAM

	A Hwy. 2 (West)	B Hwy. 2 (East)	C Hwy. 40 (South)	D Hwy. 40 (North)
1980	10 500	7 600	4 600	6 000
1981	10 600	7 600	4 600	6 000
1982	10 700	7 600	4 850	6 050
1983	10 700	7 700	5 000	6 200
1984	10 700	7 700	5 250	6 300
1985	10 900	8 000	5 850	6 150

* Annual Average Daily Traffic

Source: Ontario Ministry of Transportation

Other than on Highway 40, south of Chatham ('C') between Highway 401 and Chatham, the rate of growth in traffic has been negligible.

The Ontario Ministry of Transportation also develops short-term (5 year and 10 year) traffic growth forecasts. These forecasts, which relate to the highway links in proximity to Chatham, are provided in Table 6.

Table 6
SHORT-TERM TRAFFIC PROJECTIONS

	A Hwy. 2 (West)		B Hwy. 2 (East)		C Hwy. 40 (South)		D Hwy. 40 (North)	
	AADT	DHV	AADT	DHV	AADT	DHV	AADT	DHV
1985	10 900	1 079	8 000	792	5 850	608	6 150	639
1990	11 400	1 127	8 500	842	6 400	663	6 300	654
1995	11 900	1 174	8 900	881	7 300	754	6 400	665
10 Year Growth	9%		11%		24%		4%	

AADT = Annual Average Daily Traffic

DHV = Design Hour Volume

Source - Ontario Ministry of Transportation

Forecast growths also follow an irregular pattern; however, overall the growth rates of 15 percent and 30 percent which have been developed and applied to forecast the traffic volumes for the Chatham road network within the planning period appear to be reasonable.

3.3 Forecast Traffic Volumes

The 1986 evening peak hour traffic volumes and those which are estimated for 2006 are illustrated for the main links in the Chatham road network on Exhibit 4.

The traffic volumes at all major intersections have been forecast in the context of the aforementioned procedure - the application of a growth factor and a subsequent surcharge to represent the impact of concentrated growth. The results are documented on plans in the files of the City Engineering Department.

In relation to the issue of the By-pass Route, the traffic volumes using the Thames River bridges are examined in greater detail and are provided in a subsequent chapter of this report.

3.4 Road System Capacity Deficiencies

In an urban context, the capacity of the road system is normally governed by the intersections controlled by traffic signals. Only in the case of Expressways or similar limited access roads or where there are high capacity intersections at each end of a bridge is the capacity likely to be limited by the capacity of a road section.

The capacity and service volumes that a traffic signal controlled intersection can accommodate are dependent on the intersection geometrics, traffic signal operation and traffic factors.

In the first category, the number of approach lanes and, to some extent, their width and road grade are most critical. The existence of parking at an intersection is also important.

In the second category, the proportioning of green time is the single most important factor. Cycle length, phasing and "lost time" features are also (although slightly less) significant.



EVENING PEAK HOUR

-36-

Traffic factors include the pattern and composition of arriving traffic, turning movements, presence of pedestrians and general driver characteristics. The latter appear to be related to the size of and location within an urban area; although, these are not considered to be well quantified. The pattern of vehicle arrivals is strongly influenced by nearby traffic signals and their coordination.

Of major concern in evaluating intersection capacity and service volumes is the proper way of describing the traffic performance at intersections.

3.5 Principles of Level of Service

Level of service, used in the transportation context, is a measure to describe the quality of traffic flow. The following three factors are the most significant measures of it at signalized intersections:

- vehicle delay;
- vehicle queue length at the approach;
- probability of a vehicle entering the intersection during the first green phase after its arrival at the intersection.

The extent to which an intersection may be considered as providing satisfactory operation must be described in some manner and the term normally used is the "level of service". Regardless of which methodology is used to determine the level of service, Level of Service 'A' is the optimum while, at the other end of the scale, Level of Service 'E' represents the maximum traffic volume that can be accommodated. That is, the intersection is operating at its capacity. The selection of the "level of service" to be achieved is a matter of policy for the local municipality.

In the new U.S. Highway Capacity Manual, two concepts have been advanced to describe level of service. At the level of analysis for "traffic operations" applications, a calculation of delay is used.

For planning applications, the following table is provided for determining the level of service using approach traffic volumes.

<u>Maximum Sum of Critical Lane Volumes</u>	<u>Approximate Level of Service</u>
0 to 1200	A through C
1201 to 1500	D through E
greater than 1500	F

In the determination of the level of service, using an analysis methodology developed in Ontario, commonly referred to as the "MTC Methodology", a probability function (a Poisson probability distribution) is applied. This is based on the concept that any driver arriving at a signalized intersection will, as many times as possible, pass through the intersection during the first green phase encountered after arriving at the intersection. That is, drivers should not have to wait through any more red indications than are necessary having regard to the traffic flow rate.

The criteria used to describe the various levels of service, using the MTC Methodology, are provided in Appendix A.

3.6 Selecting the Appropriate Level of Service

The probabilities used for the various levels of service bear no direct relationship to the U.S. Highway Capacity Manual but are believed to represent a good philosophical measure of the various levels of service. These probabilities have been in use for a number of years by the Ontario Ministry of Transportation and in several municipalities with satisfactory results.

For traffic signal controlled intersections, a probability of 95% (Level of Service 'A') is generally considered to be optimum. It means that 95 out of 100 times, all vehicles arriving during a complete cycle, for example, beginning at the commencement of the red signal, should be able to clear

before the completion of the next green interval; or, in other words, for a particular approach, 5% of the time, more vehicles will arrive during the cycle than can be handled by the green phase for that approach.

As is true with all other highway elements, the importance of short peaks within the hour - in the case of a traffic signal, on the intersection approaches - can be established only by relating their consequences to local civic and economic problems as a whole. An intersection approach may be fully adequate if drivers arriving during a one-a-day 15-minute peak period (such as when a large industrial plant closes) willingly accept a temporary back-up as inevitable or, at least, as more acceptable than the expenditure of local funds to eliminate the very short overload period. On the other hand, if this is found to be unacceptable locally, the level of service during the short period will require consideration in terms of possible design modifications in the form of road widenings or new road links.

Previous Councils of the City of Chatham have established Level of Service 'C' as the criterion which should be achieved. In the deliberations on the need for the Lacroix Bridge, the Council decided that the road system should be designed to provide sufficient capacity to achieve Level of Service 'C'. In the Traffic Operations Study, undertaken in 1981, the Technical Coordinating Committee established the following principles related to the level of service:

Intersections which operate below Level of Service 'A' will be the subject of further analysis to develop proposals for improvements which will raise the level of service to 'A'. Where, based on 1985 forecast traffic volumes, a level of service of 'C' or higher can be obtained by low cost traffic engineering techniques which do not involve road or sidewalk construction or reconstruction, such a level of service will be considered acceptable. Where road or sidewalk construction or reconstruction is required, the improvement should be designed to achieve Level of Service 'A' based on 1985 projected traffic volumes.

The existing major intersections have been analyzed using the existing geometric conditions (but not including the existing traffic signal timing) to determine the level of service which can be achieved at these intersections, based on the existing traffic volumes, the 1996 forecast traffic volumes and the 2006 forecast traffic volumes.

The level of service analysis is premised on the prohibition of parking in the morning and evening peak periods on both sides of the street in the vicinity of the intersections as necessary to realize the full capacity of the existing road width and the use of traffic signal timings consistent with the traffic demands. Should a capacity problem occur, it would be expected that parking would be prohibited during the peak traffic periods and/or the traffic signal timing would be adjusted before significant investments would be made in road widenings or new links in the network to provide additional capacity.

All intersections in the City of Chatham currently operate at Level of Service 'C' or better during the morning and evening peak traffic periods.

Table 7 identifies the intersections at which Level of Service 'C' cannot be achieved, without some physical improvements, based on the forecast 1996 traffic volumes. That is, these intersections operate "below Level of Service 'C'" which means that the conditions are moving towards the absolute capacity of the intersection (Level of Service 'E').

TABLE 7
INTERSECTIONS OPERATING
BELOW
LEVEL OF SERVICE 'C'
(1996 Traffic Volumes)

Lacroix Street/Sandys Street and Grand Avenue
Lacroix Street and Park Avenue

Table 8 identifies the intersections at which Level of Service 'C' cannot be achieved, without some physical improvements, based on the forecast 2006 traffic volumes. Thus, additional intersections are also moving towards the utilization of their capacity.

TABLE 8
INTERSECTIONS OPERATING
BELOW
LEVEL OF SERVICE 'C'
(2006 Traffic Volumes)

Grand Avenue and St. Clair Street
 Grand Avenue and Keil Drive
 Riverview Drive and Keil Drive
 Lacroix Street/Sandys Street and Grand Avenue
 Lacroix Street and Park Avenue
 Lacroix Street and Richmond Street

For the two intersections which fail to meet the 'level of service' criterion in 1996, it is possible to achieve Level of Service 'C', in one case, by a modest intersection modification, as described in the following.

At the Lacroix Street/Sandys Street-Grand Avenue, the addition of an eastbound right-turn lane and allowing the left turns to operate at Level of Service 'E' would provide the capacity for all other traffic movements to operate at Level of Service 'C'.

At the intersection of Lacroix Street and Park Avenue, accepting a lower level of service for southbound left turns would just achieve Level of Service 'C' for the remaining traffic movements. There is no practical minor physical modification which could be implemented at this location to allow all traffic movements to operate at Level of Service 'C'.

In the period from 1996 to 2006, it is expected that traffic service at the six intersections listed in Table 8 will deteriorate to a condition which will require a decision on major elements of the road system. The Keil Drive extension is one of these elements and it is concluded that since no other reasonable alternative exists, the Keil Drive extension should be provided in the period 1996-2006.

A current project being undertaken by the City includes the widening of Keil Drive between Richmond Street and Grand Avenue to create a five-lane section with a centre lane for left turns in both directions between Richmond

Street and Riverview Drive. In conjunction with this project, the intersection of Keil Drive and Riverview Drive and the intersection of Keil Drive and Grand Avenue will be improved.

Although the capacity of Sandys Street is dependent on the capacity of the intersections of Lacroix Street/Sandys Street and Grand Avenue to the south and Sandys Street and McNaughton Avenue to the north, the increase in traffic volumes on Sandys Street indicates that Sandys Street should be widened; however, a widening to four lanes is not required within the planning period of this study. Nevertheless, due to the uncertainty of the growth of Chatham to the north and the extent to which Dover Township in the area north of Chatham will become urbanized in the twentieth century, a right-of-way should be designated which could be achieved and protected over the next twenty years (or more) through redevelopment and site plan control. The road system to serve North Chatham is also very much dependent on the foregoing factors.

Both the Sandys Street extension and the road system to serve North Chatham are discussed in more detail in a subsequent chapter.

In the 1981 Traffic Operation Study report, it was recommended that St. Clair Street be widened from McNaughton Avenue to a point north of McFarlane Avenue to create a fifth lane for both northbound and southbound left turns. This operational improvement is still warranted to serve the adjacent commercial development.

3.7 Road Classification

It is appropriate to highlight the characteristics of the different classes of urban roads - namely arterials, collectors and locals - that are relevant to the road system in the City of Chatham.

Arterial Roads - Arterial roads are designed to facilitate the intra-urban and through movement of a large volume of traffic, at a relatively high operating speed of 50-80 km/h to and from major traffic generating sectors. Major arterial roads intersect with other arterial roads and collector roads and provide limited access to and egress from abutting properties (only where such access/egress cannot be provided from a collector or local street). Arterial roads do not contain a parking lane. A major arterial road will carry bus transit vehicles when serving the needs of the bus transit system. The characteristics of urban arterial roads are summarized in Table 9.

**TABLE 9
CHARACTERISTICS OF ARTERIAL ROADS**

Element	Planning Characteristics
Number of lanes	2 - 6 lanes divided or undivided, typical; more than 4 lanes divided or undivided under heavy traffic conditions
Range of daily traffic volumes	5 000 - 30 000 vehicles per day
Characteristics of traffic flow	uninterrupted flow except at traffic signals and pedestrian crosswalks (crossovers)
Average running speed under free flow conditions	50 - 70 km/h (with the higher value prevalent in suburban areas)
Vehicle types	all types with up to 20% trucks
Connections to	freeways, arterials, collectors
Typical examples	St. Clair Street, Grand Avenue, Sandys Street/Lacroix Street, Keil Drive, Richmond Street and Park Avenue

Collector Roads - Collector roads are designed to collect and carry medium volumes of local traffic, at a relatively moderate speed of 50-60 km/h, to and from the major and minor arterial roads and distribute traffic to and from local roads, as well as to provide access to abutting properties and may contain a parking lane or parking lanes. A collector road may be used as a bus transit route. Table 10 summarizes the characteristics of collector roads.

TABLE 10
CHARACTERISTICS OF COLLECTOR ROADS

Element	Planning Characteristics
Number of lanes	2 lanes undivided, typical
Range of daily traffic volumes	1 000 - 3 000 vehicles per day (approx. 100 to 300 vehicles per hour in the peak hour)
Characteristics of traffic flow	interrupted flow due to traffic control measures
Average running speed under free flow conditions	30 - 50 km/h
Vehicle types	buses, passenger cars and service vehicles
Connections to	arterials, other collectors and locals
Typical examples	Oxley Drive, Victoria Avenue, King Street, Wellington Street, Park Street and Tweedsmuir Avenue

Local Roads - Local roads are designed primarily to carry low volumes of traffic at low speeds of 40-50 km/h (average running speeds are usually lower) and to provide access to and egress from abutting properties. Local roads should be designed so as to discourage the movement of "through" traffic on such roads and should function as local distributor roads. Parking may be permitted on such roads. Only when necessary to serve a transit system demand which cannot be served by collector and arterial roads will a local road be used as a bus transit route. Table 11 summarizes the characteristics of local roads.

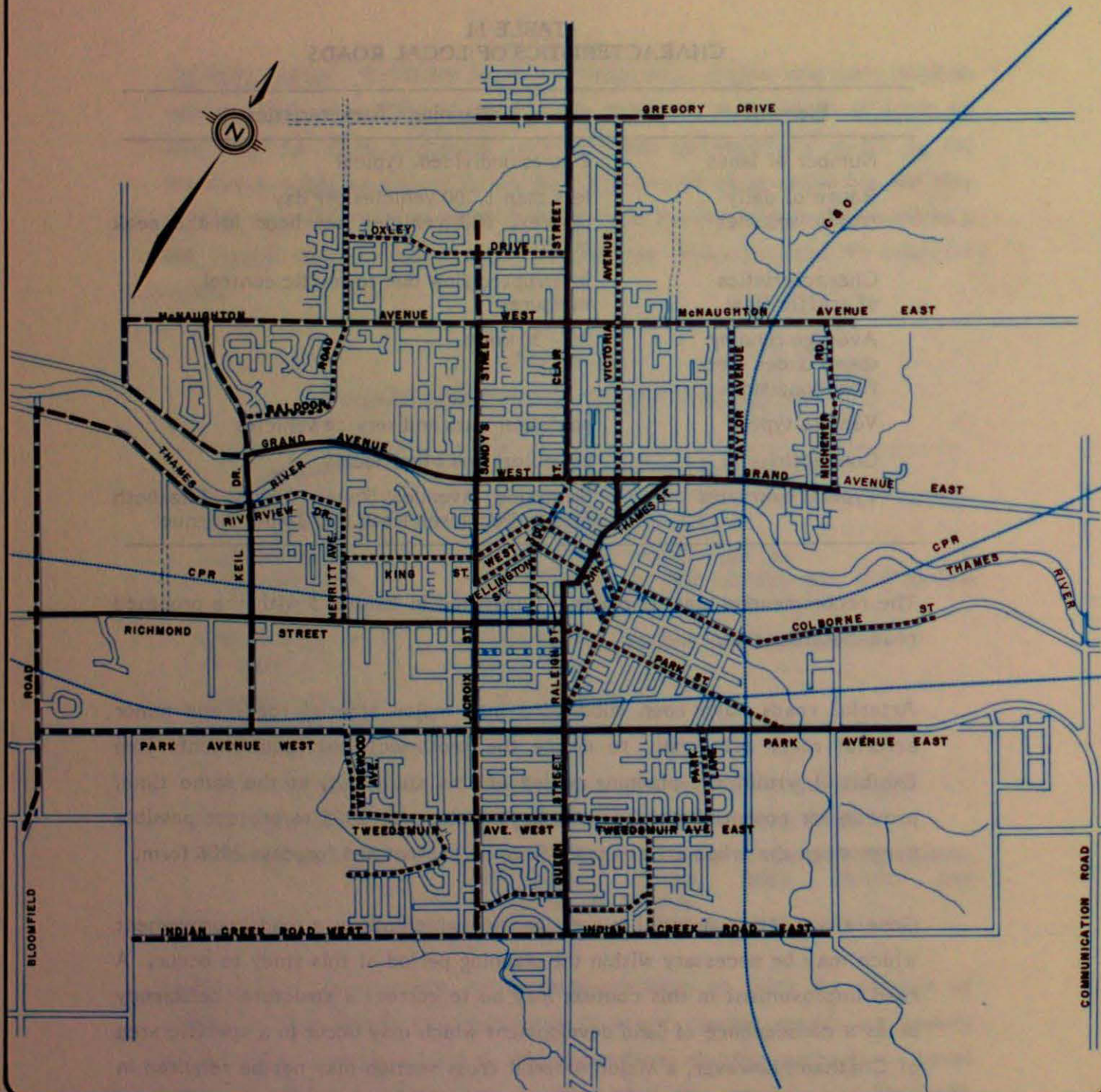
TABLE 11
CHARACTERISTICS OF LOCAL ROADS

Element	Planning Characteristics
Number of lanes	2 lanes undivided, typical
Range of daily traffic volumes	less than 1 000 vehicles per day (approx. 100 vehicles per hour in the peak hour)
Characteristics of traffic flow	interrupted flow due to traffic control measures
Average running speed under free flow conditions	20 - 30 km/h
Vehicle types	passenger cars and service vehicles
Connections to	collectors and other locals
Typical examples	Sunnyside Avenue, Sussex Street, Elizabeth Street, Tecumseh Road and Jasper Avenue

The recommended plan of roads is illustrated in Exhibit 5 with the proposed road classification.

Arterial roads have been subdivided into major arterial roads and minor arterial roads principally to define the cross-sectional requirements (see Exhibit 6) within the planning period of this study but, at the same time, provide for potential requirements beyond the year 2006 to protect possible needs when the urban area expands from its present and forecast 2006 form.

Generally a Minor Arterial is a designation which allows a road improvement which may be necessary within the planning period of this study to occur. A road improvement in this context may be to correct a structural deficiency or as a consequence of land development which may occur in a specific area of Chatham; however, a Major Arterial cross section may not be required in these circumstances. The Minor Arterial cross section, indicated on Exhibit 6, provides a means of achieving the required improvement and allowing for the future designation and construction of the road as a Major Arterial road should future demands warrant such action. In these cases, each facility should be considered on the basis of its circumstances and merits.



LEGEND

- MAJOR ARTERIAL ROAD
- MINOR ARTERIAL ROAD
- COLLECTOR ROAD

CITY OF CHATHAM TRANSPORTATION PLAN

RECOMMENDED PLAN OF ROADS

Since a substantial portion of the arterial road network has an adequate right-of-way width to allow for the required number of lanes (generally two lanes for a minor arterial and generally more than two lanes for a major arterial) additional right-of-way should not be purchased by the City simply to meet the right-of-way widths which are adopted in the Official Plan. Rather, additional right-of-way should be acquired as development or redevelopment takes place. For example, as Park Avenue West is developed in the south-western area of Chatham, the existing right-of-way should be increased to the recommended right-of-way through subdivision agreements.

3.8 Right-of-way for Roads

The public right-of-way should be sufficient in width to accommodate the roadway and the sidewalks and provide the area required for utilities, for trees and other streetscape features.

The roadway must provide the number of lanes of adequate width as required to satisfy the traffic demand. The sidewalks should be set back from the roadway to provide the optimum measure of safety for pedestrians.

The boulevard area between the sidewalk and the roadway is principally the means of providing for the safety of pedestrians who should be as far removed from the roadway as is practical.

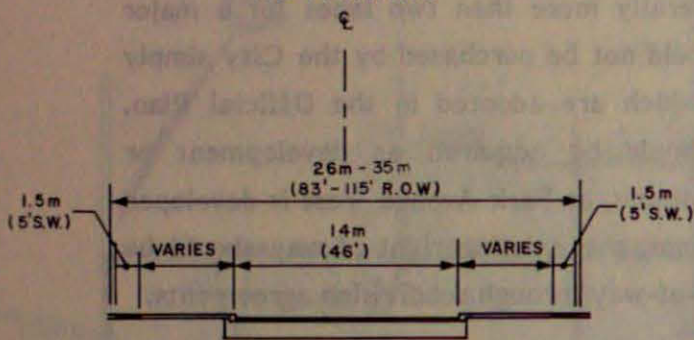
The boulevard area also can be used for utilities, trees and a snow storage area in winter to provide a means by which the traffic lanes can be unencumbered by snow accumulation near the curb.

A boulevard also minimizes the likelihood of pedestrians being splashed by passing motorists when there are puddles of water on the roadway.

The right-of-way cross sections for arterial (major and minor) roads, collector roads and local roads are indicated in Exhibit 6.

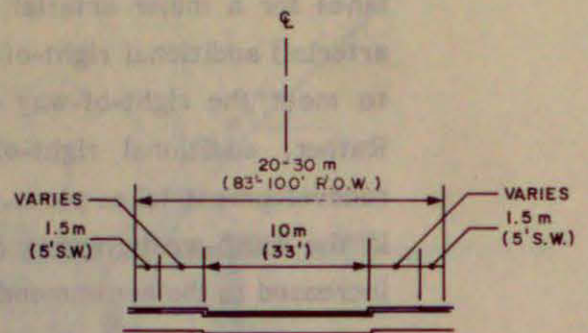
MAJOR ARTERIAL

**4 LANES
NO PARKING**

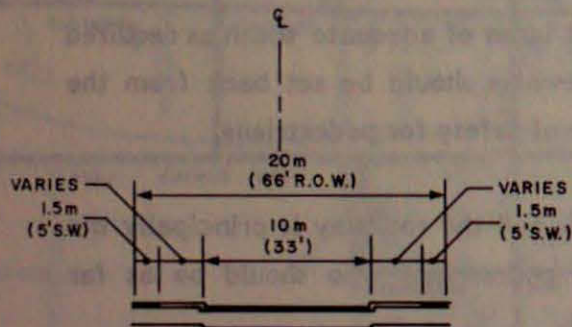


MINOR ARTERIAL

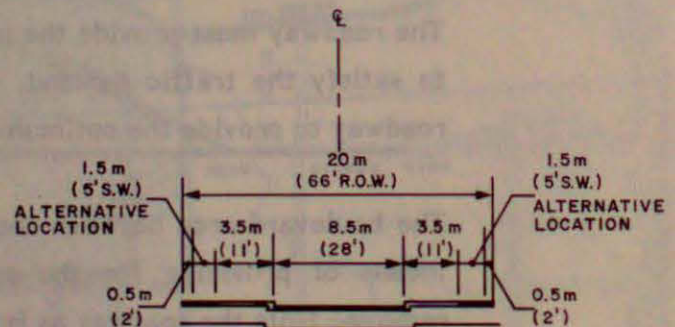
NO PARKING



**COLLECTOR
PARKING - ONE SIDE**



LOCAL



LEGEND

**RIGHT-OF-WAY AND ROADWAY
DIMENSIONS ARE MINIMUMS**

**NOTE: CONVERSIONS FROM
METRIC UNITS TO
IMPERIAL UNITS ARE
APPROXIMATE**

**CITY OF CHATHAM
TRANSPORTATION PLAN**

**RIGHT OF WAY
AND
CROSS SECTIONS**

These are basic right-of-way requirements. The roadway cross-sections illustrated should be considered as the cross-sections which should be provided. If possible, roadways should be constructed with lane widths of 3.5 metres (nominally 11.5 feet), parking lanes of 2.5-3.0 metres (nominally 9 feet) and a curb offset of 0.15 metres (6 inches) for a total cross section of approximately 10 metres (nominally 33 feet).

The City of Chatham currently defines collector roads in two categories - "collector" and "minor collector". The standards proposed in this report are for "collector" roads without differentiation. These roads are illustrated on Exhibit 5. A "minor collector" road has not been defined.

When a range of values is shown (e.g., 25.5-36.5 metres (nominally 83'-120')), the lower value is the minimum right-of-way that should be provided and the larger value is the maximum that should be required at intersections where additional lanes may be needed for turning vehicles (e.g., right-turning vehicles).

The Victoria Avenue - Thames Street area is an exception in that it is unlikely that both of these streets will ever require four lanes. Some widening of the existing pavement will likely be required some time in the future. For this purpose a 20 m (nominally 66') right-of-way would be adequate.

A 'system road link' comprised of Queen Street, School Street and Fifth Street will be adequate for the planning period of this study. In the future, an extension of Richmond Street to Centre Street may be required which will necessitate a modification to the Official Plan. Chapter 9 provides a more detailed evaluation of the needs in this area.

Where the existing right-of-way is less than the minimum, provision should be made to acquire the land necessary to achieve the minimum right-of-way through subdivision agreements, rezoning applications, severances, site plan approvals, etc. In many cases, this will be a very long-term program.

3.9 Railway-Roadway Crossings

The 1974 Official Plan of the City of Chatham identified the intention to construct railway-roadway grade separations of the Canadian National Railway at the crossings on Lacroix Street and Queen Street. The Lacroix Street crossing has been completed.

The recent acquisition of the Conrail system by the Canadian National Railway has resulted in significant changes to the use of the CNR tracks west of the former Chessie (C&O) system tracks which are located in the east end of Chatham. There have been increases in the rail movements on the C&O trackage and decreases in rail movements on the CNR trackage, west of the C&O trackage. The City and the Canadian National Railway have entered into an agreement which is intended to create a grade separation of the CNR (formerly C&O) tracks and Park Avenue East.

While traffic volumes on Queen Street have remained essentially the same, (approximately 13 500), in the past two years, rail movements on the C.N. trackage across Queen Street have decreased from an average of 30 trains per day in 1985 to a current (1987) level of 12 trains per day. No information has been obtained on the number of rail movements across Queen Street that are expected in future years.

The reduced rail traffic has necessitated a reconsideration of the need for a grade-separated crossing at this location. Consequently, the City does not intend to include, in the proposed Official Plan, the requirement for a grade separation at the Canadian National Railway crossing on Queen Street.

4.0 BY-PASS

4.1 Introduction

In the current review of the City of Chatham Official Plan, MacLaren Plansearch identified, in concept form, an eastern "by-pass" and a western "by-pass" of the City, as illustrated in Exhibit 7 - Long Range Plan of Roads.

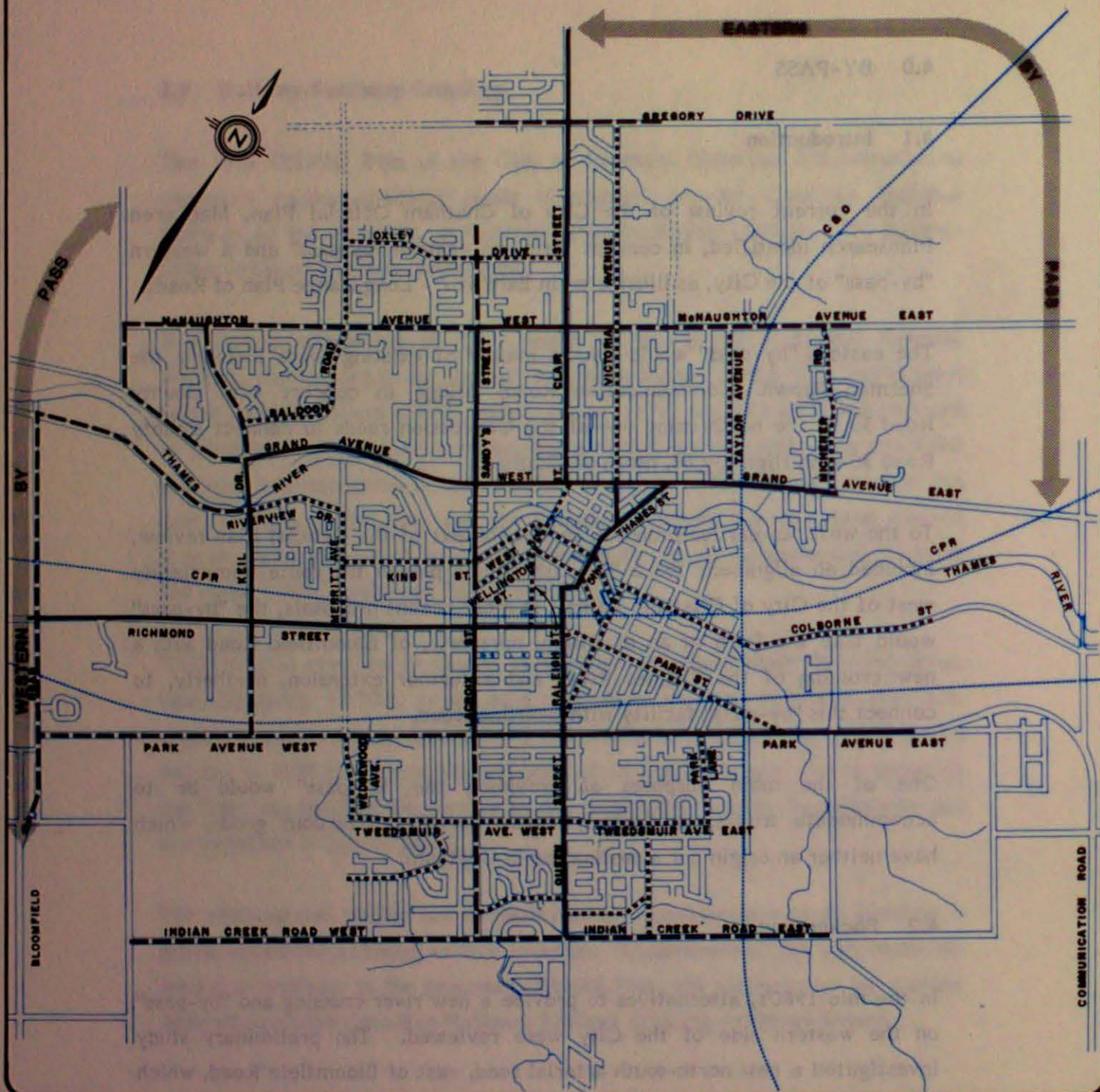
The eastern "by-pass" would consist mainly of existing roads including the Sherman Brown (Communication Road) Bridge in concert with County Road 30 to the north using one of the Concession roads to connect County Road 30 with Highway 40, north of Chatham.

To the west, an earlier proposal, in the context of the Official Plan review, included an alignment for a "by-pass" which placed the route immediately west of the City of Chatham limits. In more recent proposals, the "by-pass" would take the form of an extension, northerly, of Bloomfield Road with a new crossing of the Thames River and a further extension, northerly, to connect this "by-pass" facility with Bearline Road.

One of the main purposes of providing the "by-pass" would be to accommodate trucks, particularly trucks carrying hazardous goods, which have neither an origin nor a destination in Chatham.

4.2 Background

In the mid 1960's, alternatives to provide a new river crossing and "by-pass" on the western side of the City were reviewed. The preliminary study investigated a new north-south arterial road, east of Bloomfield Road, which would be projected northerly behind Oriole Parkway. This routing potential was pre-empted in 1966 when the sites of the Motor Wheel and Eaton Spring Corporations were developed. An alignment along Bloomfield Road was discarded due to the anticipated need at that time for a grade separation as a consequence of the volume of cars on Bloomfield Road and the number of



LEGEND

- MAJOR ARTERIAL ROAD
- MINOR ARTERIAL ROAD
- COLLECTOR ROAD

CITY OF CHATHAM TRANSPORTATION PLAN

LONG RANGE PLAN OF ROADS

trains on the CPR trackage. Another alternative to the west of Bloomfield Road was reviewed and the matter was finally resolved in the Traffic Planning Report (Delcan 1968) in which it was indicated that the traffic demand crossing the Thames River could be satisfied with the construction of the Lacroix Bridge.

The Lacroix Bridge was opened to vehicular traffic in November 1983 and has provided a significant relief to the other bridges within the City which had been carrying the traffic load to that time - the Parry Bridge (Keil Drive), the Third Street Bridge and the Fifth Street Bridge.

The Sherman Brown (Communication Road) Bridge was opened in 1979. Very little information is available over the period that this bridge has been carrying traffic; although, current traffic volume counts are understood to be representative. The Sherman Brown Bridge has spare capacity and would serve as a component of any eastern "by-pass" of the City.

Since an integral component of the western "by-pass" would be a new bridge over the Thames River, it is appropriate to determine if the capacity of the existing bridges will be exceeded within the planning period of the study.

4.3 Bridge Capacity

The capacity of a traffic lane on a bridge is only of relevance in practice when the means of access to and egress from the bridge are unconstrained. For example, a two-lane bridge with a high capacity interchange at each end could be subjected to volumes higher than the bridge lane capacity, simply because the interchanges can "feed" into and "accept" from the bridge more traffic than the bridge could accommodate. The converse is normally true, in that, in most cases, bridge lanes can accommodate more traffic than can be "fed" into the bridge or "accepted" from the bridge due to constraints at the end of the bridge, typically in the form of a traffic signal controlled intersection.

Therefore, it is normally the capacity of the intersections on the approach to the bridge that govern the volume of traffic accommodated on the bridge. The intersection capacity is governed by the number of lanes of traffic on the approach to the intersection and the timing of the traffic signals having regard to any regulations which may restrict pedestrian and traffic movements.

The volume of traffic using an intersection is not necessarily a measure of its capacity. Rather, the volume in relation to the capacity gives a measure of the "level of service" (refer to Appendix 'A' for a description of "Level of Service"). An intersection approach is considered to be at its capacity when that approach is operating at level of service 'E'. Therefore, if an intersection is operating in a balanced condition at, for example, level of service 'B', additional traffic can be accommodated on all approaches before the capacity of the intersection is said to have been reached.

Operating one approach to an intersection under prevailing traffic flows at a very high level of service (say level A or B), by favouring that approach with a disproportionate amount of "green time" allocated from within the traffic signal cycle would result in a far greater volume of traffic being able to be accommodated by that approach. In these circumstances, a conflicting approach would, under demand volumes, be provided with just enough "green time" to operate at level of service 'E' and therefore could essentially process no more traffic.

It is normal practice to balance the level of service on the approaches to an intersection so that no one approach is favoured over another (although, the principle of operating a left-turn lane at Level of Service 'E' is quite common).

4.4 River Crossing Demand

In Chapter 3 of this report dealing with the transportation plan, the derivation of the traffic forecasts was described.

Historical data on the volume of traffic in the morning and evening peak hour periods are available from City of Chatham intersection traffic counts for 1980 and 1985/86. Data from automatic traffic recorders are also available but limited in scope. The traffic forecasts described in Chapter 3 were prepared for the years 1996 and 2006.

The capacity of the intersections, which are the principal constraints to the optimum capacity of the bridges, has been determined in the context of the forecast traffic demands as determined in the development of the transportation plan.

Table 12 summarizes, for the evening peak hour (considered to be the highest traffic demand period of the day), the historical data for 1980 and 1985/86 and the forecasts for the year 1996 and 2006. Also included in the table are the estimated capacities of the bridges based on the capacity of the intersections in close proximity to the bridges.

The impact of the opening of the Lacroix Bridge is quite apparent particularly on the Parry (Keil Drive) and Third Street Bridges. If traffic grows as forecast, the traffic volumes on Keil Drive (Parry Bridge) will have, by 2006, returned to the 1980 values for southbound traffic and be slightly in excess of the 1980 values for northbound traffic. Both approaches will be operating essentially at their capacity.

The Lacroix Bridge traffic volumes will grow to an estimated 900 vehicles per hour southbound and 1100 vehicles per hour northbound over the next twenty years. There will still be surplus capacity on this bridge in the year 2006 if traffic increases in accordance with the forecasts.

Considering the pattern of future development over the next twenty years, it is likely that some of the traffic estimated for Keil Drive (Parry Bridge) will use the Lacroix Bridge, thus providing some relief to the potential capacity deficiencies related to Keil Drive (Parry Bridge) and still leaving surplus capacity on the Lacroix Bridge.

TABLE 12

**THAMES RIVER BRIDGE CROSSINGS
WITHIN THE CITY OF CHATHAM
EVENING PEAK HOUR TRAFFIC VOLUMES
AND
CAPACITIES**

	Parry Bridge Keil Drive		Lacroix Street Bridge		Third Street Bridge		Fifth Street Bridge		Total
	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	
1980	1020	1400	nil	nil	840	1100	540	680	5580
1985/86	810	1180	700	850	650	800	570	550	6060
1996	930	1370	870	1060	750	900	660	630	7170
2006	1050	1530	910	1120	850	980	750	720	7910
Nominal Capacity	1050	1500	1500	1500	1000	1300	750	1200	

Source: City of Chatham Traffic Volume Surveys

Traffic volumes on the Third Street Bridge are estimated, by 2006, to return to the 1980 levels for the southbound movement but are not expected, by 2006, to reach the 1980 level for the northbound traffic movement. For both directions, it is expected that there will be spare capacity - particularly in the northbound direction.

On the Fifth Street Bridge, southbound traffic was not significantly affected by the opening of the Lacroix Bridge and is estimated to grow from the 540 vehicles per hour (p.m. peak hour) in 1980 and 570 vehicles per hour in 1985/86 to 750 vehicles per hour by 2006 which will tax the available southbound capacity. Northbound, the traffic volumes dropped after the opening of the Lacroix Bridge but are expected to grow to slightly in excess of the 1980 volumes by the year 2006. This level of traffic volume - 700 vehicles per hour (p.m. peak hour) - is well below the capacity of the Fifth Street Bridge to handle the northbound traffic.

The Sherman Brown Bridge is outside the City and the current traffic volumes are well below the capacity of this bridge.

4.5 Truck Volumes on Existing Bridges

Surveys were carried out by the City of Chatham staff on December 10, 1986 to count and classify the vehicles using the Prairie Siding Bridge, the Parry (Keil Drive) Bridge, the Lacroix Bridge and the Sherman Brown Bridge. The surveys were intended to determine the extent to which transport trucks and tanker trucks (potentially carrying dangerous goods) are currently using the existing major bridges.

The summarized results of the surveys are provided in Table 13 for the period 7:00 a.m. to 6:00 p.m. The corresponding volumes for the evening peak period (3:00 p.m. to 5:00 p.m. are provided in Table 14.

One-half of all the trucks using the four bridges use the Parry (Keil Drive) Bridge and another one-quarter use the Sherman Brown Bridge. The

remaining one-quarter use the Lacroix Bridge (2/3 of the remainder) and the Prairie Siding Bridge (1/3 of the remainder). These same ratios apply during the peak traffic period.

Based on these surveys, another bridge in the western part or to the west of the City could not be justified to accommodate the truck traffic demand. A bridge in either location would, no doubt, provide some relief to the Parry Bridge; however, the Prairie Siding Bridge already offers this opportunity, to some extent, for those truck drivers who wish to by-pass Chatham to the west. Truck use of the Prairie Siding Bridge is only one-quarter of the usage of the Parry (Keil Drive) Bridge.

4.6 "By-Pass" System

The most recent proposal in the Official Plan review documents utilizes Bloomfield Road north of Richmond Street as a major component of the "by-pass" system. The northerly extension of Bloomfield Road to cross the Thames River and pass through lands in Dover Township to provide a connection with Bearline Road is sound conceptually; however, a more detailed study, in concert with the officials of the affected townships, should be undertaken in the very near future to identify an alignment. This would allow the consideration of any development proposals which may be forthcoming for this area.

South of Richmond Street, the "by-pass" system could use either existing Bloomfield Road or the conceptual alignment in the Township of Raleigh; however, there is considerable opposition to the route through Raleigh Township. This section of the "by-pass" route also requires a more detailed study which would address all of the socio-economic, environmental, geometric and cost factors which are related to the two options. There are also variations to the option to use Bloomfield Road, such as an alignment to the east of the existing Bloomfield Road right-of-way, south of Park Avenue West. A more detailed study, in concert with officials from the affected townships should be undertaken to describe an alignment.

TABLE 13
TRAFFIC VOLUMES
BY CLASSIFICATION
MAJOR THAMES RIVER BRIDGES
 7:00 a.m. to 6:00 p.m.

Bridge	Automobile		Two-way	Stake Trucks		Tanker Trucks		Transport Trucks		Dump Trucks		Concrete Trucks		Sub-Total All Trucks		Bus		Other		Total		Two-way
	N	S		N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	
Prairie Siding			716	12	14	13	7	20	22	1	2	0	1	46	46	0	0	0	0	N/A	N/A	808
Parry	7 552	7 210		103	106	25	29	94	99	12	12	4	3	238	149	0	2	2	4	7 792	7 465	15 257
Lacroix	6 985	6 609		41	42	7	6	39	38	3	2	7	6	97	94	0	0	1	2	7 083	6 705	13 788
Sherman Brown	2 281	2 273		26	25	7	5	66	61	14	12	9	7	122	110	11	10	0	0	2 414	2 393	4 807

N - Northbound S - Southbound

N/A - Not Available

Source: City of Chatham Traffic Volume Surveys

TABLE 14
TRAFFIC VOLUMES
BY CLASSIFICATION
MAJOR THAMES RIVER BRIDGES
3:00 p.m. to 5:00 p.m.

Bridge	Automobile		Two-way	Stake Trucks		Tanker Trucks		Transport Trucks		Dump Trucks		Concrete Trucks		Sub-Total All Trucks		Bus		Other		Total		Two-way
	N	S		N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	
Prairie Siding			167	1	4	3	1	3	6	0	0	0	0	7	11	0	0	0	0	N/A	N/A	185
Parry	1 899	1 536		21	29	4	3	17	17	2	1	0	1	44	51	0	1	0	2	1 943	1 590	3 533
Lacroix	1 640	1 492		6	9	1	0	2	13	1	0	0	2	10	24	0	0	0	1	1 650	1 517	3 167
Sherman Brown	607	587		4	7	0	0	12	13	2	2	2	3	20	25	2	7	0	0	629	619	1 248

N - Northbound S - Southbound

N/A - Not Available

Source: City of Chatham Traffic Volume Surveys

The "by-pass" system is a valid long-term concept particularly to provide a route which can be used by heavy trucks and for the transport of hazardous goods. The improvements necessary to achieve the quality of facility which would be necessary before such a route could be identified as a "by-pass" involve roads and land not currently within the City of Chatham.

There is insufficient information available to establish the need and benefits of the implementation of either component of the "by-pass" system at this time. Nevertheless the "by-pass" concept should be recognized in the Official Plan as part of a 'long range' road network.

The cost of implementing the "by-pass" route has not been estimated; however, it is apparent that it would be substantial - particularly in the case of the western "by-pass". The cost of improving County Road 30 from Highway 2 East to either Concession Road III or IV and improving Concession Road III or IV between Highway 40 North and County Road 30 should be determined before any further consideration is given to implementing a "by-pass" system.

In conclusion, there is no justification for a new bridge across the Thames River to provide additional road capacity to serve the needs of the City of Chatham within the planning period for this study.

Should it be consistent with the capital improvement programs of the road authorities involved, an eastern "by-pass" could be developed within the planning period.

5.0 OFFICIAL PLAN STATEMENTS

The City of Chatham intends to adopt a new Official Plan. In the new Official Plan, a section will be devoted to 'Transportation'. Statements have been developed for inclusion in the Official Plan and are provided in the following. These statements are based on material prepared by the consultant to the Planning Department, modified to reflect the findings of this study as appropriate.

For the purposes of referencing the Official Plan, the section numbers below are the same as in the Official Plan document.

5.1 Introduction

The major goal for transportation in the planning area is to develop a safe, convenient and efficient transportation system which should serve the existing and proposed land use pattern and facilitate convenient and energy efficient movement of goods and people throughout the City. The Official Plan must recognize the relationship between future development and all modes of transportation, including automobiles, trucks, railways, public transit, bicycles and pedestrians.

Given the possible need to accommodate a population of fifty-four thousand persons which are expected to live in Chatham by the year 2006, the resultant travel has to be accommodated in accordance with the identified goal for transportation. The Official Plan must also recognize the need to accommodate growth beyond the year 2006 without a forecast of where long-term future growth will occur.

This section generally defines the transportation policy for the City. The Proposed Arterial Road Network, Schedule E "Road Network" (see Chapter 3, Exhibit 5, "Recommended Plan of Roads") and the statements of intent contained in this section, provide the principles on which to protect rights-of-way and to determine more precise road alignments within the City.

Schedule 6 "Long Range Road Network" (see Chapter 4, Exhibit 7 - Long Range Plan of Roads) provides a conceptual long range road system comprised of a "by-pass" system integrated with the arterial roads from the "Road Network" plan. The "by-pass" system represents a concept using, for the most part, existing Provincial Highways, County Roads or Township Roads. This system provides a means by which through traffic can by-pass the City to travel between Highway 40 north of Chatham and Highway 401.

5.2 Transportation System

5.2.1 Objectives

The objectives of the transportation system are to:

Roads:

- (a) develop an appropriate hierarchy of roads to facilitate the safe and efficient movement of all traffic within and through the City. The proposed system should:
 - . in the case of new and improved elements of the system, be physically, socially, environmentally, aesthetically and economically feasible;
 - . carry most movements on the minimum number of new or improved facilities;
 - . make proper use of existing facilities so as to minimize the need for additional roads;
 - . serve the proposed growth structure and other elements in the Official Plan;
 - . provide sufficient capacity to meet the forecast travel demand;
 - . serve major activity centres;
 - . be operationally feasible;
 - . in the case of new elements, complement existing committed elements and so form an integrated system providing an area-wide function;

- . utilize readily available rights-of-way wherever possible so as to minimize cost and disruption;
- . allow trips to be made on the most practical and direct route between their origins and destinations;
- . maximize safety by minimizing points of conflict and by providing for the separation of longer distance and through trips from shorter distance and local trips;
- . be capable of being constructed in stages on a priority basis;
- . be capable of expansion.

Parking:

- (b) ensure that adequate parking facilities are provided throughout the City.

Pedestrians/Cyclists:

- (c) develop a comprehensive pedestrian/bicycle system.

Public Transit:

- (d) encourage the use and expansion of the public transit system to all parts of the City.

Rail

- (e) minimize road/rail conflicts by relocating minor or underutilized railway lines and remove at-grade railway crossings where feasible.
- (f) encourage the maintenance of adequate passenger and freight rail services.

Hazardous Goods Movement:

- (g) provide for, insofar as possible, the haulage of hazardous materials on routes that do not conflict with urbanized residential and/or institutional areas.

Environmental:

- (h) minimize the impact on the environment and the aesthetic character of the City.

5.2.2 General Policies

5.2.2.1 Without limiting the generality of this Plan, it is the intent that minor adjustments may be made to the road network during implementation without amendment to this Plan.

5.2.2.2 The Transportation Policies should be considered in conjunction with Schedule "F", "Long Range Road Network" (see Chapter 4, Exhibit 7, "Long Range Plan of Roads"), which forms part of this Plan.

5.2.2.3 This Plan recognizes that the automobile will continue to represent the primary mode in meeting the travel needs within the City.

5.2.3 Roads

5.2.3.1 Schedule "E", "Road Network", provides a system of Arterial and Collector streets which serve the needs of the City and which is integrated with the Provincial Highway and County Road Systems. Schedule "F", "Long Range Road Network", provides a basis for preparing development plans in the City (and surrounding townships) to allow for the orderly future growth beyond the year 2006.

5.2.3.2 **Functional Classifications:** The roads within the City of Chatham, both existing and proposed, are classified according to their ultimate desired function in Schedule "E", "Road Network" (see Chapter 3, Exhibit 5, "Recommended Plan of Roads"), as follows:

MAJOR ARTERIAL ROAD - Major arterial roads, by virtue of their location and physical characteristics, are existing and proposed divided and undivided roads of 2 - 6 traffic lanes which have a nominal basic right-of-way width of 83 to 100 feet (26 to 30 metres) and which may have a right-of-way of 115 feet (35 metres) at intersections with other arterial and collector roads. Arterial roads are designed to facilitate the intra-urban and through movement of a large

volume of traffic, at a relatively high operating speed of 50-80 km/h to and from major traffic generating sectors within the Chatham Planning Area. These roads also connect to the Provincial Highway system and major County roads. Major arterial roads intersect with other arterial roads and collector roads and provide limited access to and egress from abutting properties (only where such access/egress cannot be provided from a collector or local street). Arterial roads do not contain a parking lane. A major arterial road will carry bus transit vehicles when serving the needs of the bus transit system.

MINOR ARTERIAL ROADS - A minor arterial road is an existing or proposed road of 3 traffic lanes with a right-of-way width of 83-100 feet (26 to 30 metres) which represents an interim designation to allow for the future designation of the road as a major arterial road should future demands warrant such a designation. The characteristics of a minor arterial road are the same as a major arterial road with the exception of the roadway width.

COLLECTOR ROAD - Collector roads are existing and proposed undivided roads of 2 - 3 traffic lanes which have a nominal right-of-way width of 66 feet (20 metres) and which may have a right-of-way width of 72 feet (22 metres) at intersections with arterial roads. Collector roads are designed to collect and carry medium volumes of local traffic, at a relatively moderate speed of 50-60 km/h (the average operating speed will normally be less), to and from the major and minor arterial roads and distribute traffic to and from local roads, as well as to provide access to abutting properties and may contain a parking lane or parking lanes. A collector road may be used as a bus transit route.

LOCAL ROAD - Local roads are existing and proposed undivided roads with 2 traffic lanes which have a nominal right-of-way width of 66 feet (20 metres). Local roads are designed primarily to carry low volumes of traffic at low speeds of 40-50 km/h (the average operating speed will normally be less) and to provide access to and egress from abutting properties. Local roads should be designed so as to discourage the movement of through traffic on such roads and should function as local distributor roads. Parking may be permitted on such roads. Only when necessary to serve a transit system demand which cannot be served by collector and arterial roads will a local road be used as a bus transit route.

- 5.2.3.3** It is the policy of City Council to secure the necessary rights-of-way to accommodate the number of lanes and function for roads

as defined in the foregoing through negotiation, expropriation, as a condition of approval for a rezoning of the lands and/or plans to subdivide, sever, develop or redevelop any lands.

5.2.3.4 It is the policy of the City Council to maintain, protect and enhance the safety and the traffic capacity of Collector and Arterial roads by minimizing the number and restricting the location of intersections and driveways. To this end, Council will:

- (a) encourage joint use driveways and common access locations along arterial roads;
- (b) enact by-laws to control the number, location and dimensions of driveways connected to arterial and collector roads;
- (c) impose more stringent control of driveway locations and site circulation through site plan control and 0.3 metre reserves;
- (d) encourage "reverse frontage" for residential lots with no vehicular driveway connections to arterial roads.

5.2.3.5 To control future land uses that would create traffic congestion on arterial roads and nearby intersections, Council will:

- (a) restrict strip commercial development or redevelopment and "residential to commercial" conversions along arterial roads;
- (b) locate highway-oriented service commercial development in designated areas along arterial roads;
- (c) locate high density residential uses in designated areas along arterial roads to minimize the impact and maximize the accessibility.

5.2.3.6 To improve the traffic flow and enhance the safety on arterial and collector roads and to minimize the likelihood of increasing the through traffic on local roads which intersect arterial roads and collector roads, Council may:

- (a) prohibit the parking of vehicles at all times or, as a minimum, during peak traffic periods on both sides of all arterial roads;
- (b) install traffic control signals only at intersections of arterial roads and other arterial roads and arterial roads and collector roads;
- (c) establish speed regulations to facilitate traffic flow without jeopardizing the safety of pedestrians, cyclists and motorists with speed limits no lower than 50 km/h and no higher than 80 km/h;
- (d) implement operational techniques such as one-way streets, parking restrictions and restricted turning movements;
- (e) implement appropriate physical measures such as medians and intersection channelization.

5.2.3.7 It is the policy of the City to ensure that development does not interfere with plans to extend or widen existing roads and that sufficient land is reserved for such improvement. To achieve this the City may require "transportation impact studies" for any future development that is considered to be a major traffic generator and is proposed to abut on a collector or arterial road.

5.2.3.8(a) When an existing or proposed road is widened or improved as a capital works project, the necessary right-of-way shall be acquired as a part of the project through negotiation or, if necessary, expropriation.

5.2.3.8(b) Where the land for the widening of the right-of-way is acquired in advance of a need related to a specific capital works project, the land will be acquired through a dedication to the City, at no expense to the municipality, as a condition of approval for the following:

- (a) a draft plan for a proposed subdivision;
- (b) a land severance by the Committee of Adjustment;

- (c) a site plan for development as required by Section 6.9 of this Plan;
- (d) a rezoning of a parcel of land initiated by other than the City.

5.2.3.9 For the purpose of road widenings, the centreline of the road at its narrowest right-of-way shall be considered as the centreline of the road. The future right-of-way limit shall be determined by a line parallel to the centreline (or its straight line projection) and removed from it by one-half of the future right-of-way. City Council shall, from time to time, determine the extent of the additional right-of-way required at intersections above the nominal right-of-way width.

5.2.3.10 In areas developed or designated for retail or service commercial land use, additional road widening dedications may be required to provide for a maximum 35 metres right-of-way.

5.2.3.11 In addition to the rights-of-way designated in Schedule "E", road widenings may be required for "daylight triangles", turn lanes, channelization and other improvements at intersections. In these cases:

- (i) The intersection curb radii shall be in accordance with accepted design standards for arterial road and collector road intersections.
- (ii) The maximum widening for turn lanes and channelization shall be in accordance with accepted design standards. Widenings shall extend along the length of the road, from the intersection, the distance necessary to provide the required storage capacity in the left turn lane.

5.2.3.12 Where existing development, road alignments, topographic features or other factors make it impractical to obtain the desired widening, road improvements will be designed to minimize the impact on abutting properties.

5.2.3.13 Plans for future widenings or improvements will include consideration of measures to enhance the land use compatibility, environment and streetscape.

5.2.3.14 Where a dedication to the City at no expense to the municipality cannot be obtained, the City may acquire the right-of-way or widening necessary to accommodate the improvement to roads designated on Schedule "E" to this Plan (see Appendix B - Arterial Road Widenings as prepared by the Engineering Department).

5.2.3.15 The widening of any road or part of a road to the extent described in Schedule "G" and Subsection 5.2.3.11 above may be reduced by City Council without amending this Plan in either of the following circumstances:

- (a) where an existing building or structure is located wholly or partly within the road right-of-way and the building or structure is not proposed to be altered through redevelopment;
- (b) where a transportation feasibility study demonstrates to the satisfaction of Council that the road allowance and/or alignment of the road will not require the road right-of-way to be widened to the full extent of the designation.

5.2.4 Transportation and the Urban Environment

1. It is the policy of the City to minimize the impact of trucks upon residential areas.

- 1.1 Truck routes will be defined in a Traffic by-law to restrict trucks over 5 tonnes (5.5 tons), if loaded, and 3 tonnes (3.3 tons), if unloaded, from using designated streets unless the truck is being driven to or from a base of operations or for the purposes of making a delivery, in which case the by-law will require that the shortest route between the truck route and the base of operation or site of delivery be used.

1.2 Restrict land uses, activities and home occupations which generate truck traffic to locations abutting on arterial roads or collector roads thus precluding the need to use local and collector residential streets by traffic travelling between the site and the nearest arterial road.

2. It is the policy of the City to protect residential areas from excessive noise and vibration generated by major transportation corridors.

2.1 Adequate noise attenuation will be required to buffer future residential development from CN, CP and C&O railway lines and major arterial roads.

2.2 The City may require a Noise Impact Study to determine noise levels and mitigating measures to eliminate or minimize the noise impact on proposed residential development.

(i) Noise Impact Studies may be required prior to draft plan of subdivision approval.

(ii) Noise Impact Studies shall be undertaken in accordance with Provincial guidelines and submitted for the approval of the City in consultation with the Ministry of the Environment.

2.3 Implementation of noise control measures may be required as a condition of subdivision or site plan control agreements.

5.2.5 Public Transit

1. It is the policy of the City to promote the provision of efficient public transportation in the planning and development of the City by:

1.1 maintaining a compact urban form, viable downtown and land use concentrations to facilitate the provision of efficient transit service;

1.2 extending public transit service to new areas as demand warrants;

1.3 providing comprehensive and current information on the transit services including the provision of public notification of major service or route changes;

1.4 providing an effective means of transportation for individuals who are without access to an automobile;

1.5 minimize the need for residents to purchase a second automobile.

2. It is the policy of the City to encourage greater use of public transit as an alternative to the private automobile to facilitate energy conservation and to minimize the need for major road capacity improvements by:

2.1 continuing to provide and market the transit system to the end that acquires and maintains a positive user-oriented image and best meets the transit needs of the citizens of Chatham;

2.2 maintaining a good level of service through improvement to overall routes, speeds and regularity of service;

2.3 locating higher density housing, commercial and employment centres along transit routes;

2.4 improving public transit service on routes which link areas of population and employment concentrations;

2.5 facilitating the use of public transit for the physically disabled by providing special equipment and services where warranted, designing stops and shelters for easy access by the disabled, or any other such action to facilitate transit access.

3. The City recognizes the importance of inter-urban transit as a part of the overall transportation network and will:

3.1 encourage and participate in studies and programs leading to the planning and implementation of inter-urban transit facilities to service the planning area and to connect the City to other urban centres in Southwestern Ontario.

5.2.6 Railways

1. It is the policy of the City to recognize the importance of the rail system to the past and future development of the City, by:

1.1 facilitating the provision of freight service to industrial areas, where feasible;

1.2 supporting the continued provision of passenger service to the City.

2. It is the policy of the City to improve railway crossings, wherever warranted, by:

2.1 encouraging and seeking assistance for the grade separation of railway mainline crossings of the arterial roads where circumstances warrant a grade separation.

2.2 consider closing minor road crossings at railway mainlines, without amendment to this Plan.

3. It is the policy of the City to support the relocation of C.P. Railway operations which traverse the City's centre. The removal of a substantial part of the trackage is a long-term objective of the Plan. The City will:

3.1 encourage the development of industries requiring rail spur lines in those locations that can be served by existing rail lines to be retained;

3.2 not permit new industries to locate where such industries need service from or would contribute to the further entrenchment of rail lines proposed for removal;

3.3 encourage existing industries using rail lines proposed for removal to effect any expansion or relocation in or to areas that can be served by existing lines.

5.2.7 Pedestrian/Bicycle Paths

1. It is the policy of this Plan to recognize the increasing number of bicycle users in the City by developing a system of bikeway/walkways linking activity centres throughout the City where appropriate, in conjunction with the Open Space System. In this context, consideration shall be given in all new subdivisions, development and redevelopment proposals to provisions for walkway-bikeway links.

2. Sidewalks will be provided on both sides of all arterial roads, at least one side of all collector roads and on at least one side of all local roads with the exception of cul-de-sacs less than 150 metres (500 feet) in length. All cul-de-sacs on which a school is located shall also be provided with sidewalks.
3. Pedestrian and bicycle facilities which will facilitate the mobility of physically handicapped persons shall be provided, where appropriate.
4. The City shall give consideration to the provision of bicycle routes and facilities adjacent to or as an extension of the width of the sidewalks.

5.2.8 Parking

1. It is the policy of the City to ensure that adequate off-street parking facilities are provided to meet the parking demands generated by various land uses by:
 - 1.1 specifying off-street parking requirements for all types of land uses in the Zoning By-law;
 - 1.2 providing off-street parking areas and facilities through zoning and site plan requirements and through parking programs;
 - 1.3 acquiring, developing and operating public parking facilities in any area of the City but particularly in commercial areas, as a need is identified;
 - 1.4 requiring parking for all types of development or redevelopment as an integral part of the site development except in any area where Council adopts a by-law which provides for the payment of cash-in-lieu of providing parking or provides an exemption to the parking requirements, as may be stated in the Zoning By-law.

In cases where there is a parking deficiency for non-residential uses in a residential area, parking may be provided on abutting or neighbouring property subject to site plan approval which must ensure that proper buffering is provided to the abutting residential properties.
2. The City may, where a property owner enters into an agreement with the City to ensure continued availability of an off-street parking area, permit the provision of required parking on another site which is within

convenient and reasonable walking distance of the property but, in no case, shall such distance be greater than 150 m (500 feet).

3. It is recognized that a progressive programme to provide off-street parking facilities, both private and public, will be required to serve the Central Area. To this end the City will:

3.1 continue to work with private enterprise in the supply of off-street parking in the downtown;

3.2 consider structured parking where high demand areas in the downtown are associated with proposed new development.

4. Within the Central Area as designated on Schedules "A" and "B" (see the Official Plan), with the exception of the redevelopment area known as the Downtown Chatham Centre, the City may exempt or reduce the required parking for properties bounded by the Thames River, McGregor Creek, Third Street, Wellington Street and William Street where adequate alternative parking facilities are available and/or parking cannot be provided on-site.

5. In areas exempt from the provision of off-street parking and/or as a condition of development or redevelopment on properties where parking requirements cannot be provided on-site, cash payment may be required in lieu of parking required by the Zoning By-law in such amounts as Council may determine from time to time to assist the City in providing adequate alternative off-street parking facilities.

6. The City will establish a special reserve fund for monies contributed to the fund as cash-in-lieu of the parking provisions.

In the acquisition of land for municipal parking purposes, the City may use its powers of expropriation where a specific property has been identified for acquisition for public parking and where attempts to negotiate its purchase have failed.

7. Council will establish a formula for calculating the cash-in-lieu contribution that takes into account:

- . land cost for equivalent at-grade parking;
 - . construction costs for each space required;
 - . an adjustment factor to reflect the portion to be borne by the developer.
8. Council shall continue to replace eliminated or reduced on-street parking along arterial roads with equivalent off-street parking, where feasible.
 9. Council shall require designated parking facilities for vehicles used in the transportation of handicapped persons in new development or redevelopment proposals.
 10. The City will provide adequate off-street parking facilities in areas developed for community-wide recreational facilities.

5.2.9 Design and Construction

1. In the design and construction standards for arterial and collector streets, the Municipality will be guided by the Ontario Ministry of Transportation's Standards and by the City's Subdivision Standard requirements.
 - 1.1 The City may consider reducing local street standards in new subdivisions, where feasible.
2. The design and cost of road construction and transportation improvements effected by any subdivision of land or development project shall be paid by the developer.

2.1 Design and cost shall be determined by agreement with the City.

5.2.10 Staging

1. It is the policy of the City to limit new development to areas where adequate transportation facilities can be provided without imposing added cost to the taxpayer.

6.0 KEIL DRIVE AND SOUTHWEST CHATHAM ROAD NETWORK

6.1 Background

Keil Drive currently extends from McNaughton Avenue in the northerly part of the City to Richmond Street in the southerly part of the City and is a major element of the road network.

In the 1968 Traffic Planning Report, it was recommended that Keil Drive be extended southerly from Richmond Street to Park Avenue West as a two-lane arterial road in the first stage of the then proposed program related to the development and improvement of the arterial road network. This recommendation was embodied in Schedule E - Transportation Facilities - of the Official Plan adopted in 1974.

In 1970, a report was prepared to support the City of Chatham's application to the Canadian Transport Commission for approval to construct an at-grade crossing at Keil Drive across the right-of-way of the Canadian National Railways at mileage 62.87 Chatham subdivision. The Canadian Transport Commission was of the opinion that a grade separation was warranted due to the number and speed of trains in the area, as well as the anticipated volume of vehicular traffic. It was indicated that a crossing at grade would interfere with the CNR operation in the CNR yard at Chatham. The City was expected to assume all costs of construction and maintenance of the grade separation. The matter was not pursued as there was no agreement on the type of crossing - at grade or grade separated.

In recent correspondence to the Township of Raleigh, the CN Railways pointed out their concern over the proposal to extend Keil Drive between Richmond Street and Park Avenue and re-iterated that, in 1970, the Railway had advised the City of Chatham of its opposition to the proposal to construct the level crossing.

The Railway's position has not changed in that it would only consent to a grade separation since a public level crossing at this location would result in:

- (1) delays to switching operations of freight trains in order to comply with the City's 5 minute rule.
- (2) delays to vehicular traffic in the event of trains blocking the crossing with the consequence of unfavourable public criticism.
- (3) delays to spotting and lifting operations of revenue customers.

The Canadian National Railway asked that these concerns be passed on to the City of Chatham by the Township of Raleigh.

6.2 The Need for the Keil Drive Extension

The analysis carried out in the development of the transportation plan as described in Chapter 3, led to the conclusion that the Keil Drive extension should be provided in the period 1996-2006. The basis for this conclusion is the forecast of a low level of development activity in the large area south of Park Avenue West which was annexed approximately five years ago. By 2006 it is forecast that only 2500 persons will be living in this area; although, subsequent development will add another 10-11 000 persons. It is this growth subsequent to the end of the planning period for this study that will accentuate the need for the extension of Keil Drive. In the meantime, over the next 10 years, the modest growth in the area can be accommodated by improvements to the network as described in Chapter 3.

Conditions have changed considerably since the early 1970's when the formal approach was made to the Canadian Transport Commission for the construction of an at-grade crossing. Since the Keil Drive extension will not be required until the period 1996-2006, and since conditions will change over the next 5-10 years (eg., train service on the Canadian National Railway trackage could change and traffic volumes may not reach or may exceed the limits which have been forecast, it is inappropriate to attempt to develop information to allow a determination of the appropriate form of the crossing

- either an at-grade or grade separated crossing of the railway right-of-way on the Keil Drive extension - at this time.

The recent acquisition of the Conrail facilities and the changes made by the Canadian National Railway in diverting rail movements onto the former C&O trackage crossing Park Avenue East has reduced the volume of rail traffic on the CNR trackage in the central and western area of Chatham.

6.3 At-Grade or Grade Separated Railway Crossing

Based on using Industrial Street (the southerly extension of Keil Drive), the City of Chatham prepared a preliminary functional plan of an at-grade crossing of the CNR which demonstrates the feasibility of this crossing in terms of the geometrics - particularly the road grade that could be provided between the tracks and Park Avenue West.

A preliminary functional plan has been prepared for a grade separation which indicates that Keil Drive would have to pass beneath the tracks. There would be some difficulties in achieving an adequate grade on the Keil Drive Extension without relocating Park Avenue West to a more southerly alignment.

Since any such relocation would have to be considered in the preparation of a secondary plan for the area south of Park Avenue West, either an allowance must be made to accommodate the grade separation or a decision must be made that an at-grade crossing will be provided for the crossing of the CNR tracks by the Keil Drive Extension.

Consideration was given to the possibility of relocating the Keil Drive Extension to a more westerly location to take advantage of the increasing separation between the CNR tracks and Park Avenue West to the west of Industrial Street. The property holdings and the existing rail siding tracks mitigate against a better option than using the existing Industrial Street

right-of-way. These factors could change in the future; however, this is not foreseen at this time.

In light of the opposition of the CNR to an at-grade crossing and the likelihood that conditions in the area could change over the next ten years, no action should be taken to initiate the construction of an at-grade crossing at this time. The CNR should, however, be advised of the City's reaffirmed intention to extend Keil Drive southerly to Park Avenue West and that the preparation of a development plan for the area south of Park Avenue West will be based on this feature of the arterial road network with an at-grade crossing of the CNR. This matter should be the subject of discussion with the CNR officials prior to the preparation of the development plan.

6.4 Southwest Chatham Road Network

The decision on the alignment of the southerly extension of Keil Drive has a profound impact on the preparation of the secondary plan for the southwest area of Chatham bounded by Park Avenue West, Howard Road, Indian Creek Road and the existing development in the area west of Lacroix Street. The point at which the Keil Drive Extension intersects Park Avenue West should form a major intersection to which a major road extending to the south should connect.

The area to the south of Park Avenue West is intended to be developed residentially. Accordingly, from a road standpoint, it should be designed to be self-contained and should not be traversed by a major arterial road; particularly since there are no plans to develop the area in Raleigh Township south of the City.

The major intersections along Park Avenue West should be related to each other with a distance separation to provide for the future effective coordination of the traffic signals along Park Avenue West. A spacing in the order of 400-450 metres (nominally 1300-1500 feet) satisfies this requirement.

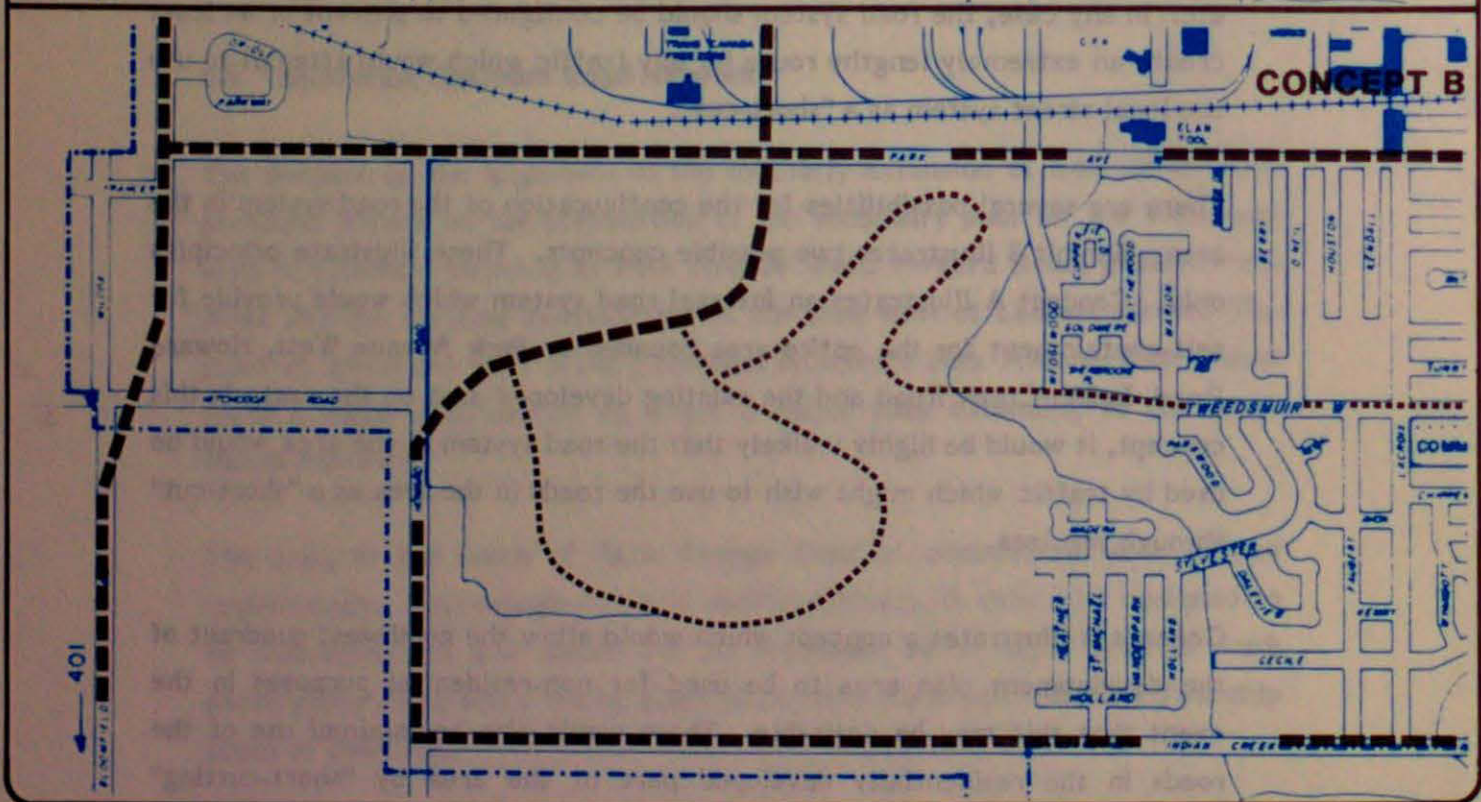
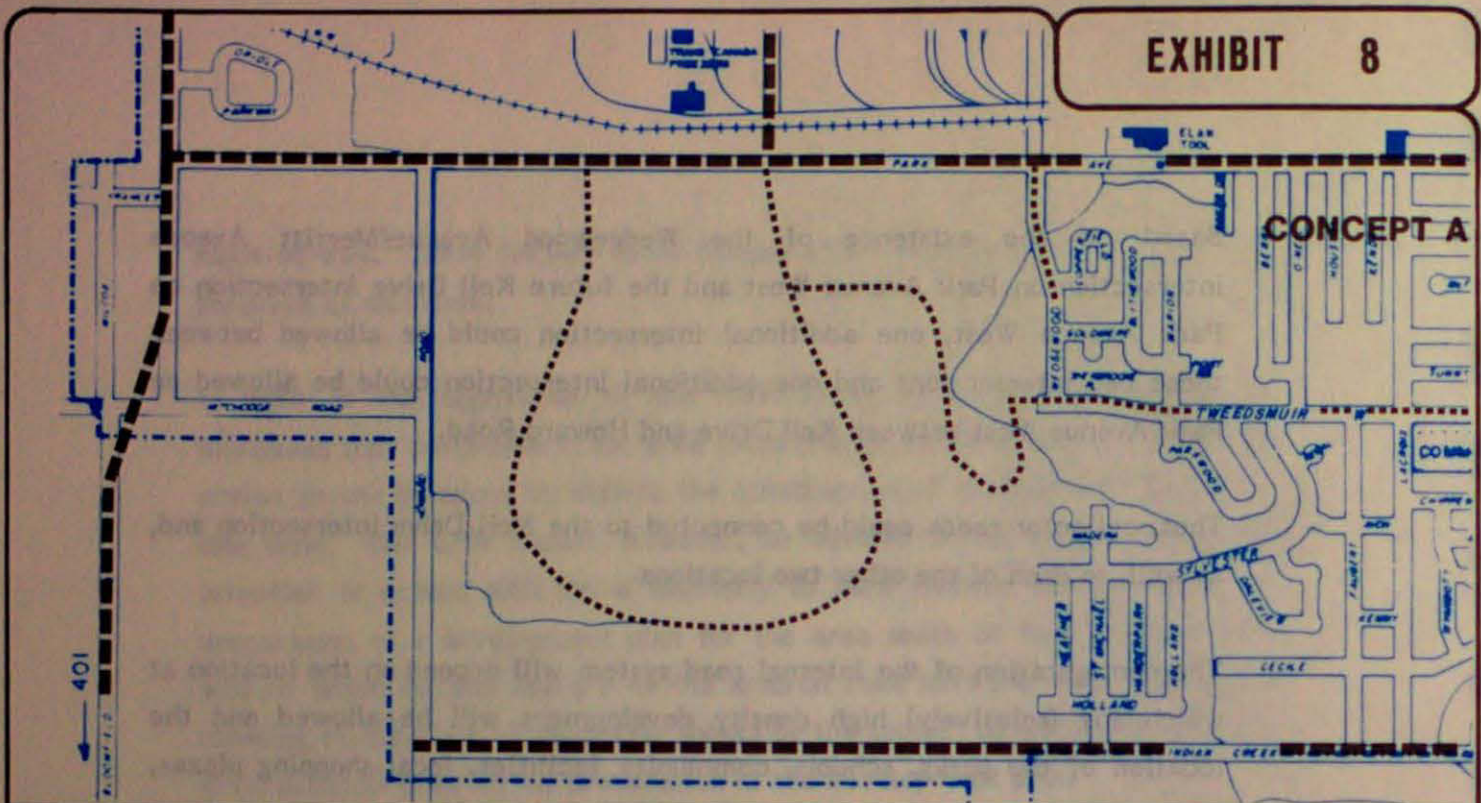
Based on the existence of the Wedgewood Avenue/Merritt Avenue intersection on Park Avenue West and the future Keil Drive intersection on Park Avenue West, one additional intersection could be allowed between these two intersections and one additional intersection could be allowed on Park Avenue West between Keil Drive and Howard Road.

Thus, collector roads could be connected to the Keil Drive intersection and, as well, to each of the other two locations.

The configuration of the internal road system will depend on the location at which any (relatively) high density development will be allowed and the location of the parks, schools, community facilities, local shopping plazas, etc. In any case, the road system should be configured to prevent or at least create an extremely lengthy route for any traffic which would attempt to use the local street system as a "short-cut".

There are several possibilities for the configuration of the road system in the area. Exhibit 8 illustrates two possible concepts. These illustrate principles only. Concept A illustrates an internal road system which would provide for self-containment for the entire area bounded by Park Avenue West, Howard Road, Indian Creek Road and the existing developed area on the east. In this concept, it would be highly unlikely that the road system in the area would be used by traffic which might wish to use the roads in the area as a "short-cut" through the area.

Concept B illustrates a concept which would allow the northwest quadrant of the development plan area to be used for non-residential purposes in the event that this may be desirable. There would also be minimal use of the roads in the residentially developed part of the area by "short-cutting" traffic. It also has the feature of providing a connection between Keil Drive and Howard Road to create a link in the system which would allow future development in the area of Raleigh Township to the south of this part of the City.



LEGEND

- MINOR ARTERIAL ROAD
- COLLECTOR ROAD

**CITY OF CHATHAM
TRANSPORTATION PLAN
KEIL DRIVE EXTENSION
AND SOUTHWEST
CHATHAM ROAD NETWORK**

7.0 KEIL DRIVE EXTENSION NORTHERLY

7.1 Introduction

Between Grand Avenue and McNaughton Avenue, Keil Drive has a 30.5 metre (nominally 100 feet) right-of-way and development has proceeded without the abutting properties having direct access to Keil Drive - consistent with Keil Drive's designation as an arterial road. In this area, the north limit of the City of Chatham is parallel to and one 'lot depth' north of McNaughton Avenue. Immediately beyond, the land in Dover Township is used for agricultural purposes.

7.2 Future Needs

Although not anticipated within the planning period for this study, the land in Dover Township could, in the long-term future, be developed, possibly for residential purposes. Should this occur and in order to avoid possible costly property acquisition in the future, it is proposed that the City protect a right-of-way north of McNaughton Avenue to the City limits. This right-of-way should be defined by a northerly extension of the existing right-of-way limits of Keil Drive, south of McNaughton Avenue.

8.0 SANDYS STREET AND THE NORTH CHATHAM ROAD NETWORK

8.1 Background

Sandys Street, between Grand Avenue and McNaughton, in the existing Official Plan, is designated as an arterial road of four lanes in width within a right-of-way described in the Official Plan as being a four-lane arterial road (the right-of-way for an arterial road is specified as 66'-100' in width).

Based on the 1968 Traffic Planning Report, Sandys Street was proposed to be extended northerly, using a curvilinear alignment, to connect with Highway 40 north of the Chatham City limits. It was intended that this route, which would be a northerly extension of Lacroix Street, would serve as part of the Highway 40 connecting link system.

When the Lacroix Bridge was constructed, its approach roads - Lacroix Street and Sandys Street - together with McNaughton Avenue which provided the link between Sandys Street and St. Clair Street became a major component of the connecting link system.

When City Council considered an application for a plan of subdivision for the development of lands north of Oxley Drive - Orangewood Developments Inc. - it approved the following motion:

"That the Official Plan be amended to delete the future designation of Sandys Street northerly of McNaughton Avenue as Highway 40, and that such amendment be directed to the Official Plan Review being carried out by MacLaren Plansearch."

The plan of subdivision provides a 30.5 metre (nominally 100 feet) wide right-of-way on Orangewood Boulevard (the northerly extension of Sandys Street) which is proposed to be extended, based on the development plan prepared by City officials, northerly to connect with Gregory Drive West, slightly to the west of the location at which the westerly boundary of the City intersects Gregory Drive West.

Between McNaughton Avenue and Oxley Drive, Sandys Street has a 20 metre (nominally 66 feet) wide right-of-way; however, the houses which have been developed are set back from the right-of-way, which is not the case on Sandys Street, south of McNaughton Avenue where the right-of-way is also 20 metres (nominally 66 feet).

In this latter section there are many houses which are situated virtually on the right-of-way limit. A road of four lanes in width built within the existing right-of-way would create an undesirable environmental condition since the road edge could be within 3 metres (nominally 10 feet) of the front of a number of the houses on this section of Sandys Street.

8.2 The Role of Sandys Street

By virtue of its connection to the Lacroix Bridge, Sandys Street will serve as an element of the arterial road system despite any actions which might be contemplated short of closing the road, which would have an extremely harsh impact on the operating service of the total road system in the area.

Within the planning period of this study - to 2006 - a widening of Sandys Street to three lanes will be adequate to provide the capacity needed to accommodate the forecast traffic demand.

Beyond the planning period, further increases in traffic will be dependent on growth in the development of lands to the north of Chatham, the extent of which is unknown at this time. With the current heavy traffic on St. Clair Street, any significant development, in the future, in the area to the north of Chatham and to the west of St. Clair Street will require adequate capacity on a north-south link parallel to St. Clair Street. This clearly indicates the need to protect for the eventuality that the Sandys Street-Orangewood Boulevard link will be required to provide the necessary capacity.

It is apparent that a strategy is required to avoid the disruption that would result from the immediate widening of Sandys Street to four lanes. At the

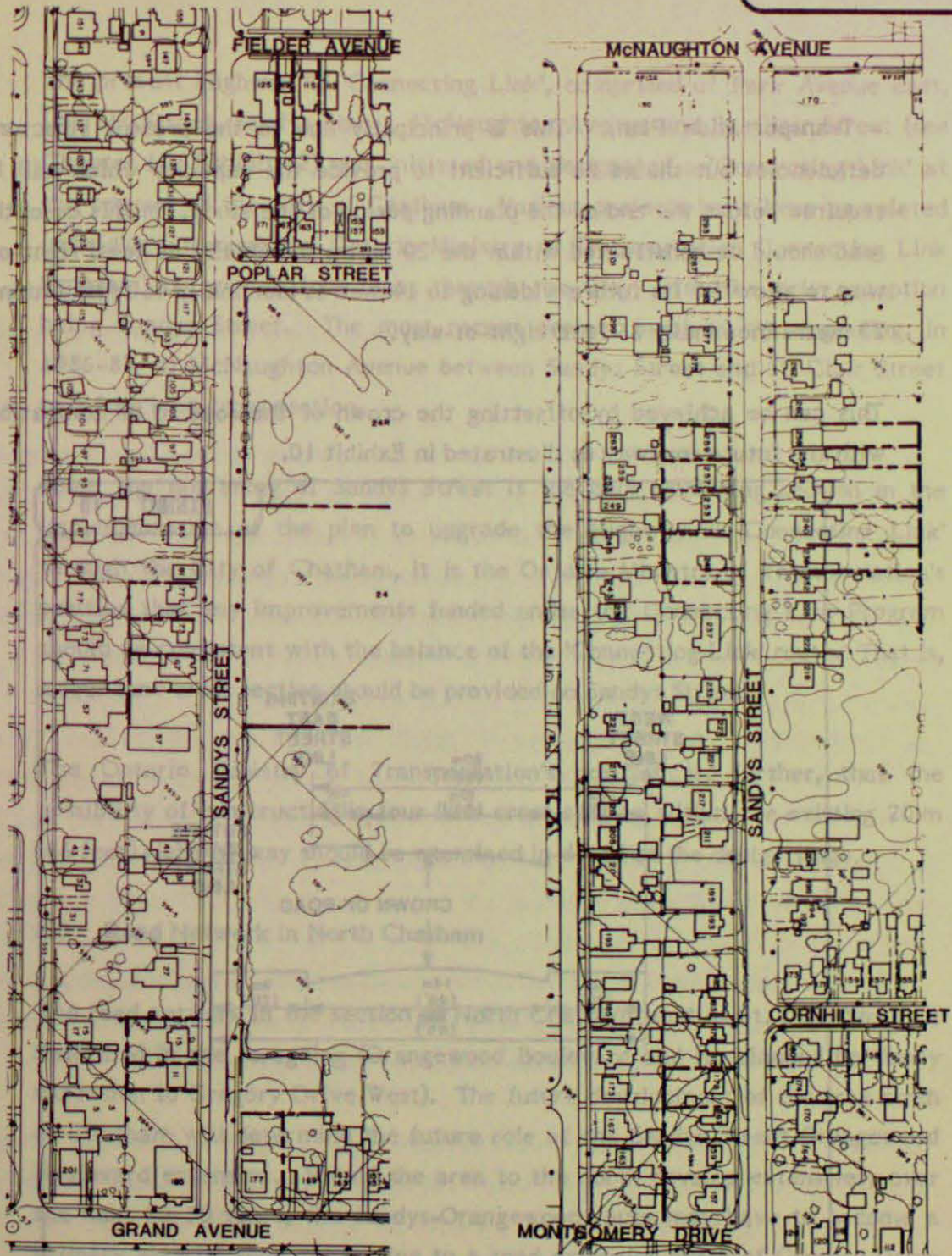
same time the strategy must provide the means by which such a widening could be achieved in the long-term future while ameliorating the environmental concerns.

Exhibit 9 illustrates the existing buildings and examples of some of the lot arrangements on both sides of Sandys Street between Grand Avenue and McNaughton Avenue. There are several large lots on the east side of the street between Grand Avenue and Poplar Street. Continuing on the east side, north of Poplar Street, three long narrow lots flank Sandys Street and, to the north of these, there are several very deep lots with only two small lots fronting on Sandys Street. Such is not the case on the west side of Sandys Street where, essentially, all of the lots between Grand Avenue and McNaughton Avenue are relatively small and front on Sandys Street.

Accordingly, it would be unreasonable to expect to be able to acquire a 3 metre (nominally 10 feet) widening on the west side of Sandys Street (to complement a 3 metre (nominally 10 feet) widening on the east side to create a 23 metre (nominally 86 feet) wide right-of-way, even if properties on the west side of Sandys Street in this area are redeveloped (this will inevitably happen). On the east side, however, there are good opportunities to acquire either entire lots (flankages) on Sandys Street or a 6 metre (nominally 20 feet) widening from the large lots or the deep lots as redevelopment takes place. It would be expected that suitable compensation would be provided in these circumstances, where all of a road widening would be taken from properties on one side of the street.

It is to be stressed that any such right-of-way widening should only be acquired as properties become available on the market or as a property is proposed to be redeveloped. Only as a last resort, should any action be taken, in the long term, to negotiate or expropriate the right-of-way widening. Such action would be well into the future - at least 20 years away.

There is a short-term need to widen Sandys Street to minor arterial standards (see the recommended cross-sections for various classes of roads in Chapter 3

**LEGEND**

--- LOT LINE

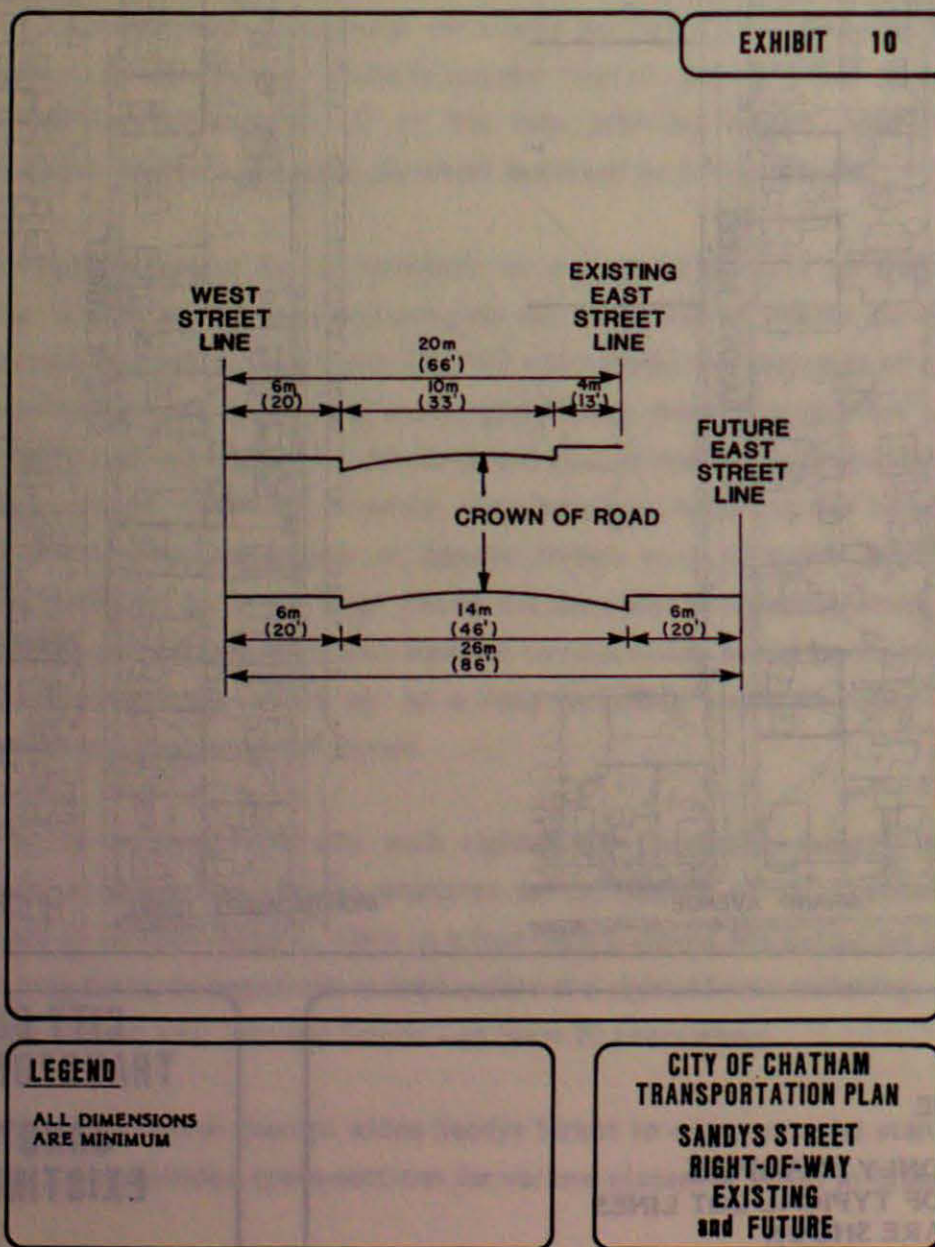
NOTE: ONLY EXAMPLES
OF TYPICAL LOT LINES
ARE SHOWN

**CITY OF CHATHAM
TRANSPORTATION PLAN**

**SANDYS STREET
EXISTING BUILDINGS
AND
LOT ARRANGEMENT**

- Transportation Plan). This is principally due to the present structural deficiencies but should be sufficient to provide the capacity which will be required before the end of the planning period of the study. In this case, the road should be constructed within the 20 metre (nominally 66 feet) right-of-way to allow for its future widening to 14 metres (nominally 46 feet) within a 23 metre (nominally 86 feet) right-of-way.

This can be achieved by offsetting the crown of the road to be compatible with the future roadway as illustrated in Exhibit 10.



The present Highway 40 'Connecting Link', comprised of Park Avenue East, Lacroix Street, Sandys Street, McNaughton Avenue and St. Clair Street (see Chapter 10, Exhibit 12) was initiated and designated a 'Connecting Link' at the request of the City of Chatham. Various projects have been completed (subsidized through the Ontario Ministry of Transportation Connecting Link Program) to provide four lanes through the City, with the only exception being Sandys Street. The most recent project involved the upgrading, in 1986-87, of McNaughton Avenue between Sandys Street and St. Clair Street to a four lane cross section.

Since the upgrading of Sandys Street is the only remaining section in the implementation of the plan to upgrade the Highway 40 'Connecting Link' through the City of Chatham, it is the Ontario Ministry of Transportation's position that any improvements funded under the Connecting Link Program should be consistent with the balance of the 'Connecting Link' route. That is, a four lane cross section should be provided on Sandys Street.

The Ontario Ministry of Transportation's position is, further, that the possibility of constructing a four lane cross section within the existing 20 m (66 feet) right-of-way should be examined in detail at the design stage.

8.3 Road Network in North Chatham

The road network in the section of North Chatham west of St. Clair Street is described in the foregoing (Orangewood Boulevard and its planned northerly extension to Gregory Drive West). The future development of the area north of Chatham will determine the future role of the Sandys Street-Orangewood Boulevard extension. Should the area to the north develop extensively over the next 20-50 years, the Sandys-Orangewood route may have to become a primary arterial road connecting to a road extension north of Gregory Drive West perhaps extending in a curvilinear pattern to the west thus serving the area from a more central location and complementing Baldoon Road, functioning as a collector road. If development to the north of Gregory Drive West is never going to be extensive, the Sandys Street-Orangewood Boulevard route can function as a secondary arterial which is essentially the same as a collector street.

9.0 QUEEN STREET-CENTRE STREET SYSTEM

9.1 Background

Based on a recommendation contained in the 1968 Traffic Planning report, the City of Chatham introduced a one-way street system utilizing Queen Street and Centre Street.

From a point south of Richmond Street, an extension of Park Street provided a connecting roadway between Queen Street and Centre Street accommodating northbound traffic, which was diverted onto this connecting roadway, to allow this traffic to continue north, one-way, on Centre Street. Traffic was allowed to continue northbound on Queen Street but only as far north as Richmond Street at which a mandatory left turn was required.

For motorists destined to Queen Street in the downtown area, School Street provided the opportunity for the northbound traffic to reach Queen Street and enter the business area via Queen Street. Otherwise, northbound traffic could continue on Fifth Street (the extension of Centre Street) and reach the bridge over the Thames River.

Queen Street complemented Centre Street between School Street and the previously mentioned point south of Richmond Street to serve southbound traffic and form the Queen-Centre one-way street system.

Based on representations from the business community, City Council, in 1986, decided to abandon the one-way street system to allow two-way traffic to use both Queen Street and Centre Street.

Accordingly, there is a need to determine any modifications required to the road system and the intersection configurations, more particularly, in the Queen Street-Richmond Street-Park Street area.

9.2 Traffic Flow Patterns

When the one-way system was in effect, recent (1985/86) traffic counts indicated, in the evening peak hour, a southbound flow of approximately 600 vehicles per hour on Queen Street with a northbound flow of slightly more than 400 vehicles per hour on Centre Street.

Subsequent to the conversion to the two-way operation of the street system, there is, on Queen Street, approximately the same southbound traffic and a northbound flow of slightly more than 300 vehicles per hour (p.m. peak hour). Slightly more than 100 vehicles per hour travel northbound on Centre Street. It would appear that although southbound traffic on Queen Street has remained essentially the same, approximately 300 vehicles per hour northbound, in the evening peak hour, have shifted from Centre Street to Queen Street. Of these, approximately 75% continue northbound on Queen Street towards the business district in the King Street/Wellington Street area.

Southbound traffic on Centre Street, formerly not allowed, has experienced only a small increase. This is due to the fact that a left turn is not permitted for westbound traffic on the Park Street Extension at Queen Street. Thus, any motorist wishing to use Centre Street southbound and then Queen Street to continue southbound must use either Harvey Street or School Street to travel between Centre Street and Queen Street.

School Street, which, under the one-way street system, was carrying approximately 350 vehicles per hour (evening peak hour) westbound, is now carrying the same volume of evening peak hour traffic; however, the distribution is 250 vehicles westbound and 100 vehicles eastbound.

In the Park Street-Richmond Street-Queen Street area, the dominant movements are:

- . north-south on Queen Street at Richmond Street;
- . an eastbound right turn and complementary northbound left turn at the Queen Street-Richmond Street intersection; and
- . an east-west through movement at the junction of Park Street and Centre Street.

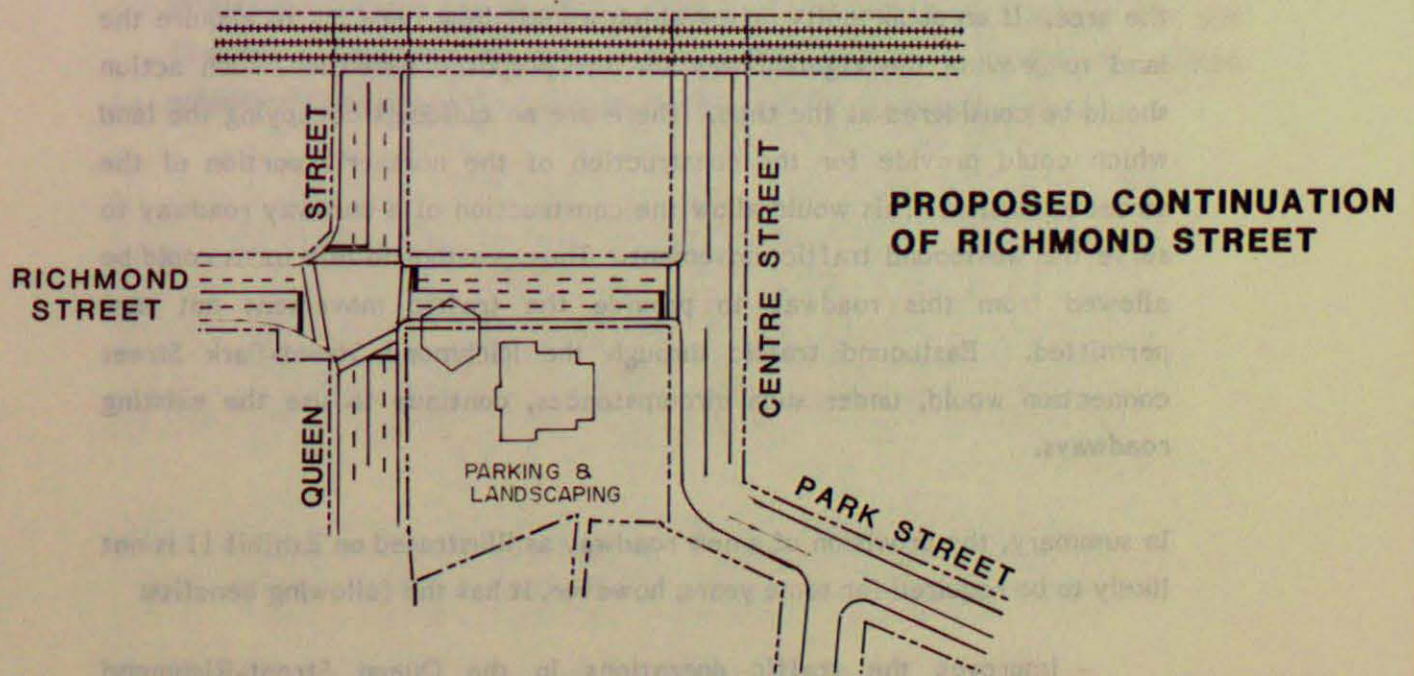
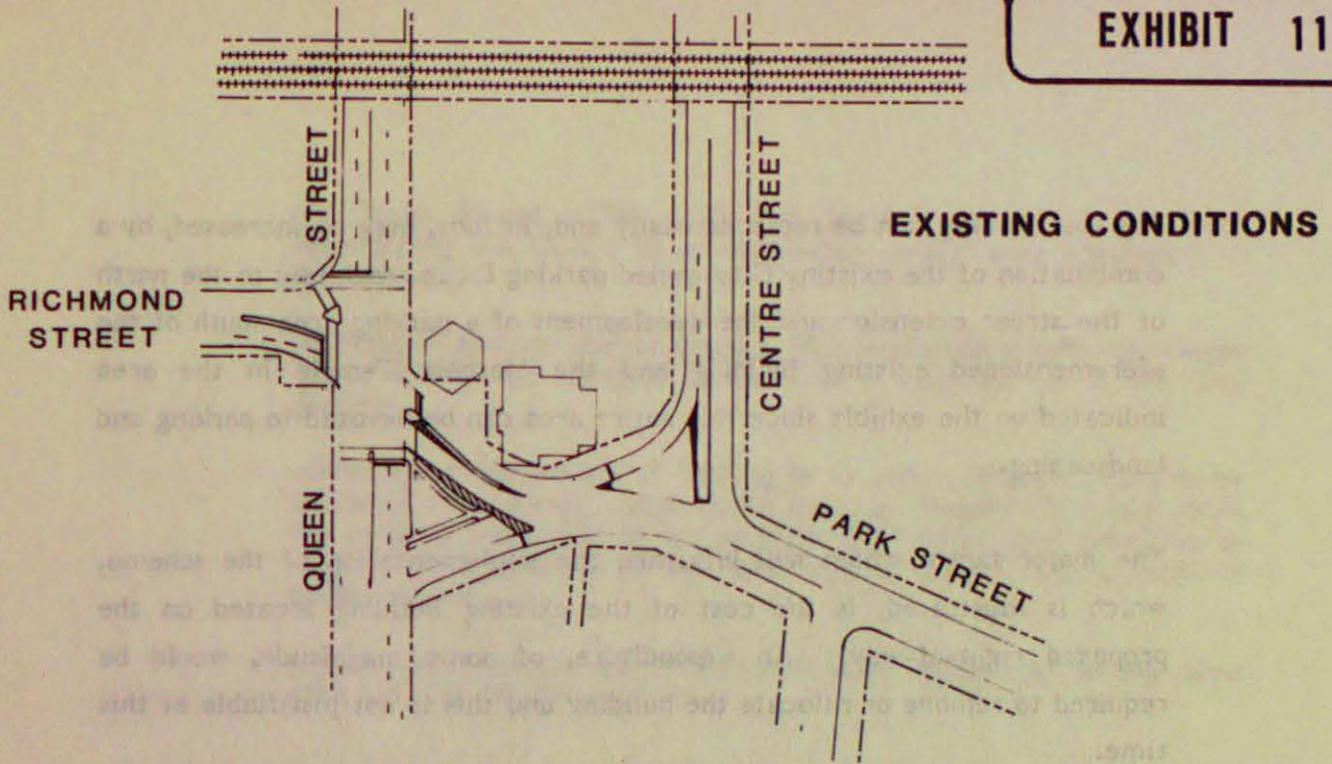
Although the configuration of the intersection of Queen Street and Richmond Street/Park Street creates some difficult traffic movements and requires the prohibition of westbound left turns from the Park Street Extension onto Queen Street, the road system in the area appears to be functioning with few difficulties.

No improvements should be required in this area for some time; however, in the longer term, traffic in the Queen Street/Centre Street corridor could grow to a level which, under the present street system configuration, may cause problems on Queen Street and impair the ability of Queen Street to serve the dual function it now performs - carrying traffic travelling through the area as well as traffic travelling to and from the City Centre.

9.3 Potential Future Improvement Needs

In order to provide some relief to Queen Street, some measures will have to be introduced which allow traffic travelling south through the area to use Centre Street and a new connection to Queen Street from which a left turn can be made to continue southbound on Queen Street.

A new street connecting Queen Street and Centre Street as an extension of Richmond Street would achieve this objective. Exhibit 11 illustrates the existing configuration of the street system in the area and, as well, the location of the proposed street extension. The land on which this street extension would be located is currently occupied by a building in the location shown. The balance of the area is used for parking.



LEGEND

**CITY OF CHATHAM
TRANSPORTATION PLAN**

**QUEEN STREET
RICHMOND STREET
PARK STREET
ROAD SYSTEM**

11 EXHIBIT

The lost parking can be replaced easily and, in fact, may be increased, by a combination of the existing City-owned parking lot immediately to the north of the street extension and the development of a parking area south of the aforementioned existing building and the Masonic Temple in the area indicated on the exhibit since this entire area can be devoted to parking and landscaping.

The major factor which will influence the implementation of the scheme, which is illustrated, is the cost of the existing building located on the proposed right-of-way. An expenditure, of some magnitude, would be required to remove or relocate the building and this is not justifiable at this time.

Accordingly, the City should monitor the traffic conditions and situation in the area. If an opportunity arises which would allow the City to acquire the land to provide the right-of-way for the proposed extension, such action should be considered at the time. There are no buildings occupying the land which could provide for the construction of the northerly portion of the street extension. This would allow the construction of a one-way roadway to serve the westbound traffic movement. Thus, westbound left turns could be allowed from this roadway to provide the traffic movement not now permitted. Eastbound traffic through the Richmond Street-Park Street connection would, under such circumstances, continue to use the existing roadways.

In summary, the provision of a new roadway as illustrated on Exhibit 11 is not likely to be required for some years; however, it has the following benefits:

- improves the traffic operations in the Queen Street-Richmond Street-Park Street-Centre Street area;
- allows more efficient use of the capacity of Richmond Street particularly for eastbound left turns from Richmond Street to Queen Street;
- creates a westbound left turn onto Queen Street which will serve southbound traffic on Centre Street wishing to continue southbound

on Queen Street. This will also provide an option for those approaching the Queen Street-Richmond Street area westbound on Park Street;

- encourages greater use of Centre Street providing relief to Queen Street which will continue to serve as a main access to the City Centre;
- allows the development of parking in an area currently occupied by roadways immediately south of the Masonic Temple which will serve the existing businesses in the vicinity of the new road extension as well as the businesses on the west side of Queen Street, south of Richmond Street;
- allows the development of a landscaping treatment in the area referred to in the foregoing.

Accordingly, the City should monitor the traffic conditions and the development in the area for the purposes of taking action in acquiring property to build the extension if the circumstances are appropriate and favourable arrangements can be made to ultimately implement the entire scheme (roadways, parking, landscaping) as illustrated on Exhibit 11.

10.0 CONNECTING LINKS

10.1 Background

The following description and relevant information on highway connecting links has been extracted from the Ontario Ministry of Transportation's document entitled "Highway Connecting Link":

Connecting Links

A King's Highway Connecting Link as described in The Public Transportation and Highway Improvement Act is a connection between parts of a King's Highway or is an extension of a King's Highway. The provisions in the Act for King's Highway Connecting Links apply also to Secondary Highways. The following is the present interpretation of this definition.

- (1) A route that connects the ends of a highway by the most direct, practical means from one municipal boundary to the other.
- (2) A route that connects the end of a highway to another highway entering the municipality.
- (3) The extension of a highway from a municipal boundary to the Central Business District of the municipality or to connect with a Provincial or International boundary.

To further clarify the above, only one route is to be designated for each highway except for one-way streets which fulfill the above conditions and for which the need has been proven by a traffic study. Where possible and practical more than one highway is to be carried over one route.

These conditions do not take into consideration new facilities which, through a transportation study, have been found to be required within the foreseeable future. Such new facilities may be designated for the purpose of construction under the following conditions:

1. Where they will replace existing designated routes, the designation of the existing route will be revoked when the new designation becomes effective.
2. Where they are to be constructed on a staged basis providing for construction over a period of years, designations on paralleling sections of the old routes will be revoked when the new designation becomes effective.

3. When a new permanent route has been approved for future designation, and designation on the old route is still effective, the Ministry will not contribute to the reconstruction of the old route.

Under the present legislation the Ministry will contribute towards eligible expenditures on designated connecting links at the rate of:

- 75% for construction in Cities and Separated Towns,
- 90% for construction and maintenance in Towns, Villages, Townships having a population of more than 2500,
- 100% for construction and maintenance in Towns, Villages, Townships having a population of not more than 2500.

Designation

Designation of a route as a King's Highway Connecting Link is made by Order in Council. The designation is initiated by the municipality with a formal request to the Ministry forwarded through the district Engineer for the area in question.

The Ministry will assess the route(s) and proceed to make a recommendation for an Order in Council to designate the required route(s) as Connecting Links where appropriate.

If, as the result of this assessment, the Ministry feels that more information is necessary, the municipality may be asked to carry out a study as required. When the study has been completed, the municipality may again submit a formal request for designation of route(s).

When the route has been designated by Order in Council, the municipality will receive a copy of the Order in Council, a plan showing designated routes and a schedule of these designated routes.

The effective date of the Order in Council is the effective date of the agreement, with the exception, noted in the agreement, which provides that work performed prior to this date, but in accordance with the terms and the true intent of the agreement, may, with the approval of the Minister, be treated as if such work had been performed after the effective date of the Order in Council.

When the designation becomes effective, route marker signs will, if required, be changed to conform to the designation.

A road that is designated as a King's Highway Connecting Link remains a road under the jurisdiction of the municipality, and the municipality retains controls with respect to signs, buildings and entrances.

Basic Agreement

The basic agreement applies to all designated routes within the municipality. It is a continuing agreement that can be expanded to include future designations, and is the authority for the presentation of specific construction proposals on any part of these designated routes. The agreement explains the responsibility of the municipality and of the Ministry and is the basis for the break-down of items to which the Ministry will contribute. It sets forth the terms as to definition, shareable items, alternate methods of preparing proposals, invoicing, termination, etc., and should be used in all cases as a guide for the preparation of construction proposals.

Where required, these basic agreements must be submitted to the District Engineer for the area, together with a copy of the by-law authorizing the execution of the document on behalf of the Corporation. The submission is to be in three copies, properly signed and sealed.

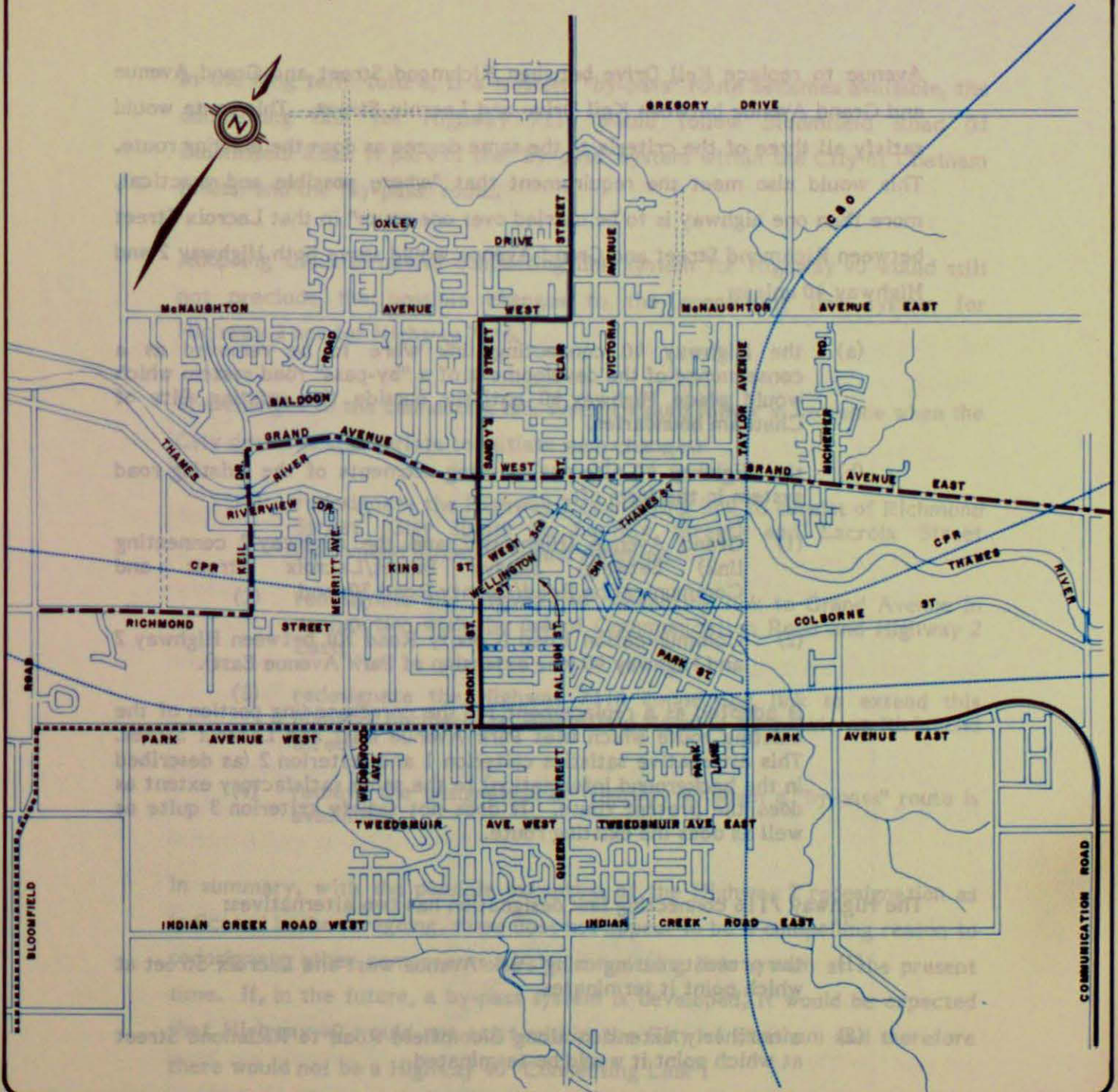
The documents are forwarded by the District Engineer to the Director, Municipal Branch, who takes the necessary steps to have the agreement executed by the Minister. One of these copies is returned to the municipality.

10.2 Evaluation

The existing connecting link system in the City of Chatham is illustrated in Exhibit 12. This system satisfies all of the criteria set out in the foregoing.

The development of a by-pass system as described in Chapter 4 would require a re-structuring of the connecting link systems. With an eastern by-pass, Highway 40 would no longer be a "connecting link" in that, given the present municipal boundaries, it would no longer qualify as a "connecting link" but rather as a provincial highway which by-passes the City of Chatham.

An alternative to the present Highway 2 connecting link which might be considered would be the use of Richmond Street, between Keil Drive and Lacroix Street and Lacroix Street between Richmond Street and Grand



LEGEND

- HIGHWAY 2 CONNECTING LINK
- HIGHWAY 40 CONNECTING LINK
- HIGHWAY 7116 CONNECTING LINK

CITY OF CHATHAM TRANSPORTATION PLAN EXISTING HIGHWAY CONNECTING LINK SYSTEM

Exhibit 15

Avenue to replace Keil Drive between Richmond Street and Grand Avenue and Grand Avenue between Keil Drive and Lacroix Street. This route would satisfy all three of the criteria to the same degree as does the existing route. This would also meet the requirement that "where possible and practical, more than one highway is to be carried over one route" in that Lacroix Street between Richmond Street and Grand Avenue would serve both Highway 2 and Highway 40 unless:

- (a) the Highway 40 connecting link were to be removed as a consequence of the development of a "by-pass" road system which would place Highway 40 entirely outside the existing City of Chatham boundaries.
- (b) the Highway 40 alternative using elements of the existing road system in the form of:
 - (1) Grand Avenue (Highway 2 and the Highway 2 connecting link) between Sandys Street/Lacroix Street and Communication Road/County Road 30; and
 - (2) Communication Road (County Road 30) between Highway 2 and Highway 40 (the extension of Park Avenue East).

is adopted as a replacement for the corresponding portion of the existing route which uses Park Avenue East and Lacroix Street. This alternative satisfies criterion 1 and criterion 2 (as described in the background information) to the same satisfactory extent as does the present route. It does not satisfy criterion 3 quite as well as does the existing route.

The Highway 7116 connecting link designation has two alternatives:

- (1) the present routing using Park Avenue west and Lacroix Street at which point it terminates.
- (2) a northerly extension along Bloomfield Road to Richmond Street at which point it would be terminated.

The present route satisfies the second criterion; however, criterion (1) and criterion (3) (as described in the background information) do not apply.

In the long term future, if a western "by-pass" route becomes available, the connecting link for Highway 7116 would follow Bloomfield Road (if Bloomfield Road is part of the "by-pass" system within the City of Chatham limits) and the "by-pass" route.

Adopting the alternative connecting link system for Highway 40 would still not preclude the possible changes to the connecting link system for Highway 2 nor for Highway 7116.

The changes to the connecting link system should follow in sequence when the City deems it appropriate to initiate such changes:

- (1) redesignate the Highway 2 connecting link to consist of Richmond Street (City limits to Lacroix Street) and Lacroix Street (Richmond Street to Grand Avenue);
- (2) redesignate the Highway 40 connecting link to Grand Avenue in conjunction with the use of Communication Road and Highway 2 East;
- (3) redesignate the Highway 7116 connecting link to extend this highway northerly on Bloomfield Road to terminate at Richmond Street;
- (4) remove the designation of Highway 40 when a "by-pass" route is available.

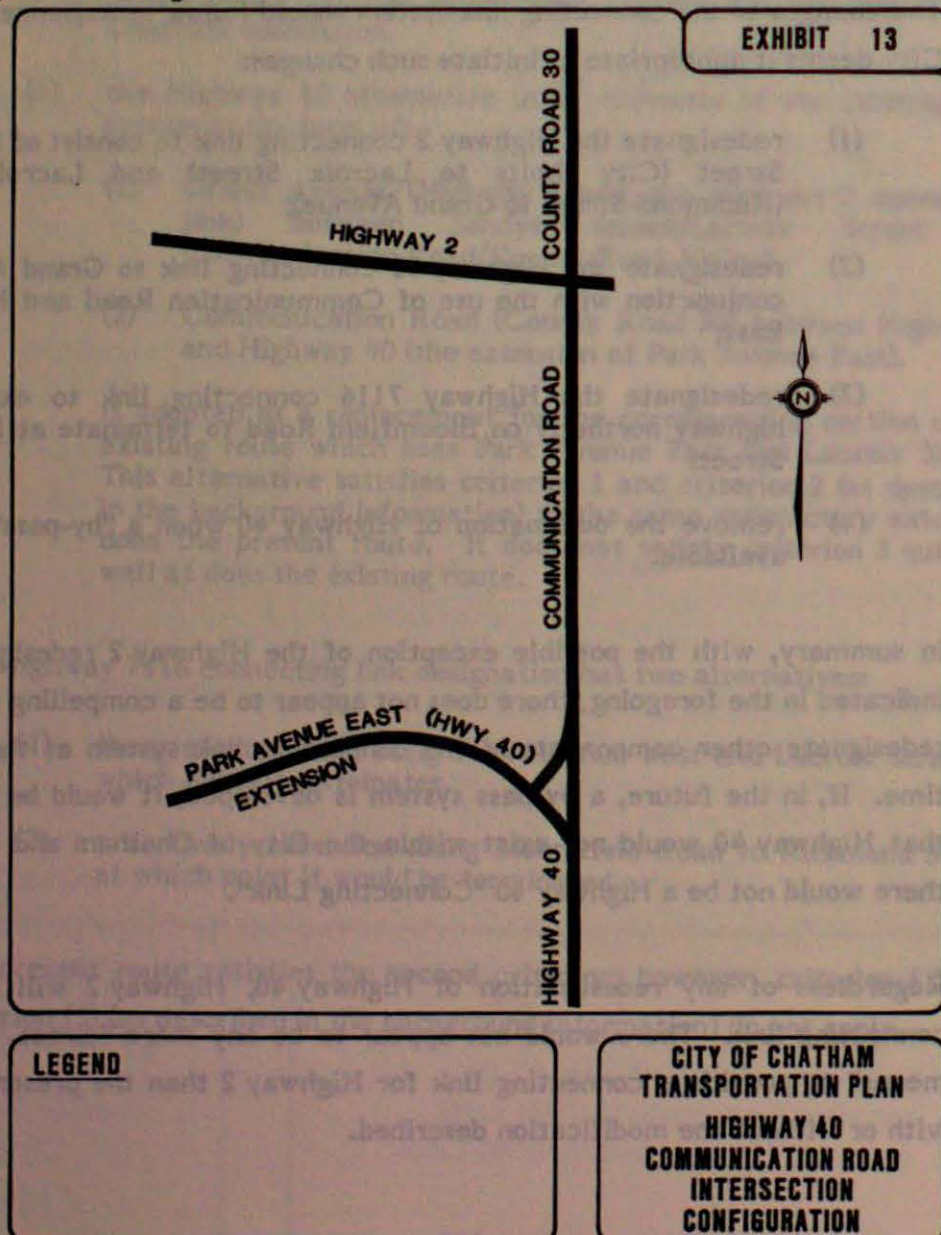
In summary, with the possible exception of the Highway 2 redesignation as indicated in the foregoing, there does not appear to be a compelling reason to redesignate other components of the connecting link system at the present time. If, in the future, a by-pass system is developed, it would be expected that Highway 40 would not exist within the City of Chatham and therefore there would not be a Highway 40 "Connecting Link".

Regardless of any redesignation of Highway 40, Highway 2 will remain a connecting link. There would not appear to be any more "direct, practical means" to provide a connecting link for Highway 2 than the present system with or without the modification described.

11.0 HIGHWAY 40/COMMUNICATION ROAD INTERSECTION

Although this location is outside the limits of the City of Chatham, the intersection was included in this study because of the potential impact, on the traffic patterns in the City, of any changes to the intersection configuration.

For some years, Highway 40 has been in the form of a curve where it intersects Communication Road. Exhibit 13 illustrates, in line diagram form, the general configuration of the intersection.



Extending westerly from the curve, Highway 40 connects to Park Avenue East which forms part of the connecting link system in the City of Chatham. Extending southerly from the curve, Highway 40 continues south of and interchanges with Highway 401.

Communication Road connects to and terminates, for southbound traffic, at Highway 40 on the curve in Highway 40; Northbound traffic on Highway 40 can proceed in an essentially straight northerly direction towards the Sherman Brown (Communication Road) Bridge. North of the Bridge, Communication Road intersects with Highway 2, (the easterly extension of Grand Avenue) east of Chatham and extends northerly as County Road 30.

Southbound traffic on Communication Road is channelized on the approach to the curve in Highway 40 to provide a relatively free flow movement for those wishing to proceed towards Chatham. Left turns from southbound Communication Road to Highway 40 and from eastbound Highway 40 to Communication Road are made at a location on Highway 40 within the curved section.

Communication Road has become more prominent in terms of the amount of traffic which has been using this road since the opening of the Sherman Brown Bridge in 1979.

In the current Official Plan proposals, County Road 30 is identified as part of an easterly "by-pass" of the City of Chatham.

An examination of the traffic volumes at the intersection of Communication Road and Highway 40 indicates that, during the period from 1979 to 1984, the northbound traffic on Highway 40 approaching Communication Road has been gradually decreasing in terms of the traffic which follows the curve to proceed towards Chatham and has been gradually increasing in terms of the traffic proceeding northerly on Communication Road.

Eastbound traffic from the City of Chatham (via the extension of Park Avenue East - Highway 40) has been increasing in terms of the traffic volume making a left turn onto Communication Road while there has been a slight decrease in the traffic which follows the curve to proceed southerly on Highway 40. Southbound Communication Road traffic has remained fairly stable.

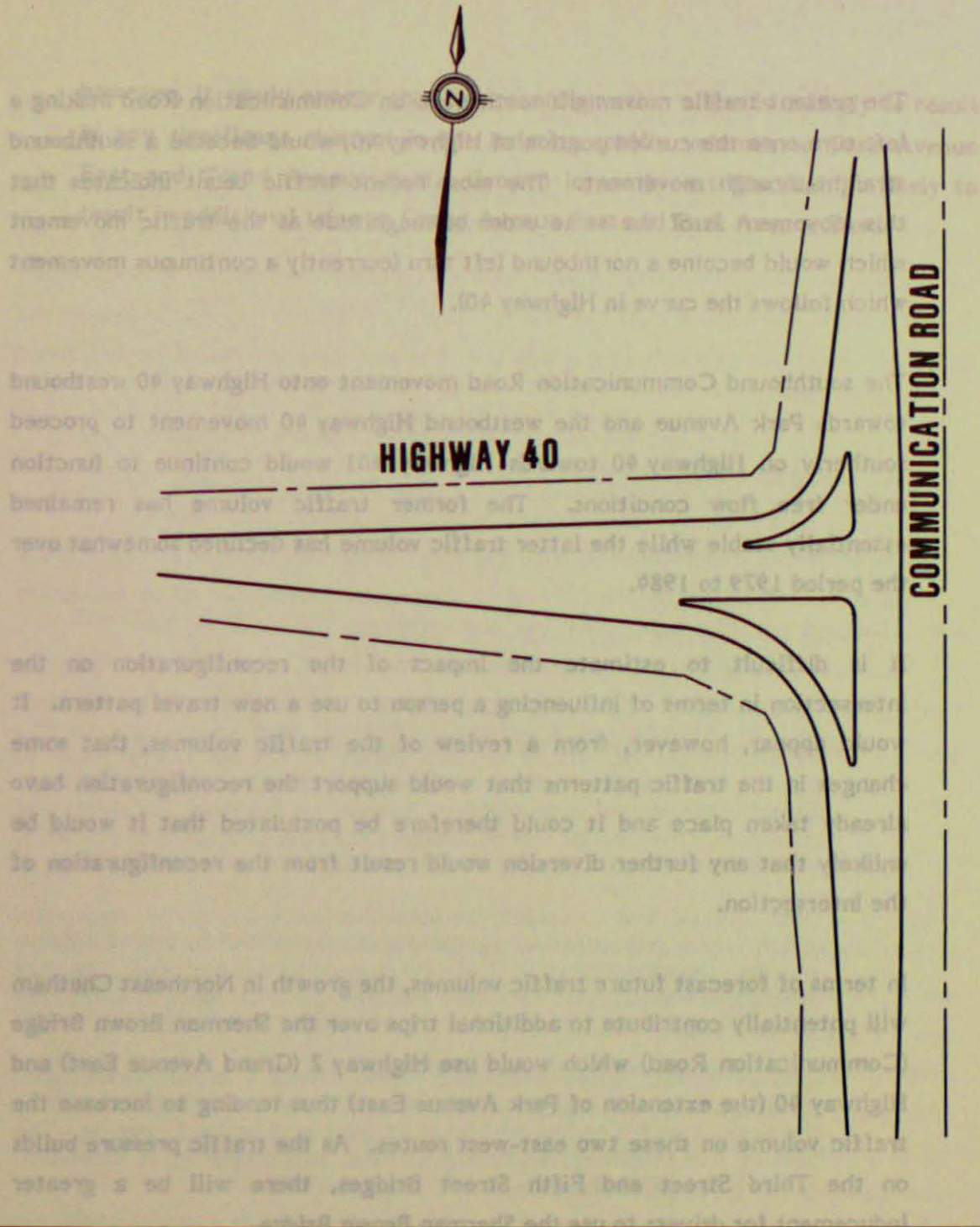
The Ontario Ministry of Transportation is proposing to reconstruct this intersection which will result in a different configuration. The proposed intersection design is illustrated in Exhibit 14. Highway 40, south of the intersection, will connect directly to Communication Road to form an essentially straight north-south alignment of Highway 40/Communication Road. Highway 40, west of the Communication Road intersection will be relocated such that it will form the stem of the T intersection.

The significant changes, in terms of traffic movements, which would result from this reconfiguration, relate to the following:

- northbound traffic on Highway 40 which proceeds around the curve,
- eastbound traffic on Highway 40 (the extension of Park Avenue) which makes a left turn from the curve onto Communication Road, and
- southbound traffic on Communication Road which makes a left turn onto the curved portion of Highway 40.

The northbound traffic on Highway 40 which currently follows the curved portion of the road would be transformed into a left-turn movement. This movement has decreased from approximately 1800 vehicles per day in 1979 to 1200 vehicles per day in 1984.

The eastbound traffic on Highway 40 (Park Avenue extension) which currently makes a left turn from the curve would make a left turn from the "stem" of the T. It is planned to install traffic signals at the new intersection in the future which would accommodate this left turn.



LEGEND

- RIGHT-OF-WAY
- EDGE OF ROAD

**CITY OF CHATHAM
TRANSPORTATION PLAN
PROPOSED INTERSECTION
DESIGN
HIGHWAY 40
& COMMUNICATION ROAD**

41 TIBINX3

The present traffic movement southbound on Communication Road making a left turn onto the curved portion of Highway 40, would become a southbound straight-through movement. The most recent traffic count indicates that this movement is of the same order of magnitude as the traffic movement which would become a northbound left turn (currently a continuous movement which follows the curve in Highway 40).

The southbound Communication Road movement onto Highway 40 westbound towards Park Avenue and the westbound Highway 40 movement to proceed southerly on Highway 40 towards Highway 401 would continue to function under free flow conditions. The former traffic volume has remained essentially stable while the latter traffic volume has declined somewhat over the period 1979 to 1984.

It is difficult to estimate the impact of the reconfiguration on the intersection in terms of influencing a person to use a new travel pattern. It would appear, however, from a review of the traffic volumes, that some changes in the traffic patterns that would support the reconfiguration have already taken place and it could therefore be postulated that it would be unlikely that any further diversion would result from the reconfiguration of the intersection.

In terms of forecast future traffic volumes, the growth in Northeast Chatham will potentially contribute to additional trips over the Sherman Brown Bridge (Communication Road) which would use Highway 2 (Grand Avenue East) and Highway 40 (the extension of Park Avenue East) thus tending to increase the traffic volume on these two east-west routes. As the traffic pressure builds on the Third Street and Fifth Street Bridges, there will be a greater inducement for drivers to use the Sherman Brown Bridge.

Without the benefit of a survey which would involve interviews with the drivers currently using the intersection and an attempt to establish their likely change in behaviour with the intersection reconfiguration, it is difficult to predict, with certainty, the impact that the reconfiguration will have;

however, it would appear that the reconfiguration alone is unlikely to result in any significant changes in the existing traffic volumes on Park Avenue East and Grand Avenue East. Growth in north-east Chatham is likely to result in additional trips on Grand Avenue East and Park Avenue East.

The following improvements, with the associated class D cost estimates (1997 dollars), as provided by the City of Chatham, are considered to be necessary to provide an effective road network in the City:

1. Grand Avenue East - widening and improvement of the road to provide a 3 lane - 10 metre (approximately 33 feet) roadway between Grand Avenue and Macpherson Avenue to improve the structural condition. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$1,600,000.

2. Park Avenue and Canadian National Railways - a grade separation project to provide a grade separation between the City of Chatham and the Canadian National Railways. The cost of this grade separation, including the approach roads is estimated (Class D) at \$2,500,000.

3. Richmond Street - a new link should be provided initially in the 1998-2000 period as a two-lane roadway designed to be widened to four lanes in some subsequent time period (assuming development in northwest Chatham occurs at forecast). The cost of this new two-lane link, excluding utilities and property and based on an at-grade crossing of the CN tracks, is estimated (Class D) at \$1,000,000.

12.0 ROAD IMPROVEMENTS - COSTS, IMPLEMENTATION, STUDY MONITORING AND UPDATING

This chapter summarizes the road improvements (and, where appropriate, the costs) which are foreseen based on the forecast development in the City. Cost estimates are Class 'D' estimates. A Class D estimate is a preliminary estimate, developed with the use of little site information and indicates the approximate magnitude of cost of the proposed project, based on the broad requirements.

12.1 Road Improvements and Costs

The following improvements, with the associated class 'D' cost estimate (1987 dollars), as provided by the City of Chatham, are considered to be necessary to provide an effective road network in the City:

- Sandys Street - the widening of Sandys Street, although not required for the purposes of providing additional road capacity until the 1996-2006 period, should be undertaken in the next five years to provide a 3 lane - 10 metre (nominally 33 feet) - roadway between Grand Avenue and McNaughton Avenue to improve its structural condition. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$1,600,000.
- Park Avenue and Canadian National Railways - a grade separation which is the subject of an agreement between the City of Chatham and the Canadian National Railways, should be constructed. The cost of the grade separation structure and the approach roads is estimated (Class D) at \$5,320,000.
- Lacroix Street/Sandys Street and Grand Avenue - an eastbound right-turn lane should be added within the next 5-10 years and included in the project to widen Sandys Street as described in the foregoing. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$50,000.
- Keil Drive Extension (south of Richmond Street) - this new link should be provided initially in the 1996-2006 period as a two-lane roadway designed to be widened to four lanes in some subsequent time period (assuming development in southwest Chatham occurs as forecast). The cost of this new two-lane link, excluding utilities and property and, based on an at-grade crossing of the CNR tracks, is estimated (Class D) at \$1,000,000.

- St. Clair Street - the widening and the creation of a "fifth" lane to allow "two-way left turns" and separate left turn lanes on St. Clair Street between McNaughton Avenue and a point north of McFarlane Avenue, although not required for the purposes of providing additional capacity should be undertaken to provide improved traffic operations on St. Clair Street. This project was proposed as part of the program developed in the Traffic Operations Study in 1981. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$110,000.
- Grand Avenue - the widening and creation of left turn lanes on Grand Avenue between Thames Lea Plaza and the Kent County Building, although not required for the purposes of providing additional capacity should be undertaken to provide improved traffic operations on Grand Avenue. This project was proposed as part of the program developed in the Traffic Operations Study in 1981. The cost of this widening, excluding utilities and property, is estimated (Class D) at \$230,000.

The City of Chatham currently has underway the widening of Keil Drive between Richmond Street and Grand Avenue to provide a "fifth lane" for left-turning vehicles and an improved pavement surface. This project will include improvements at the intersection of Keil Drive and Riverview Drive and Keil Drive and Grand Avenue.

12.2 Monitoring and Updating

A structured traffic counting program should be developed to monitor traffic growths (or declines) in key areas of the City. Principal among these is the traffic across the Thames River. Traffic counts should be conducted for one week in each of the spring, summer and autumn with vehicle classification (including transit vehicles and their occupancy) counts taken on one of the five week days. The County of Kent should be requested to count traffic on the Prairie Siding and Sherman Brown Bridges for the same periods. Consistency in the timing of the counts from year-to-year should be achieved in order to remove biases.

Traffic counts should also be taken on screenlines north of Grand Avenue and south of Richmond Street-Park Street-Park Avenue West to monitor growth in the north-south oriented traffic in the areas north and south of these roads.

Population and employment should also be monitored to relate any increases or decreases to changes in the traffic volumes.

An intermediate review of the entire road system should be undertaken based on the data collected over the next five years and a comprehensive review of the system should be undertaken in ten years.

12.3 Future Studies

More comprehensive studies are required to deal with:

- the rationalization of the rail system within the City
- the future construction of the Keil Drive extension and its integration into the road system which will be part of the secondary plan which must be prepared for the area south of Park Avenue West in south-west Chatham
- the selection of locations for routes for the eastern and western "by-pass" facilities in order to ensure that a right-of-way is available for the approach roads when a decision is made to provide these facilities. It is imperative that a route be selected for the western "by-pass" in the immediate future. Otherwise, development may occur which could frustrate the implementation of an optimum location for the "by-pass" route.

DESCRIPTION OF LEVELS OF SERVICE "MTC METHODOLOGY"

LEVEL A - At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation. The probability is that 95% of the time all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL B - At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection. The probability is that 90% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

APPENDIX A

LEVEL C - At this level, the operation is stable; although, with more frequent fully utilized phases, many drivers feel more restricted and occasionally may have to wait more than one red signal indication. Queues may develop behind turning movements. The probability is that 75% of the time all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL D - At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive back-ups. The probability is that 60% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL E - This represents capacity. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles. The probability is that 30% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

DESCRIPTION OF LEVELS OF SERVICE "MTC METHODOLOGY"

LEVEL A - At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation. The probability is that 95% of the time all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL B - At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection. The probability is that 90% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL C - At this level, the operation is stable; although, with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication. Queues may develop behind turning vehicles. The probability is that 75% of the time all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL D - At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive back-ups. The probability is that 60% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

LEVEL E - This represents capacity. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles. The probability is that 50% of the time, all vehicles arriving on one complete cycle, for example, beginning at the commencement of the red signal, will clear before the completion of the next green interval.

SCHEDULE "C"
ARTERIAL ROAD TABLE
REQUIRRED ROAD WIDENINGS

Street	From	To	Street Classification	Existing Width (ft.)	Right of Way Width
Bloomfield Road	South City Limit	Richmond Street	Minor Arterial	66	83
Grand Ave. West	Churchill Street	100 ft. west of Woods Street	Major Arterial	73/82	83/89
Indian Creek Rd. W.	Howard Road	Lacola Street	Minor Arterial	66	83
Indian Creek Rd. E.	Queen Street	Creek Road	Minor Arterial	66	83
Industrial Street	Canadian National Railway R.O.W.	2nd Street of Industrial Lane	Minor Arterial	66	83
Industrial Lane	Industrial Street		Minor Arterial	33	100
Kell Drive*	Park Avenue W.	Canadian National Railway R.O.W.	Minor Arterial	N/A	100
Lacola St.	Wilfrid Avenue	Prince Arthur	Minor Arterial	63/80	83
McNoughton Avenue	Beattie Road	University Drive	Minor Arterial	66/83	83
Park Avenue West	Bloomfield Road	Houston Street	Minor Arterial	66	83
Park Lane	Hydro R.O.W.	Park Avenue East	Collector	36	66
Queen Street	Sunshine Ave. Eugene	Park Avenue	Major Arterial	66/83	83
Richmond Street	Isabel Avenue	Lacola Street	Major Arterial	66	83
Riverview Drive	Bloomfield Road	Kell Drive	Minor Arterial	30	83
Sandys Street	Grand Avenue West	McNoughton Ave. W.	Major Arterial	66	86
St. Clair St.	Grand Avenue	Selkirk Street	Major Arterial	80	100

* Proposed Street

SCHEDULE "G"

ARTERIAL ROAD TABLE

REQUIRED ROAD WIDENINGS

Street	From	To	Street Classification	Right of Way Width	
				Existing Width (ft.)	Required Width (ft.)
Bloomfield Road	South City Limit	Richmond Street	Minor Arterial	66	83
		Richmond Street	Minor Arterial	66/96	83/96
Grand Ave. West	Churchill Street	100 ft. west of Woods Street	Major Arterial	75/89	83/89
Indian Creek Rd. W.	Howard Road	Lacroix Street	Minor Arterial	66	83
Indian Creek Rd. E.	Queen Street	Creek Road	Minor Arterial	66	83
Industrial Street	Canadian National Railway R.O.W.	Southerly limit of Industrial Lane	Minor Arterial	66	83
Industrial Lane	Industrial Street	Richmond Street	Minor Arterial	33	100
Keil Drive*	Park Avenue W.	Canadian National Railway R.O.W.	Minor Arterial	N/A	100
Lacroix St.	Willowmac Avenue	Prince Arthur Ave.	Minor Arterial	63/80	83
		Prince Arthur	Minor Arterial	63	100
McNaughton Avenue	Bearline Road	University Drive	Minor Arterial	66/83	83
Park Avenue West	Bloomfield Road	Houston Street	Minor Arterial	66	83
		Houston Street	Minor Arterial	66	100
Park Lane	Hydro R.O.W.	Park Avenue East	Collector	36	66
Queen Street	Sunnyside Ave./Eugenie	Park Avenue	Major Arterial	66/83	83
		Park Avenue	Major Arterial	66/69	100
Richmond Street	Inshes Avenue	Lacroix Street	Major Arterial	66	83
		Jeffrey Street	Major Arterial	66	83
Riverview Drive	Bloomfield Road	Keil Drive	Minor Arterial	80	83
Sandys Street	Grand Avenue West	McNaughton Ave. W.	Major Arterial	66	86
St. Clair St.	Grand Avenue	Selkirk Street	Major Arterial	80	100

* Proposed Street

