Hastings - Belleville Transportation Planning Study

Cansult Engineering Limited

Greer Galloway & Associates Ltd.

STUDY PARTICIPANTS

Hastings - Belleville
Suburban Roads Commission

County of Hastings

City of Belleville

Township of Sidney

Township of Thurlow

Ministry of Transportation,
Ontario

Hastings - Belleville Transportation Planning Study

Consult Engineering Limited

Greer Galloway & Associates Ltd.

Our File No. 870 P6

August 17, 1990

Mr. G. Jewell, P. Eng.
Chairman-Technical Advisory Committee
Hastings-Belleville Transportation Planning Study
County Administration Building
Postal Bag 4400
Belleville, Ontario
K8N 3A9

Dear Sir,

We are pleased to submit this report entitled "Hastings-Belleville Transportation Planning Study".

The objective of the study was to identify the immediate, intermediate and long term transportation needs for the Belleville area including parts of the Townships of Sidney and Thurlow.

This report presents a complete summary of each of the study phases and the resulting recommended Transportation Plan and Transportation Policies. We feel that the staged implementation of the Plan will provide the appropriate transportation network to serve the future requirements of a 70,000 population.

Thank you for allowing us the opportunity to participate in this interesting and challenging study. Assistance and guidance provided by the Technical Advisory Committee, the Hastings-Belleville Suburban Roads Commission and staff of the various agencies involved was greatly appreciated.

Yours very truly

CANSULT ENGINEERING LIMITED

G. H. Horning, P. Eng.
President

GREER GALLOWAY & ASSOCIATES LTD.

Peter M. Anderson, P. Eng.

GHH/PMA/at

Enclosure

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Table of Contents

List of Tables

List of Figures

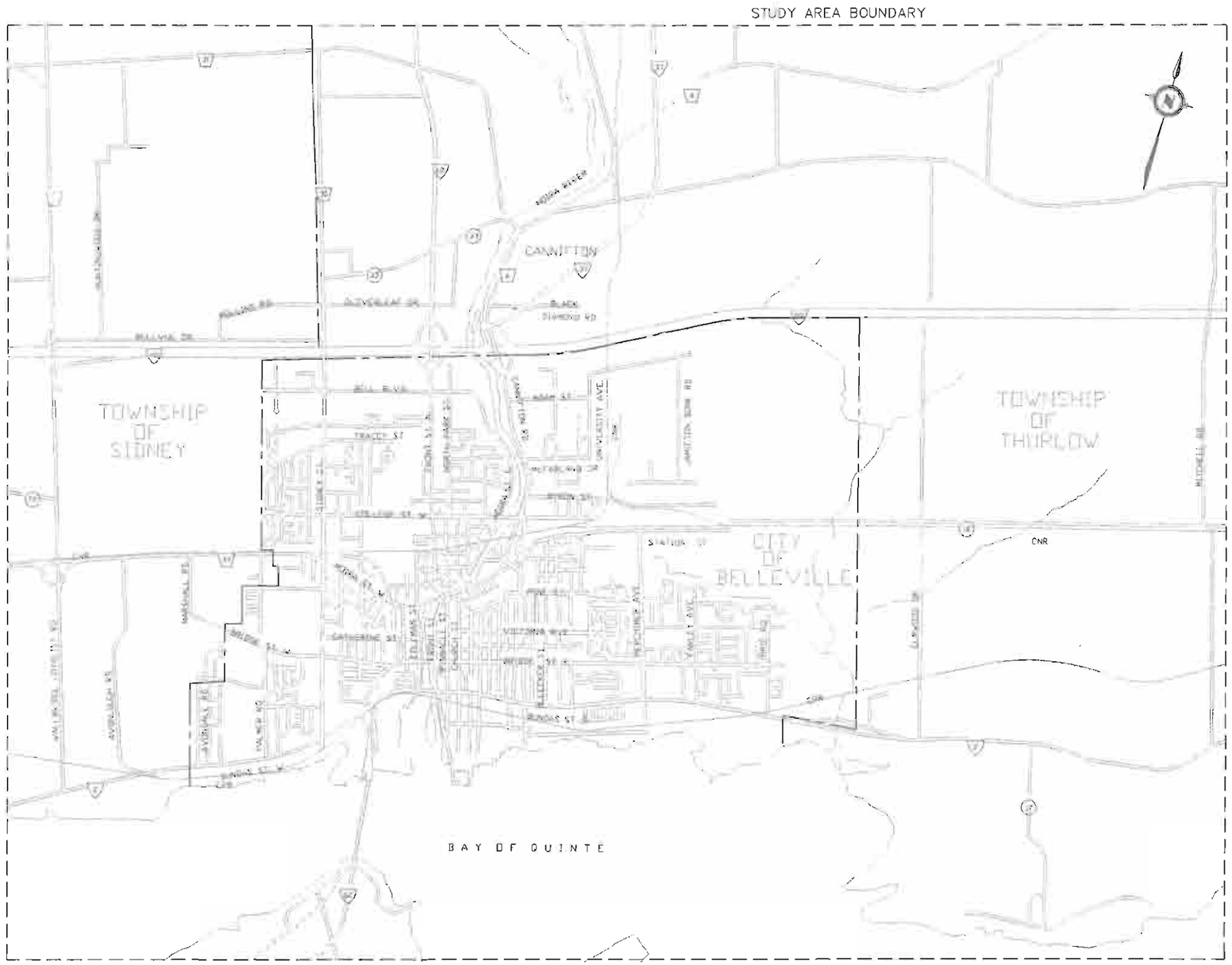
1 - Introduction

The Hastings - Belleville Transportation Planning Study was initiated in mid-1988 to review the area transportation system.

Objective

The objective of the Hastings - Belleville Transportation Planning Study is to identify the immediate, intermediate and long term transportation needs involving major roads in and around the City of Belleville. These include the City of Belleville's major streets and their connections through suburban roads to the Provincial Highway system, the County Road system and major Township roads. The study is established on an area-wide basis to ensure the cost-effectiveness of major road improvements.

The study area encompasses the lands within the City of Belleville and portions of the Township of Thurlow and the Township of Sidney as illustrated in Figure 1.1.



Hastings – Belleville Transportation Planning Study

LEGEND

MUNICIPAL BOUNDARY

STUDY AREA BOUNDARY

1000m 0 1000m 2000m 3000m

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Study Area

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Figure 1.1

Study Organization

The Hastings-Belleville Suburban Roads Commission, on behalf of the Ministry of Transportation, Ontario, the County of Hastings, City of Belleville and the Townships of Sidney and Thurlow, retained Cansult Engineering Limited and Greer Galloway and Associates Limited to conduct the study. A technical advisory committee was formed to direct and assist in the undertaking of the study and consisted of the following representatives.

Hastings-Belleville Suburban Roads Commission
- Mr. B. F. Pinder, P. Eng., County Engineer, Hastings County (1988-1989)
- Mr. G. D. Jewell, P. Eng.,County Engineer, Hastings County (1989-1990)

Township of Sidney
- Mr. R. C. Cannon, M.C.I.P., Director of Planning

Township of Thurlow
- Mr. G.J. King, M.C.I.P., A.M.C.T., Clerk-Administrator

City of Belleville
- Mr. W. S. Murray, Director of Planning
- Mr. J. Angelo, P.Eng., City Engineer

County of Hastings
- Mr. N. Carney, Director of Planning

Ministry of Transportation, Ontario
- Mr. D. Winkworth, Municipal Transportation Policy Office, Downsview
- Mr. D.S. Thompson, Municipal Transportation Policy Office, Downsview
- Mr. M. I. Rubinstein, Municipal Transportation Policy Office, Downsview
- Mr. B. Tarini, P.Eng, Area Manager, Planning & Design Office, Eastern Region
- Mr. A. Raymond, District 8, Kingston
- Mr. W. Blum, P. Eng., District 8, Kingston
- Mr. R. Rahmer, District 8, Kingston

Study Process

The study process involved six major phases as illustrated in Figure 1.2. This report includes a detailed description of each of the major phases in the development and assessment of alternatives leading to the final selection of a transportation plan.

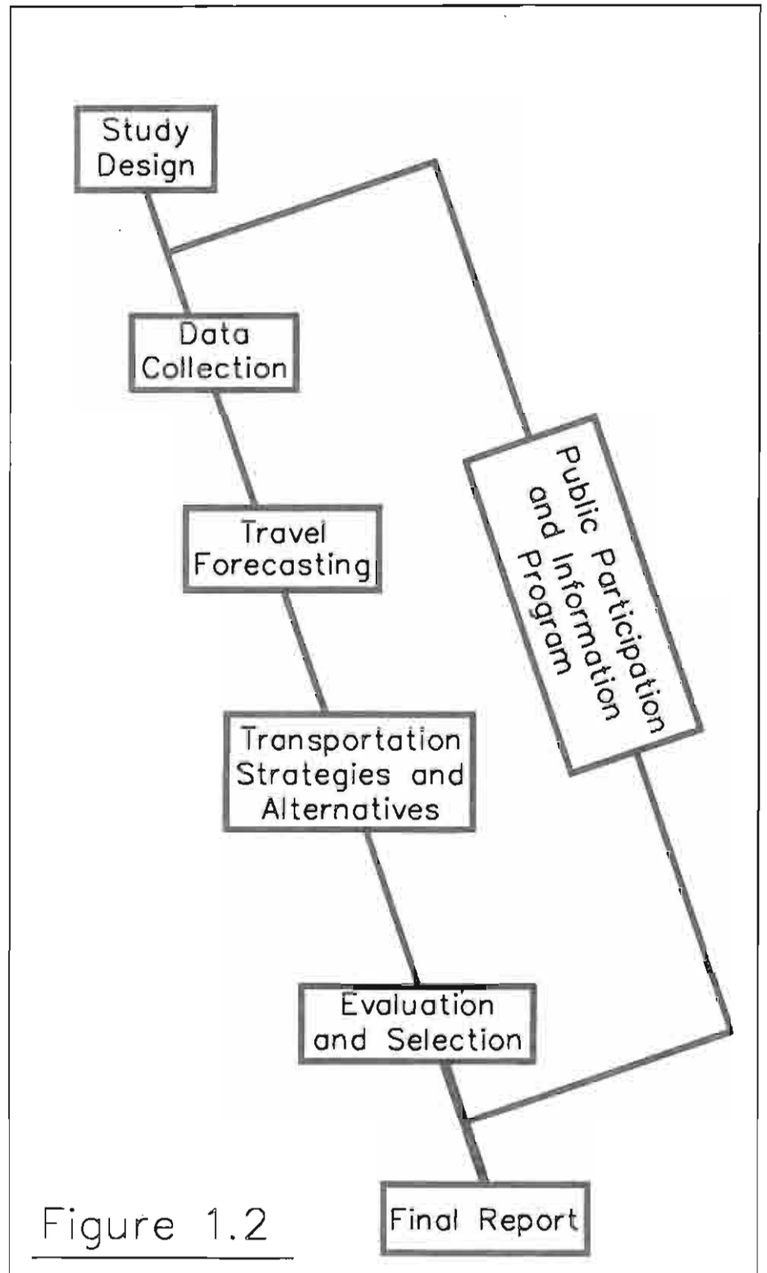

Figure 1.2
Study Process

2 - Summary

The Hastings - Belleville Transportation Planning Study was initiated in 1988 by the Hastings-Belleville Suburban Roads Commission and conducted under the direction of the Technical Advisory Committee. The overall objective of the study is to identify the immediate, intermediate and long term transportation needs for Belleville and its immediate environs.

The study addressed the transportation needs for the City of Belleville's major streets and their connection through suburban roads to the Provincial Highway system, the County Road system and major Township roads in the Townships of Sidney and Thurlow. The study progressed through several phases of work including:

- Study Design
- Data Collection
- Travel Forecasting
- Transportation Strategies and Options
- Evaluation
- Recommendations

Data Collection

A data collection program was undertaken to provide an overview of existing conditions in the study area and to provide a basis for future projections used in the planning and traffic forecasting processes. Data collection activities included the following:

- review of existing reports and documents relevant to the study
- collection of available traffic counts and origin-destination data
- collection of population, employment and land use data
- a traffic count program
- surveys of land use, population and employment characteristics
- a roadside origin-destination survey

- a work trip origin-destination survey
- a shopping trip origin-destination survey
- preparation of external, through and internal trip tables

Travel Forecasting

The data were used to develop and calibrate a computerized travel forecasting model. In order to minimize uncertainties associated with population and employment growth projections and to offer greater flexibility for planning strategies, population targets rather than time-based targets were used to develop future travel scenarios.

On the basis of the travel forecasting model and land use forecasts, future travel scenarios were developed reflecting low, medium and high growth population projections of 50,000, 60,000 and 70,000 respectively. Each of the future travel scenarios was input into the computerized model to determine traffic impacts on the existing transportation network.

Transportation Strategies and Options

Based on the assignment of future traffic volumes to the existing network, deficiencies in roadway capacities were identified for each of the population scenarios. Several roadway improvement components were identified as possible solutions for network deficiencies.

- A new east side arterial from Highway 2 to Highway 37 with a new interchange at Highway 401.
- A new bridge crossing over the Moira River connecting Cloverleaf Drive to Black Diamond Road.
- A new bridge crossing connecting Bell Boulevard to Adam Street and construction of a westerly extension of Bell Boulevard to Wallbridge-Loyalist Road.
- A new east side arterial from Highway 2 to a University Avenue extension.
- A new 401 interchange at Sidney Street.
- Closure of the Highway 37 interchange.
- Widening of Highway 401 from west of Sidney Street to east of the Highway 37 interchange with express and collector lanes in both directions.

Seven transportation system options were developed using a number of combinations of the improvement components.

Evaluation

Each of the transportation system options were evaluated for their ability to accommodate the modelled traffic volumes of the 70,000 population horizon. Evaluation criteria using both quantitative and qualitative measures were used, in conjunction with direction from the Technical Advisory Committee, to select a recommended option. Consideration was given to service level, compatibility with existing land uses, safety, social and environmental impacts, as well as financial considerations. A public participation program was undertaken to receive the suggestions and concerns of area residents.

Recommended Transportation Plan

The recommended transportation plan involves three of the improvement components:

- New East Arterial from Highway 2 to Highway 37 with an interchange at Highway 401
- Bell Bridge (including westerly extension of Bell Boulevard)
- Black Diamond Bridge

Several further improvement components were identified including:

- Widening of North Front Street to a five lane cross-section from Highway 401 southerly to College Street.
- Widening of Highway 62 to four lanes from Highway 401 to the north limit of proposed urban development at Suburban Road 31.
- Widening of Suburban Road 30 (Sidney Street) to a four lane cross-section from Bell Boulevard northerly to Cloverleaf Drive.
- Extensions to a number of existing arterial and collector roadways including: College Street, University Avenue, Station Street, Bridge Street, and Victoria Avenue.
- Intersection modifications at the Highway 401, Wallbridge-Loyalist Road Interchange.
- Intersection improvements at the Highway 37 and 62 interchanges.

The recommended plan detailing the improvement components is shown in Figure 2.1.

Staging of Road Improvements

Certain road improvements were identified as requiring immediate attention, namely:

- Upgrading of the Wallbridge-Loyalist Road interchange.
- Interim ramp modifications of the Highway 37 interchange.

In addition environmental assessment and planning studies be undertaken immediately for road improvements required in the one to five year horizon, including:

- The new East Arterial and the Highway 401 interchange.
- Bell Bridge.
- Black Diamond Bridge.

Priorities of road improvements in the six to twenty year horizon should be dependent upon actual progression of development in the study area. Staging of road improvements is detailed in table 2.1

Road improvements are generally the responsibility of the road authority having jurisdiction. For the Highway 401-East Arterial interchange, a cost sharing program may be arranged between the province, municipalities and local industry. An agreement on cost sharing programs is recommended to be made as soon as possible to facilitate actual development.

Recommended Transportation Policies

Several transportation policy issues were examined for transportation within the study area. Key recommendations are outlined as follows:

Hastings – Belleville Transportation Planning Study

LEGEND

- MUNICIPAL BOUNDARY
- HWY #401 INTERCHANGE
- EAST SIDE ARTERIAL
- PROPOSED EXTENSIONS
- PROPOSED ROAD WIDENING
- STUDY AREA FOR POSSIBLE FUTURE ROAD EXTENSIONS
- PROTECTION OF RIGHT-OF-WAY FOR FUTURE ROAD EXTENSIONS
- INTERCHANGE IMPROVEMENTS

NOTE:

LOCATIONS OF EAST SIDE ARTERIAL, COLLEGE ST.– COUNTY RD. 22 AND BRIDGE ST. W. ARE CONCEPTUAL ONLY AND SUBJECT TO CHANGE FOLLOWING FUTURE STUDY.

1000m 0 1000m 2000m 3000m

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Road Improvements

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Figure 2.1

TABLE 2.1
Staging of Road Improvements

Timeframe	Studies	Road Improvements
Immediate	◦ Environment Assessment and Interchange Design: Hwy 401 - East Arterial Interchange ◦ Route selection study: East Arterial ◦ Environmental Assessment: Bell Bridge ◦ Environmental Assessment: Black Diamond Bridge	◦ Wallbridge - Loyalist interchange modification ◦ Highway 37 interchange ramp modification
Intermediate 50,000 pop. (1 - 5 years)	◦ Arterial corridor protection studies for Sidney Township (College St. W., Bridge St. W. et al)	◦ East Arterial interchange ◦ East Arterial (401 -County Rd. 18) with extensions of University Ave. & College St. E. ◦ Bell Bridge ◦ Bell Blvd. extension to Wallbridge-Loyalist Road ◦ Black Diamond Bridge
Long Term 60,000+ pop. (6 - 20 years)		◦ Highway 62 interchange reconstruction and widening ◦ Highway 37 interchange reconstruction ◦ East Arterial grade separation at C.N.R. line ◦ East Arterial (College St. - Hwy 2) with extensions of Station Street, Victoria Avenue and Bridge Street East ◦ East Arterial extension to Hwy 37 ◦ Reconstruction of North Front Street ◦ Reconstruction of Suburban Road 30 (Sidney Street)

NOTE: Suggested staging of road improvements is preliminary and is dependent upon the progression of development within the urban area.

Access Controls on County/Suburban Roads

For both urban and rural applications, it is recommended that access to County and Suburban roads be provided by public roads, with new development by plan of subdivision with reverse lots. On County/Suburban roads with low traffic volumes (i.e. AADT less than 5000) private entrances may be permitted with suitable spacing or to permit infilling. In all cases access should be permitted only when all geometric and safety requirements of the County are met.

Reconstruction/Widening of Roads in Developed Areas

Specific issues relating to the North Front/Pinnacle corridor were examined. The most viable option, from a technical viewpoint, would be the removal of on street parking to permit four lane operation on Pinnacle Street. Removal could be staged to allow for provision of off street parking. Additional relief may also be provided by spare capacity on parallel routes. Provision should be made for ultimately providing a fifth centre turn lane on North Front St. from College St. W. to Highway 401 to accomodate turning vehicles at the numerous commercial entrances.

Rail Consolidation

Rail consolidation of the CNR and CPR rail lines would allow for improved safety and access to waterfront developments. Current access to the waterfront is impeded by rail crossings which may pose a safety hazard to residents cut off from emergency vehicles.

Intermunicipal Transit Services

Increasing development in the Townships of Sidney and Thurlow will likely increase the demand for intermunicipal transit services. Appropriate cost-sharing arrangements may be negotiated in cooperation with the Ministry of Transportation, in order to encourage these services.

Roadway Classification and Jurisdiction

With completion of the east side arterial and extension of Station Street, it is recommended that Victoria Ave. be downgraded from arterial to collector. To maintain the collectors' functionality, both Victoria Avenue and Bridge Street should not be extended east of the new East Arterial as classified roads.

The new East Arterial extension from Highway 401 to existing Highway 37 is recommended to become the new Highway 37. Existing Highway 37 from the east arterial southerly to Highway 401 would be redesignated as Suburban Road. Similarly, Suburban Road 6 would change to local jurisdiction. Jurisdiction for the westerly extension of Bell Boulevard to Wallbridge-Loyalist Road is recommended as Suburban.

Provision should be made for protection of future easterly road extensions, east of the new East Arterial of University Avenue, College Street East and Station Street. Protection of right-of-way for an easterly extension of County Road 33 should also be provided. As future development within the Township of Sidney is not yet clearly determined, protection of all current road crossings from the City of Belleville to the Township should be maintained including Bridge Street and College Street West.

3 - Transportation Issues

Prior to initiating the study, specific areas of concern were identified to be addressed in the course of the transportation study.

A number of transportation issues were identified based upon written submissions prepared by members of the Technical Advisory Committee and subsequent interviews. The illustrations on the following pages outline some of the issues to be taken into consideration.

Additional problem areas identified for further study were:

1. Need for Highway 401 - Sidney Street interchange.
2. Need and location for an east side arterial from Highway 2 to new Highway 401 interchange with extension to Highway 37.
3. Function of Highway 62 north of Highway 401.
4. Transportation requirements to serve growth north of Cannifton.
5. Extension of Bell Boulevard westerly to Wallbridge-Loyalist Road.
6. Extension of College Street and Bridge Street into the Township of Sidney.
7. Extension of University Avenue, Station Street, Bridge Street and/or Victoria Avenue.
8. Transportation requirements to serve growth in Point Anne area.

Transportation policies to be considered in the study include:

1. Access controls on Suburban Roads.
2. Policies for reconstruction of major roads in developed areas.
3. Transit service across municipal boundaries.
4. Tourist traffic.
5. Feasibility of and need for rail consolidation (CNR, CPR)
6. Truck routes, movement of dangerous goods.

Close spacing between the interchanges of Highways 62 and 37 with minimum acceleration lane lengths and a high volume of local traffic using Highway 401 as a crossing point over the Moira River, creates significant road hazards.

Photos are looking east along Highway 401, from the Highway 62 overpass across the Moira River to the Highway 37 interchange.

Photo of the new Sears distribution facility located north of College St., with a forecast employment of 1500 to 2000.

High industrial growth levels, east of the City of Belleville, may pose a strain on local roads. Current access from Highway 401 to these areas is limited.

East/west traffic flow is impeded by the Moira River. These photos show possible crossing points both north and south of Highway 401 at Black Diamond Road and Bell Boulevard.

Photo looking east across the Moira River to Black Diamond Road.

Photo looking east along Bell Boulevard from North Park Street.

Photo looking north along North Front Street.

Numerous commercial accesses along North Front Street result in a high level of turning movements impeding through traffic.

Photo looking east across Wallbridge-Loyalist Road to a major truck stop.

Heavy truck movements at Wallbridge-Loyalist Road and Highway 401 indicate a need for interchange improvements.

Photo of marina on Bay of Quinte extending from downtown Belleville.

Access to future development of the waterfront may be impeded by the close proximity of the CPR rail line.

Photo looking south on Pinnacle Street from Victoria Avenue.

On street parking and heavy traffic volumes along Pinnacle Street result in congestion of the downtown core.

4 - Existing Roadway Network

Roadway Classification

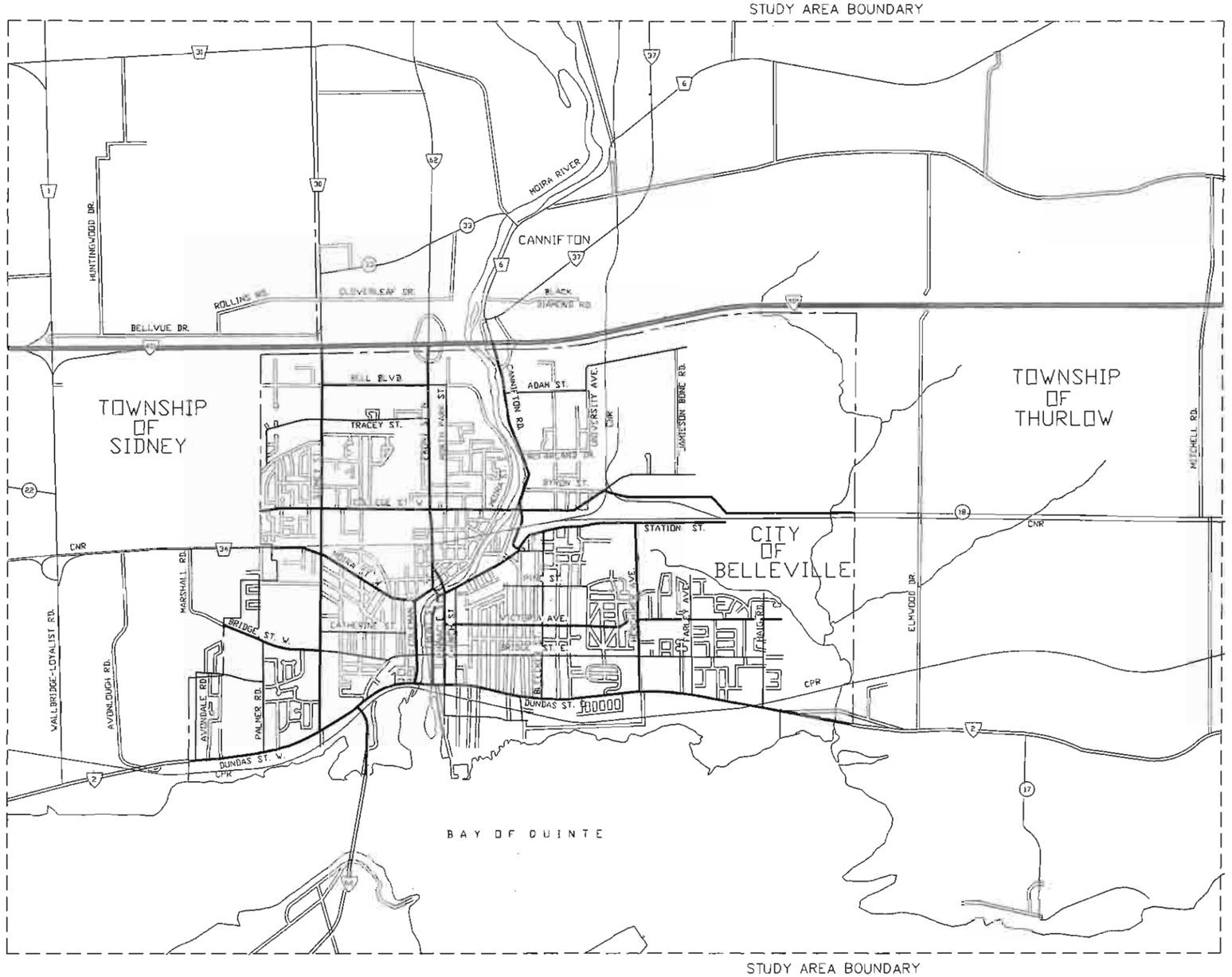
In order to identify the transportation needs for the Belleville area, a careful examination of the existing roadway network was undertaken.

Roadways are established as part of a hierarchy of roads and each road is designated within the hierarchy according to its intended function, anticipated traffic volumes and general operating conditions. The classification of roadways in the study area is shown in Figure 4.1.

Regional accessibility to the Belleville area, including the Townships of Thurlow and Sidney, is provided through Highways 401, 2, 37, and 62. The area contains a network of arterial, county, suburban, collector and local roads serving the transportation needs of the community.

Roadway Volumes

Extensive data collection activities were undertaken to determine the existing operational characteristics of the roadway network. Roadway volumes were determined using existing data from previous studies and count programs within the area. These were supplemented by an extensive traffic count program along major routes in the area. Screenlines, or imaginary lines were established along physical barriers and between other points with minimal crossings in the study area, as illustrated in Appendix A. To establish the traffic volumes crossing the screenlines, 24-hour traffic counts were taken using automated traffic recorder (ATR) equipment, on all major streets crossing the screenlines. In total, twenty-five screenline traffic counts were taken. The location and results of the counts are shown in Appendix A. In addition, 24-hour ATR counts were taken at each of the roadside interview stations for the origin-destination survey. A total of seventeen such counts were taken.



Hastings – Belleville Transportation Planning Study

LEGEND

- MUNICIPAL BOUNDARY
- STUDY AREA BOUNDARY
- CITY ARTERIAL ROADS
- CITY COLLECTOR ROADS
- FREEWAY
- PROVINCIAL HWY
- COUNTY ROADS
- SUBURBAN ROADS
- LOCAL ROADS

1000m 0 1000m 2000m 3000m

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Roadway Classification

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Figure 4.1

5 - Land Use

The Study Area

The study area includes the City of Belleville, and parts of the Townships of Sidney and Thurlow. To assist in the collection and classification of land use, population and employment data and forecasts, traffic zones were established within and outside the study area. The traffic zone system is illustrated in Appendix A.

Existing Land Use

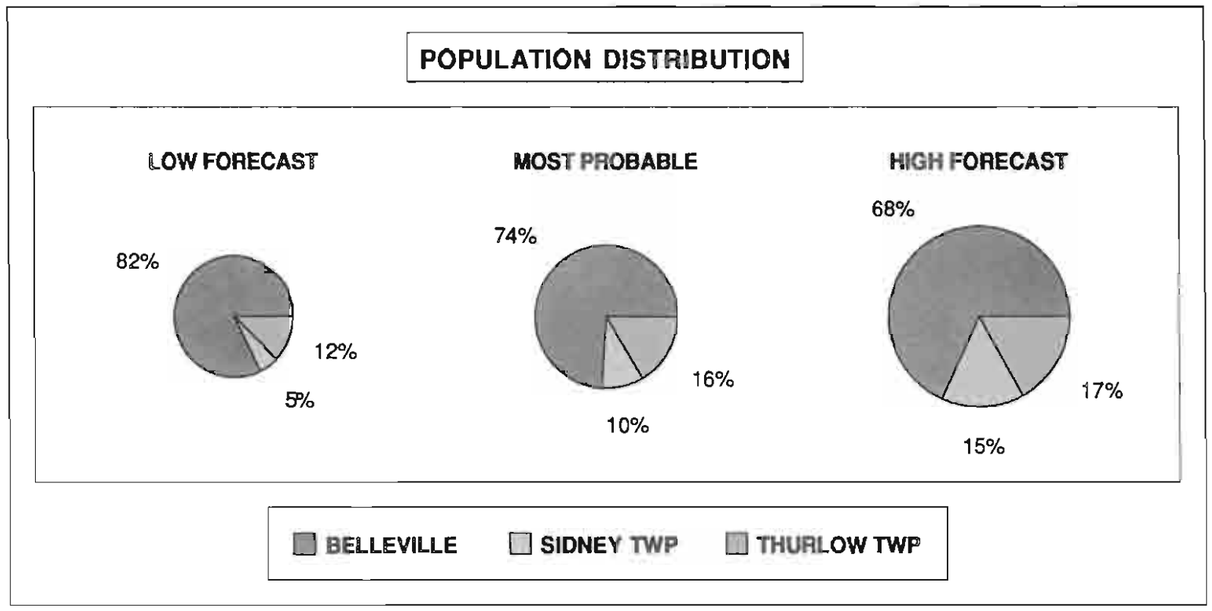
Land use, population and employment data were collected from existing published sources such as official plans, zoning by-laws, school board enrollment records and employment records. A windshield survey was undertaken which involved driving through areas within the study boundaries counting residential dwelling units and industrial and commercial facilities and estimating their floor area from available mapping and aerial photography. Inventories of unique uses such as schools, churches and parks, were also recorded. The information was collected and tabulated for each of the twenty-five internal study zones.

A roadside origin-destination survey was conducted at entry locations along the study boundary. The survey included vehicle classification, vehicle occupancy, trip origin and destination and trip purpose. Where trucks were involved a check for dangerous goods was also conducted.

In order to further supplement and verify the count volumes, a work trip origin-destination survey was conducted in co-operation with major employers in the Belleville Area. A total of 47 employers were contacted and thirty or sixty-four percent responded. The employers responding employ a total of 7,116 employees representing thirty-one percent of the

TABLE 5.1
Study Area Population Forecasts

	LOW FORECAST	MOST PROBABLE	HIGH FORECAST
BELLEVILLE	40,019	42,671	49,671
SIDNEY TWP	2,649	5,743	10,933
THURLOW TWP	5,928	9,410	12,460
TOTAL	48,596	57,824	73,064



Note: Forecasts are based on a twenty year horizon

Land Use

Possible land use scenarios were estimated in accordance with the foregoing population and employment projections.

In the short term, residential growth in the City of Belleville is expected to occur in accordance with past trends. A substantial increase is expected in the west and north-west portions of the City.

Residential growth in the Cannifton-Corbyville area of Thurlow Township is expected to be significant due to the extension of municipal water and sewage services from the City of Belleville.

Residential growth in Sidney Township on the western periphery of the City of Belleville is estimated to be limited due to the uncertainty associated with the extension of municipal water and sewage services from the City of Belleville.

Continued but limited residential growth is expected to occur to the east of the City of Belleville at the Hamlet of Farley and Point Anne in Thurlow Townships.

An increase in commercial and industrial development activity is expected at four locations adjacent to the Highway 401 Corridor, including:

- Sidney Township; to the south of Highway 401 between the Wallbridg-Loyalist Road and the City of Belleville,
- Thurlow Township; to the north of Highway 401 in the vicinity of the Highway 62 Interchange,
- Thurlow Township; to the north of Highway 401 in the vicinity of Cannifton and the Highway 37 Interchange,
- City of Belleville; to the south of Highway 401 and east of the Highway 37 Interchange.

Commercial growth is also expected in the City of Belleville; in the downtown and bayfront areas.

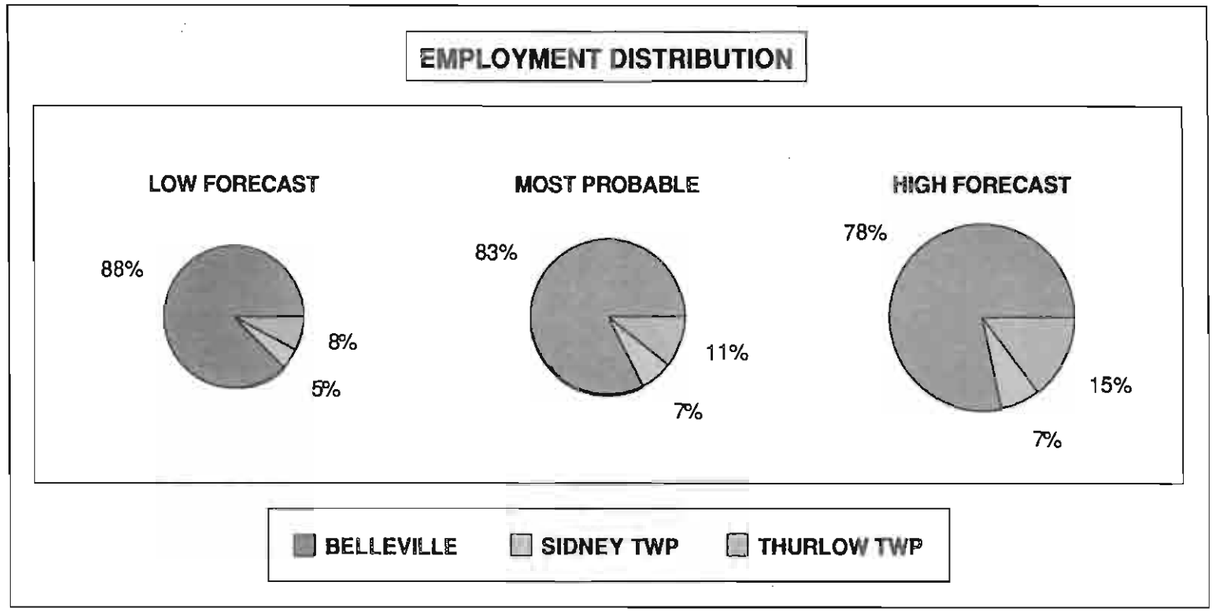
In the longer term (i.e. 10-20 years), growth in the City of Belleville is expected to continue to be modest. However, new residential growth is expected to occur mainly in the eastern areas.

The Cannifton-Corbyville area is expected to experience continued population growth, but the development of higher density and lifestyle accommodation will result in a different population mix from that currently being experienced.

Substantial residential growth is expected in Sidney Township on full or partial municipal services. Although the future residential land use scenario is uncertain with respect to the actual density of development, it is estimated

TABLE 5.2
Study Area Employment Forecasts

	LOW FORECAST	MOST PROBABLE	HIGH FORECAST
BELLEVILLE	24,635	25,424	28,872
SIDNEY TWP	1,325	2,094	2,469
THURLOW TWP	2,154	3,258	5,466
TOTAL	28,114	30,776	36,807



Note: Forecasts are based on a twenty year horizon

that this area, to the west of the City of Belleville, would develop over time as residential.

Highway 62 North in Thurlow Township is expected to develop as commercial and the industrial potential in the extreme north-east portion of the City of Belleville is expected to be realized. New commercial and industrial development in Sidney Township is anticipated to be modest south of Highway 401.

6 - Travel Forecasting

Network Development

Travel forecasting for the study was developed using a computerized model (QRS II) based upon currently accepted mathematical techniques for determination of travel characteristics. The model was calibrated using existing travel characteristics and patterns within the study area. A 24-hour travel forecasting model was then developed to accommodate land use, population and employment projections to determine future travel scenarios. Model equations are detailed in Appendix C.

Modelling Existing Travel

Based upon the sample surveys taken and the existing and new traffic counts, the various survey data were expanded to represent trip patterns of the study area as a whole. Three trip classifications were developed: Home-based Work Trips, Home-based Other Trips, and Non-Home-Based Trips. The established zone system indicates which of these trips were internal, internal-external, external-internal and through trips.

Trip tables were then developed detailing the trip data. Within the established zone system these tables present matrices detailing the number of trips from any given origin zone to any destination zone. Trip tables were developed for internal, external and through trips as shown in Appendix C. The results were verified and a set of expansion factors applied, based on the traffic counts taken simultaneously. The expansion was based on the assumption that a sample of origins is representative of the total traffic volume in a given hour.

The results were further expanded to reflect 24-hour traffic count figures determined in the ATR count program. The trip table matrix was then

balanced to ensure that trip productions from a zone matched trip attractions to a zone over a 24-hour period.

The internal trip table was developed based on the employer survey data and the shopping centre data. Adjustments were made based on typical trip making characteristics for cities of similar size. Once factored to total employment figures, the workplace survey data provide a good picture of home-based work trips in Belleville. Experience in Ontario studies of cities similar in size to Belleville has shown home based work trips typically comprise approximately sixteen percent of a total of 9.5 trips per household which are made each day.

Based on workplace survey data, total existing travel in Belleville was estimated to be 150,000 vehicle trips per day. Applying typical trip rates from other similar sized communities to the 15,500 households in Belleville would result in a total of 147,000 vehicle trips per 24-hour day.

Using the initial trip tables derived from existing land use, the daily traffic was assigned to the existing road network. In order to calibrate the table to accurately reflect the existing travel data, comparisons were made between actual traffic counts taken at the various screenline locations and the crossings predicted by the survey trip tables. These comparisons showed survey results to be consistently lower than actual counts.

An expansion factor was applied to the internal trip table, and the assignment and screenline comparisons were repeated. The resulting screenline comparisons between the count survey and model are shown in Appendix C. This yielded a comparison ratio of 100 +/- 1%. The finalized trip table was then used to develop trip generation equations.

Forecasting Future Vehicular Travel

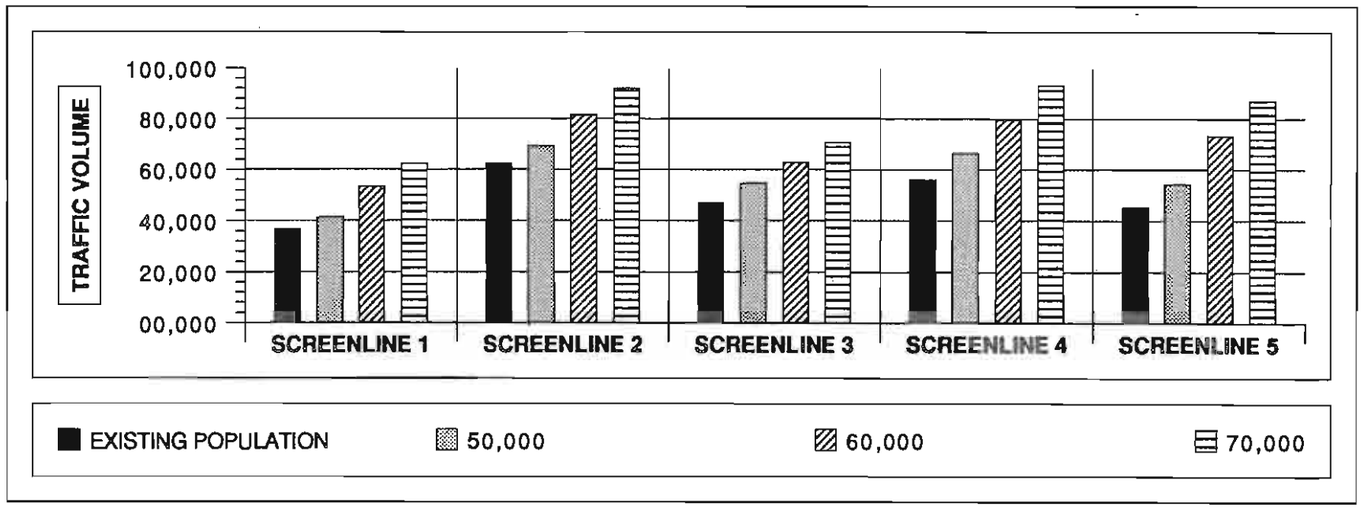
In accordance with the land use scenarios outlined in section 5, future travel scenarios were developed for the study area. Because of the direct connection to the population and employment projections, the land use scenarios have a temporal quality that is reflected in the horizon year forecasts. However, travel patterns are less dependent on a time frame than they are on the level of growth that is realized. The inseparability of trip generation and travel forecasting makes it much more appropriate to base future travel scenarios on population targets rather than horizon years. For this reason the targeted horizon years were converted to corresponding population targets, reflecting future development levels.

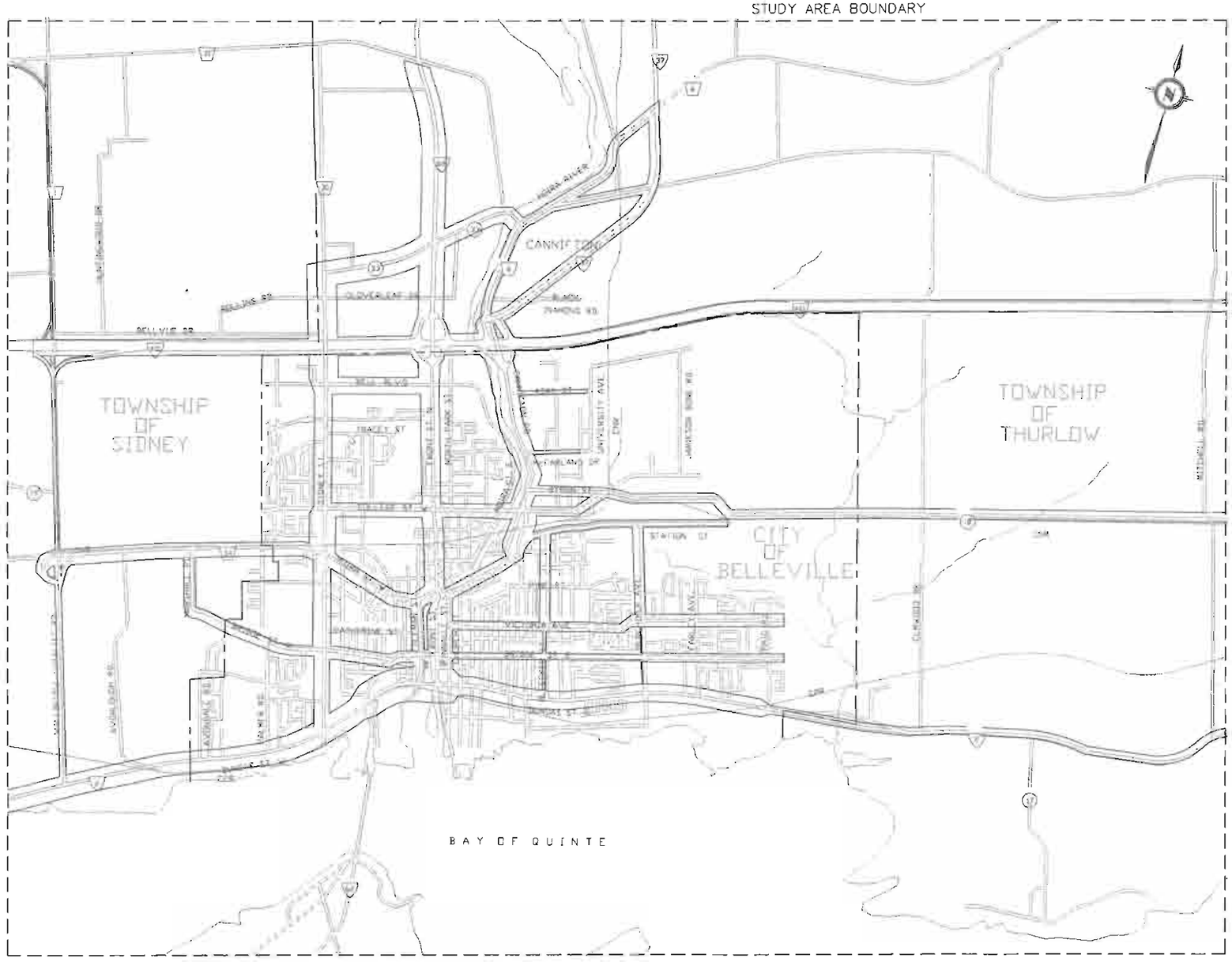
On the basis of the travel forecasting model and land use forecasts, future travel scenarios were developed reflecting low, medium and high growth population projections of 50,000, 60,000 and 70,000 respectively. Each of the future travel scenarios was derived from the previous land use projections which were input to separate modelling runs to determine the traffic impacts on the existing transportation network. Screenline comparisons of the 50,000, 60,000 and 70,000 population scenarios are shown in Table 6.1.

The resulting analysis for each of the scenarios was presented as a horizon population projection. Detailed analysis was conducted on the 70,000 population scenario. The estimated traffic volumes in the existing road network for the 70,000 scenario are illustrated in Figure 6.1.

TABLE 6.1
Population Scenarios - Screenline Comparisons

POPULATION	SCREENLINE 1	SCREENLINE 2	SCREENLINE 3	SCREENLINE 4	SCREENLINE 5
EXISTING POPULATION	36,700	62,500	46,900	56,000	45,500
50,000	41,300	69,200	54,500	66,200	54,300
60,000	53,300	81,400	62,800	79,700	73,400
70,000	62,300	91,900	70,800	93,000	87,000





Hastings – Belleville Transportation Planning Study

NETWORK VOLUME SCALE

30,000 25,000 20,000 15,000 10,000 5,000 2,500

NOTE:

HIGHWAY 401 TRAFFIC VOLUMES DO NOT INCLUDE THROUGH TRAFFIC.

1000m 0 1000m 2000m 3000m

Consult Engineering Limited

Future Volumes on Existing Network

Greer Galloway & Associates Ltd.

Figure 6.1

7 - System Evaluation

Based on travel forecasts for the 50,000, 60,000 and 70,000 population horizons the expected roadway volumes were applied to the existing network. The resulting link volumes are shown in Appendix D. Each of the major roadways were evaluated for their capacity to handle the increased volumes.

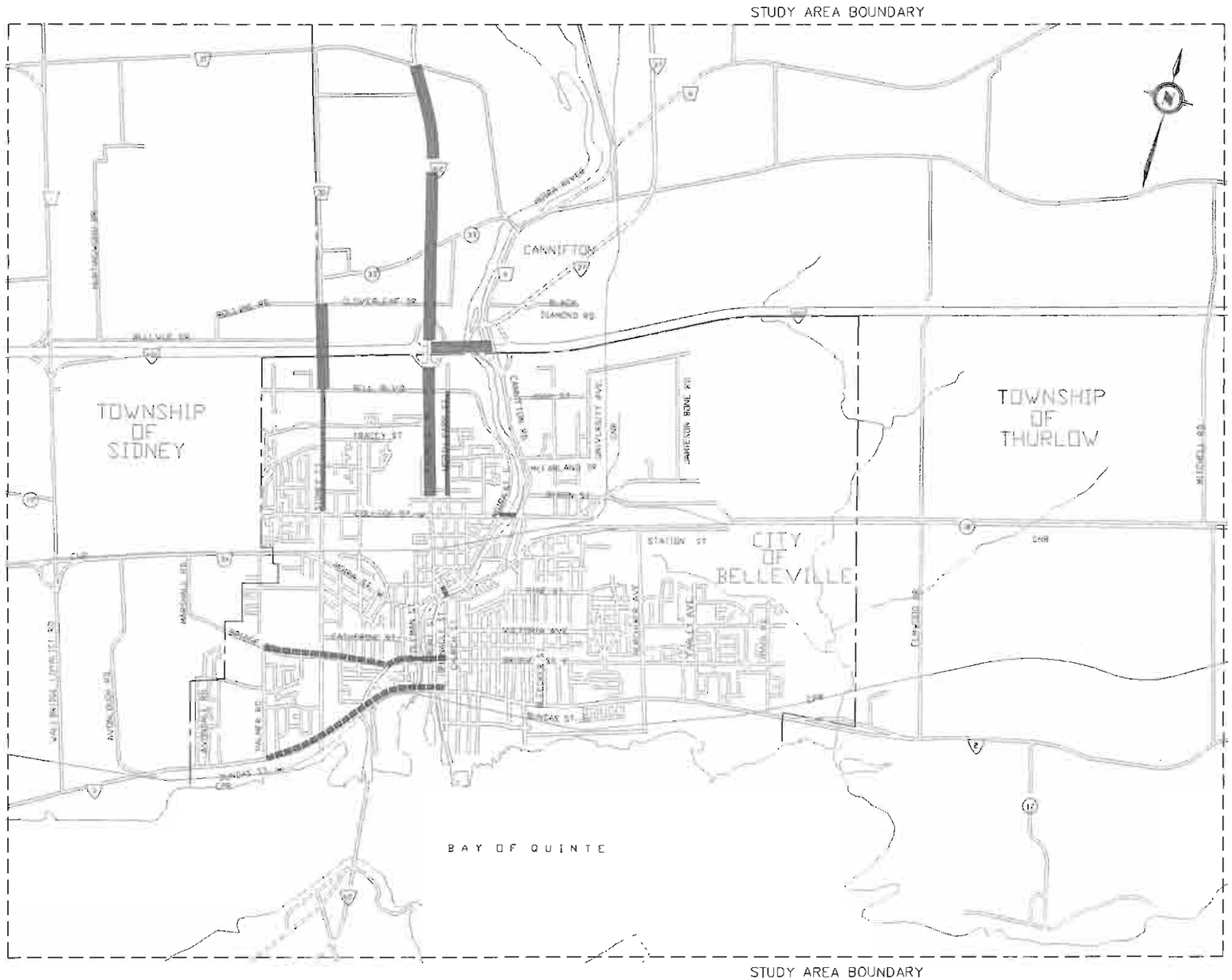
Capacities for each of the existing road links were based on current lane configurations, using an accepted capacity of 750 vehicles per lane (peak hour) and a peak hour factor of ten percent (10%). Capacity estimates were refined for particular links where actual operating conditions showed higher levels of operation (Bay Bridge) or lower levels (North Front Street). Projected traffic volumes for each of the population scenarios were compared to these assigned capacities to determine the operating conditions of each link. Because of the nature of the model's "all or nothing" traffic assignment method, some manual adjustments were necessary to show re-routing of traffic along alternative routes with reserve capacity, as would actually be expected to occur under normal operating conditions.

Existing Network Deficiencies

Network deficiencies were identified for each of the population horizons as illustrated in Figure 7.1.

a) Population Horizon 50,000

This scenario represents an increase of approximately twenty-five percent over the existing study area population. Under high growth rate assumptions, this horizon would be reached within five years; the low growth scenario estimates this population as being the ultimate level achievable in twenty years.



Hastings – Belleville Transportation Planning Study

LEGEND

MUNICIPAL BOUNDARY

EXISTING ROAD NETWORK DEFICIENCIES BY POPULATION HORIZON:

- 50,000
- 60,000
- 70,000

1000m 0 1000m 2000m 3000m

Consult Engineering Limited

Network Deficiencies

Greer Galloway & Associates Ltd.

Figure 7.1

The travel forecasts for this scenario indicated the following areas of concern:

- **Highway 62**

  As the area north of Highway 401 becomes increasingly urbanized, additional capacity would be required on Highway 62. With assumed daily capacities of 15,000, Highway 62 is estimated to exceed capacity by ten to twenty percent within the 50,000 population horizon.

- **Suburban Road 30**

  Similarly, Suburban Road 30 (Sidney Street) north of Bell Boulevard would be expected to approach its rated capacity during this time frame.

- **North Front Street**

  Adjusted modelling results for this population horizon predict diversion of traffic to North Park Street from North Front Street as traffic continues to increase.

- **Highway 401**

  Local traffic on Highway 401, given the current weaving conditions, presents an existing concern. Using the existing network, current local traffic levels of 3,000-5,000 on the link between Highways 62 and 37 would increase to 8,000 within the 50,000 population horizon. While this does not present a capacity problem on Highway 401, these levels of local traffic operating on a controlled-access highway are undesirable and may result in higher than average accident rates.

b) Population Horizon 60,000

This population horizon represents a fifty percent increase over the existing study area population. Under high growth rate assumptions, this horizon would be reached within ten years; under the medium growth scenario, it represents the ultimate population horizon achievable in twenty years.

The travel pattern and traffic volume increases associated with this horizon do not result in additional over-capacity problems. However, there are several areas of concern with road links approaching capacity:

- **Bridge Street West**

  Bridge Street, west of Pinnacle, in the downtown core area, would become increasingly congested within this population horizon.

- **Dundas Street**

  Similarly, Dundas Street also approaches capacity within this time frame.

c) Population Horizon 70,000

This population horizon represents a seventy-five percent increase in the existing study area population. The high growth scenario represents the ultimate population level, achievable within twenty years.

The traffic and travel pattern increases under this scenario continue to compound previous capacity problems on road links such as North Front Street, the Dundas-Bridge Corridor, and Highway 62.

Several new areas of concern are indicated, as traffic volumes begin to approach capacity:

- **Bridges**

  Both the Lower Bridge and the Pinnacle Street Bridge would be operating close to their rated capacity within this time frame. However, none of the existing bridges are expected to experience serious capacity problems throughout this ultimate population horizon.

- **College Street**

  College Street west of Cannifton Road will begin to show signs of capacity constraint, although reserve capacity would still exist.

- **Sidney Street**

  The four lane section of Sidney Street, between College Street and Bell Boulevard will begin to exhibit signs of being close to capacity. In conjunction with North Front/North Park operating close to capacity, this would represent the beginning of concern for north-south movements in the area.

Future Network Improvements

Based upon the identified network deficiencies and in consultation with the Technical Advisory Committee, several essential network improvements were identified. These improvements are expected to improve overall traffic circulation and accessibility, help address the traffic levels on key road links with capacity problems and reduce safety concerns. Key areas include:

- Highway 62, north of Highway 401
- Sidney Street/Suburban Road 30
- North Front Street
- Highway 401 interchanges (Wallbridge-Loyalist Road, Highway 62 and Highway 37)

An assessment was also made of the impacts of transportation network improvements included in the Official Plans.

Certain component improvements were selected for further evaluation in the selection of transportation system options. These improvements and their expected impacts are shown in Table 7.1. Locations of the selected components are shown in Figure 7.2.

Transportation System Options

In consultation with the Technical Advisory Committee, seven transportation system options were developed, including the status quo and various combinations of the optional network improvement components. The options were developed for further detailed analysis and evaluation. Table 7.2 outlines the system options and the components that comprise them.

Evaluation Criteria

Computerized analysis of each of the options was undertaken to determine changes in traffic volume on each of the roadway links.

A comprehensive set of evaluation criteria was developed to allow objective comparison of each of the options. The main criteria used were:

- level of traffic service
- travel time
- accessibility
- compatibility with existing and proposed land uses
- property requirements
- financial impacts
- safety
- environmental impacts
- social impacts

Table 7.3 contains a comparison matrix of the expected impacts for each of the options.

TABLE 7.1
Roadway Improvement Components

Improvement Component	Description	Impacts
1. Black Diamond Bridge	• Connection over the Moira River of Cloverleaf Drive and Black Diamond Road	• Reduction in level of local traffic using Highway 401 between Highways 37 and 62. Reductions expected to be in the order of 40% • Diversion of Cannifton bound traffic away from Hwy. 62 (north of Hwy 401) and County Road 33. • Increase in volume along Hwy. 37 between Black Diamond Rd. and Suburban Rd. 6.
2-3. Bell Boulevard Bridge and Western Extension	• Connection of Bell Boulevard and Adam Street across the Moira River. • Extension of Bell Boulevard westerly to Wallbridge-Loyalist Road.	• Reduction in level of local traffic using Hwy. 401 • Reduction in volume on North Front Street and Cannifton Road, north of Bell/Adam. • Increased traffic levels on Bell Boulevard. • Construction through an existing park • Moderate volumes diverted from Highway 401 to the westerly extension of Bell Boulevard.
4. East Arterial	• Construction of new north-south arterial road on the east boundary of the current urbanized area from Highway 2 (Dundas St.) to a new extension of Station St.	• Reduction in north south volumes through the centre of the city (downtown core only to College St.). • Reductions in traffic volume on Dundas St. from East Arterial to Church St. • Arterial volumes from 1,000 south of Hwy. 401 to 4,000 north of Dundas.
5. East Arterial with Hwy. 401 interchange, and northerly extension to Hwy. 37	• Construction of new north-south arterial road connecting Highway 2 to Highway 37 with interchanges at Highways 401 and 37.	• Reduction of north-south volumes on Cannifton Rd. and/or Pinnacle/North Front St. • Reduction in traffic volume on Dundas St. to Church St. • Arterial volumes from 2000 north of Hwy 401 to nearly 10,000 south of Hwy. 401.
6. Closure of Hwy. 37 interchange	• Complete closure of the interchange of Highways 401 and 37. • Road links between North Front St. and Cannifton Rd. would serve as a south service road.	• Reduction of north south volumes on Cannifton Rd. and/or Pinnacle/North Front St. • Reduction in traffic volume on Dundas St. from East Arterial to Church St. • Increased volume on Highway 62 north of Highway 401. • Slight decrease in volume on Highway 37. • Arterial volumes from 2,000 north of Hwy. 401 to 10,000 south of Hwy. 401.
7. New Sidney Interchange	• Construction of new interchange at Highway 401 from Sidney St.	• Increase in estimated volumes on Sidney St. by nearly thirty percent (30%). • Reduction of volume on North Front St., (not significant enough to improve operating conditions). • Additional local link in Highway 401. • Increase in local traffic using Highway 401.
8. Collector Distributor System	• Widening of Highway 401 from west of Sidney St. (County Rd. 30) to east of the Highway 37 interchange with express and collector lanes in both directions.	• Increase in local traffic using Highway 401, decrease in impact of these vehicles.

TABLE 7.2
Composition of Options

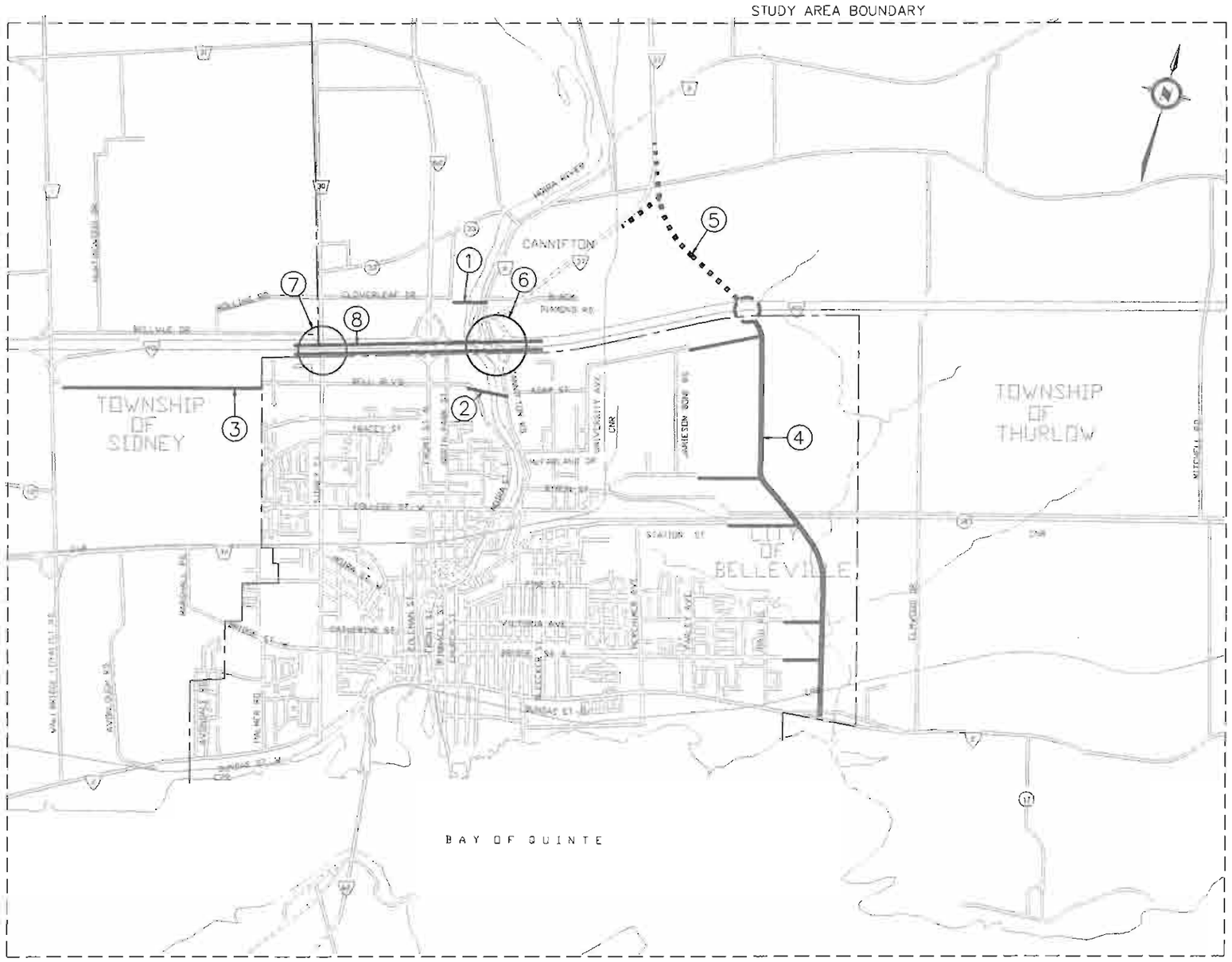
Component	1 (Status Quo)	2	3	4	5	6	7
1. Black Diamond Bridge		X	X		X	X	
2. Bell Bridge		X		X	X	X	
3. Bell Extension		X	X	X	X	X	X
4. East Arterial		X	X	X	X	X	X
5. 401 Connection		X	X	X		X	X
6. Close Highway 37 Interchange		X	X	X			
7. New Sidney Interchange							
8. C-D System							X

Evaluation

In accordance with the stated criteria, and in conjunction with the Technical Advisory Committee, the transportation system options were evaluated. Within the description of each criteria, each alternative was ranked on a five point scale. The results of the evaluation are shown in Table 7.4.

TABLE 7.3
Analysis of Options

OPTION / CRITERIA	OPTION 1 Status Quo	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6	OPTION 7
LEVEL OF TRAFFIC SERVICE							
• links approaching capacity deficiency:							
-Highway 62	27,300	23,200	27,600	24,500	17,500	26,300	29,800
-North Front St.	23,000	21,500	24,700	24,100	20,600	22,400	28,900
-Sidney St.	28,300	28,300	27,300	28,400	27,700	25,800	25,500
-Cannifton Rd.	26,000	15,800	18,500	14,600	24,200	17,000	18,600
-Suburban Road 30	31,500	24,300	25,500	24,600	23,900	21,000	21,100
TRAVEL TIME							
• modelled system average (travel time index):	10000	9602	9700	9634	9739	9601	9633
ACCESSIBILITY	Existing level of accessibility.	East arterial with 401 connection increases accessibility to northeast/southeast. Closing Highway 37 interchange may have minor impact on accessibility in immediate area.			Reduced accessibility to northeast industrial area/ southeast residential area.	Good accessibility to all areas	Good accessibility to all areas
COMPATIBILITY WITH EXISTING AND PROPOSED LAND USES							
• impact on character of existing communities	Increasing impact of traffic volumes on residential streets.	Bell Bridge will impact on park uses. Black Diamond Bridge will impact on residential areas in Cannifton.	Black Diamond Bridge will impact on residential areas in Cannifton.	Bell Bridge will impact on park uses.	Bell Bridge will impact on park uses. Black Diamond Bridge will impact on residential areas in Cannifton.	Bell Bridge will impact on park uses. Black Diamond Bridge will impact on residential areas in Cannifton.	Collector/Distributor System creates corridor intensification incompatible with urban scale
PROPERTY REQUIREMENTS							
• Acres Required:	2	80	76	78	60	80	74
• Property gained from Highway 37 interchange closure:	No	YES	YES	YES	NO	NO	NO
FINANCIAL IMPACTS							
• Property costs:	1.4 million	6.2 million	6.1 million	6.2 million	5.0 million	6.2 million	6.0 million
• Construction costs:	6.4 million	38.6 million	34.6 million	33.6 million	32.9 million	43.6 million	46.7 million
• Total:	7.8 million	44.8 million	40.7 million	39.8 million	37.9 million	49.8 million	52.7 million
SAFETY							
• 401 Weaving:							
-volume	22,700	18,300	21,300	19,300	13,800	27,100	32,800
-interchange separation	500 m.	2,500 m.	2,500 m.	2,500 m.	800 m.	800 m.	N/A
ENVIRONMENTAL IMPACTS							
• Construction:	None	← Bridge construction may have significant short term impact on river. Additional river crossings will result in increased →					C-D System construction will impact river
• On-going:	None	runoff (salt, etc.)into river.					
SOCIAL IMPACTS							
• Residences affected:	NO	YES	YES	NO	YES	YES	NO
• Businesses affected:	NO	YES	YES	YES	YES	YES	YES
• Parks/Open space affected:	NO	YES	YES	YES	YES	YES	YES



Hastings – Belleville Transportation Planning Study

LEGEND

MUNICIPAL BOUNDARY

NUMBERED COMPONENT AS DETAILED IN TABLES 7.1 AND 7.2 ⑤

1000m 0 1000m 2000m 3000m

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Optional Network Components

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Figure 7.2

TABLE 7.4
Comparative Ratings

CRITERIA \ OPTION	OPTION 1 Status Quo	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6	OPTION 7
LEVEL OF TRAFFIC SERVICE	○	●	◔	◕	●	◕	◕
TRAVEL TIME	◔	●	◔	◕	◔	◕	◕
ACCESSIBILITY	○	◕	◕	◕	◔	◕	◔
COMPATIBILITY WITH EXISTING AND PROPOSED LAND USES	○	◕	●	◕	◕	◕	◔
PROPERTY REQUIREMENTS	●	○	◔	◔	◕	○	◔
FINANCIAL IMPACTS	●	◔	◔	◔	◕	◔	○
SAFETY	○	◕	◕	◕	◕	◕	◕
ENVIRONMENTAL IMPACTS	●	◔	◕	◕	◔	◔	◔
SOCIAL IMPACTS	◔	◔	◔	◔	◔	◔	◔

● best ◕ better ◔ good ◔ poor ○ worst

8 - Recommended Transportation Plan

Roadway Network Improvements

Based on the evaluation of each of the options and in conjunction with the Technical Advisory Committee, the selected option was chosen as Option 6. This option includes the improvement components as listed below.

- Development of an east arterial from Highway 2 to Highway 37 with an interchange at Highway 401
- Black Diamond Bridge
- Bell Bridge
- Bell Boulevard extension

Based on the selected option, several other roadway improvements were identified as part of the transportation plan.

- Interchange Modifications - Wallbridge-Loyalist Road - Immediate upgrading of the Wallbridge-Loyalist Road and Highway 401 interchange is required to accommodate the high level of truck movements and extension of Bell Boulevard. These improvements are currently programmed by the Ministry of Transportation.

- Interchange Modifications - Highway 37 - Elimination of the dual ramping system and ramp improvements are required at the Highway 37 interchange.

- Interchange Modifications - Highway 62

- Road Widening - North Front Street - A five lane cross section is ultimately required from Highway 401 southerly to College Street.

- Road Widening - Highway 62 - Widening of Highway 62 from the existing two to four lanes is needed to accommodate future capacity requirements.

- Road Widening - Suburban Road 30 - Suburban Road 30 (Sidney Street) requires an extension of the existing four lane cross section south of Bell Boulevard northerly to Cloverleaf Drive.

Right-of-Way Protection

- Protection of Right-of-Way should be provided for future extensions east of the East Arterial of each of Station Street, Victoria Avenue and Bridge Street. In addition, a right-of-way should be preserved for possible extension of County Rd. 33 through Cannifton.

All future network components are illustrated in Figure 8.1.

Functional design drawings of some of the key improvement components are shown in Figures 8.2, 8.3 and 8.4.

Phasing

Staging of road improvements was assessed according to immediate need and projected development in the study area. Road improvements requiring immediate attention are the upgrading of the Wallbridge-Loyalist Road interchange (currently programmed by the Ministry) and interim ramp modifications of the Highway 37 interchange. The ramp improvements at the Highway 37 interchange are intended to serve as a temporary solution to traffic problems prior to the development of the East Arterial.

Road improvements required within the one to five year horizon include construction of the new East Arterial from College street to Highway 401 with extensions of University Avenue and College Street and the new Highway 401 interchange. This facility is required to provide for growth in the adjacent industrial area. In addition, development of the Bell and Black Diamond Bridges and the extension of Bell Boulevard to Wallbridge-Loyalist Road should be undertaken within this time frame.

Remaining road improvements should be prioritized over the six to twenty year time frame according to actual development progression within the study area. These improvements include reconstruction of the Highways 62 and 37 interchanges, road widenings of Highway 62, Suburban Road 30 (Sidney Street), and North Front Street and completion of the East Arterial.

The recommended staging of road improvements is outlined in Table 8.1.

In order to implement the road improvements several environmental assessment and planning studies will be required in the immediate time frame including: environmental assessment for the Bell and Black Diamond Bridges and the East Arterial interchange and route selection of the East Arterial. Study areas for environmental assessment and routing are shown in Figure 8.1.

Arterial corridor protection studies for Sidney Township should be undertaken in the one to five year horizon to accomodate future growth of this area. This would include possible extensions of existing road crossings from the City of Belleville such as College Street West and Bridge Street West.

Financial Assessment

Costing of road improvements is generally the responsibility of the road

TABLE 8.1
Staging of Road Improvements

Timeframe	Studies	Road Improvements
Immediate	◦ Environment Assessment and Interchange Design: Hwy 401 - East Arterial Interchange ◦ Route selection study: East Arterial ◦ Environmental Assessment: Bell Bridge ◦ Environmental Assessment: Black Diamond Bridge	◦ Wallbridge - Loyalist interchange modification ◦ Highway 37 interchange ramp modification
Intermediate 50,000 pop. (1 - 5 years)	◦ Arterial corridor protection studies for Sidney Township (College St. W., Bridge St. W. et al)	◦ East Arterial interchange ◦ East Arterial (401 -County Rd. 18) with extensions of University Ave. & College St. E. • Bell Bridge ◦ Bell Blvd. extension to Wallbridge-Loyalist Road ◦ Black Diamond Bridge
Long Term 60,000+ pop. (6 - 20 years)		• Highway 62 interchange reconstruction and widening • Highway 37 interchange reconstruction ◦ East Arterial grade separation at C.N.R. line ◦ East Arterial (College St. - Hwy 2) with extensions of Station St., Victoria Ave. and Bridge St. E. ◦ East Arterial extension to Hwy 37 ◦ Reconstruction of North Front Street ◦ Reconstruction of Suburban Road 30 (Sidney Street)

NOTE: Suggested staging of road improvements is preliminary and is dependent upon the progression of development within the urban area.

authority having jurisdiction. Several of the road improvements fall entirely under the jurisdiction of the Ministry of Transportation, Ontario. These are: interchange improvements at Wallbridge Loyalist Road, Highways 62 and 37 as well as the future widening of Highway 62.

The new East Arterial interchange is expected to provide access to a large industrial area. As a result a cost sharing arrangement will be necessary between the province, municipalities and local industry for the construction of this interchange.

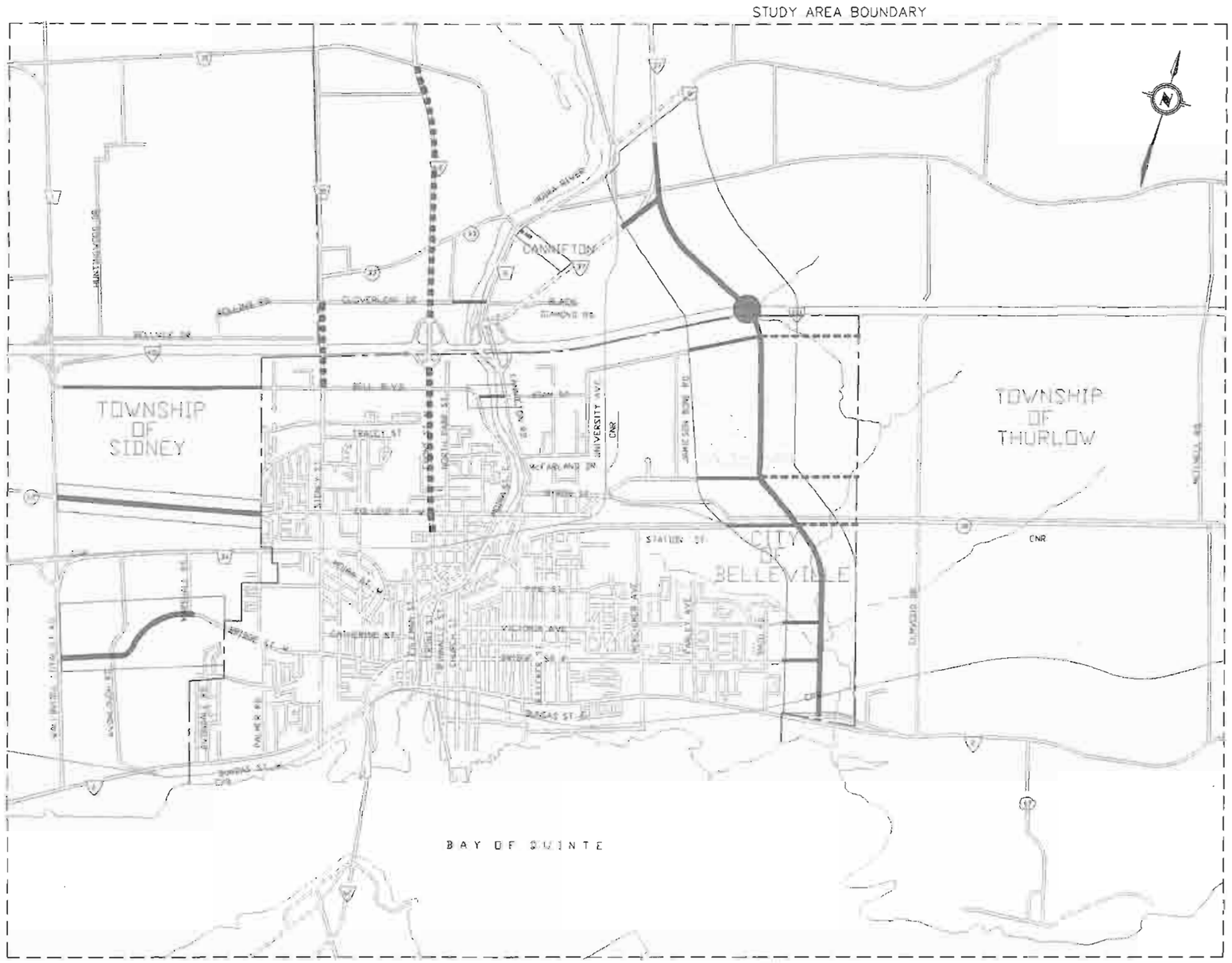
The remaining road improvements should be undertaken within the appropriate jurisdiction with cost sharing in conformity with existing subsidy programs. It is recommended that cost sharing arrangements be made as soon as possible to facilitate progression of the improvements.

A breakdown of costing for the various road improvements with the exception of road improvements funded entirely by the Ministry of Transportation are shown in Table 8.2. Road improvements, identified within this study as entirely the responsibility of the Ministry of Transportation, Ontario include: upgrading to ramps at Highway 401/ Wallbridge Loyalist Road and at Highway 401/Highway 37 interchanges, reconstruction of Highway 401 interchanges at Highways 62 and 37 and widening of Highway 62 north of Highway 401.

TABLE 8.2
Costing of Road Improvements

COMPONENT	COST (1) ($000) Interim (1-5 yrs)	Ultimate
401 Interchange (East Arterial) (2)	6,825	6,825
Black Diamond Bridge	5,000	5,000
Bell Bridge	4,030	4,030
Bell Boulevard Extension	1,200	5,240
East Arterial:		
Highway 401 - County Road 18	1,800	4,600 (3)
Highway 37 - Highway 401	0	4,210
C.N.R. Grade Separation	0	1,000
County Road 18 - Highway 2	0	6,140
TOTAL	1,800	15,950
Extension to East Arterial:		
University Avenue	540	1,070
College Street	480	940
Station Street	0	340
Victoria Avenue	0	850
Bridge Street East	0	850
TOTAL	1,020	4,050
Sidney Street Widening (4)	0	900
Reconstruction of North Front Street	0	2,800
TOTAL	**19,875**	**44,795**

(1) Interim costing is in accordance with immediate and 1-5 year staging and assumes construction of two-lane rural roads. Ultimate includes recommended road improvements built to ultimate urban standards.
(2) Costs shown are total costs and are subject to future cost sharing.
(3) Assumes 26m right-of-way dedicated by property owners and $100,000 allowance for additional property to provide 30m arterial right-of-way.
(4) Excludes Highway 401 flyover.



Hastings – Belleville Transportation Planning Study

LEGEND

- MUNICIPAL BOUNDARY
- HWY #401 INTERCHANGE
- EAST SIDE ARTERIAL
- PROPOSED EXTENSIONS
- STUDY AREA
- PROPOSED ROAD WIDENING
- PROTECTION OF RIGHT-OF-WAY FOR FUTURE ROAD EXTENSIONS
- INTERCHANGE IMPROVEMENTS

NOTE:

LOCATIONS OF EAST SIDE ARTERIAL, COLLEGE ST.– COUNTY RD. 22 AND BRIDGE ST. W. ARE CONCEPTUAL ONLY AND SUBJECT TO CHANGE FOLLOWING FUTURE STUDY.

1000m 0 1000m 2000m 3000m

Consult Engineering Limited

Future Network Components

Greer Galloway & Associates Ltd.

Figure 8.1

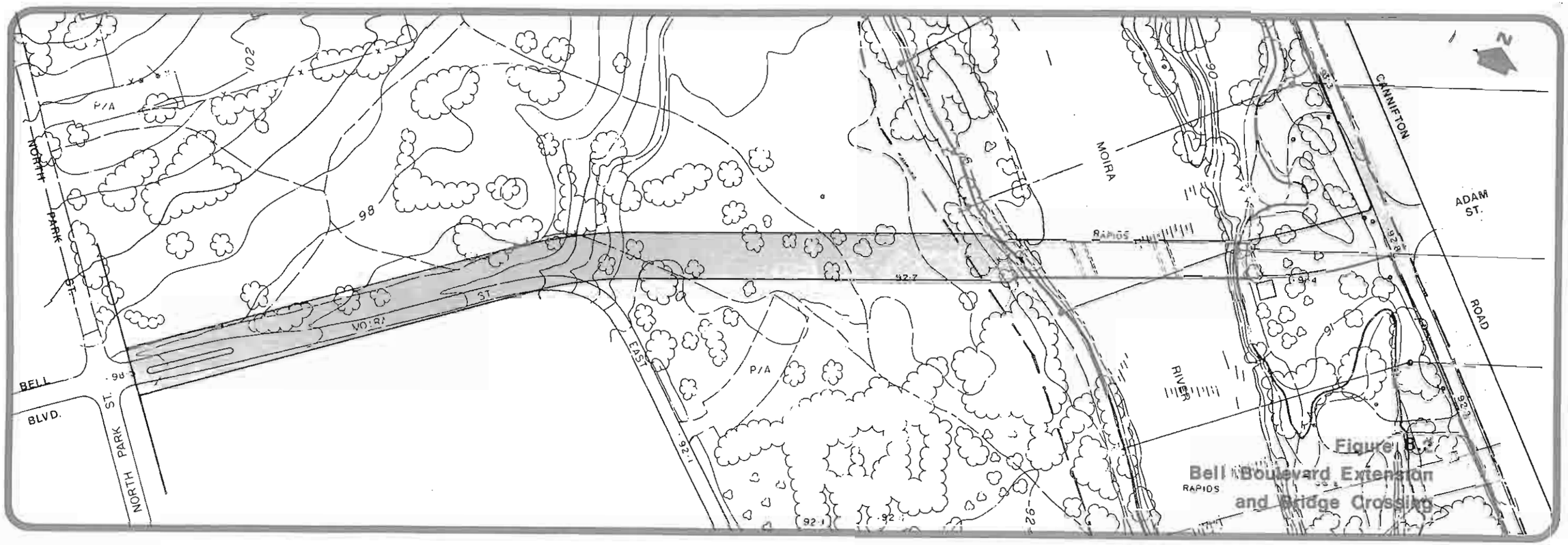


Figure 8.2
Bell Boulevard Extension
and Bridge Crossing

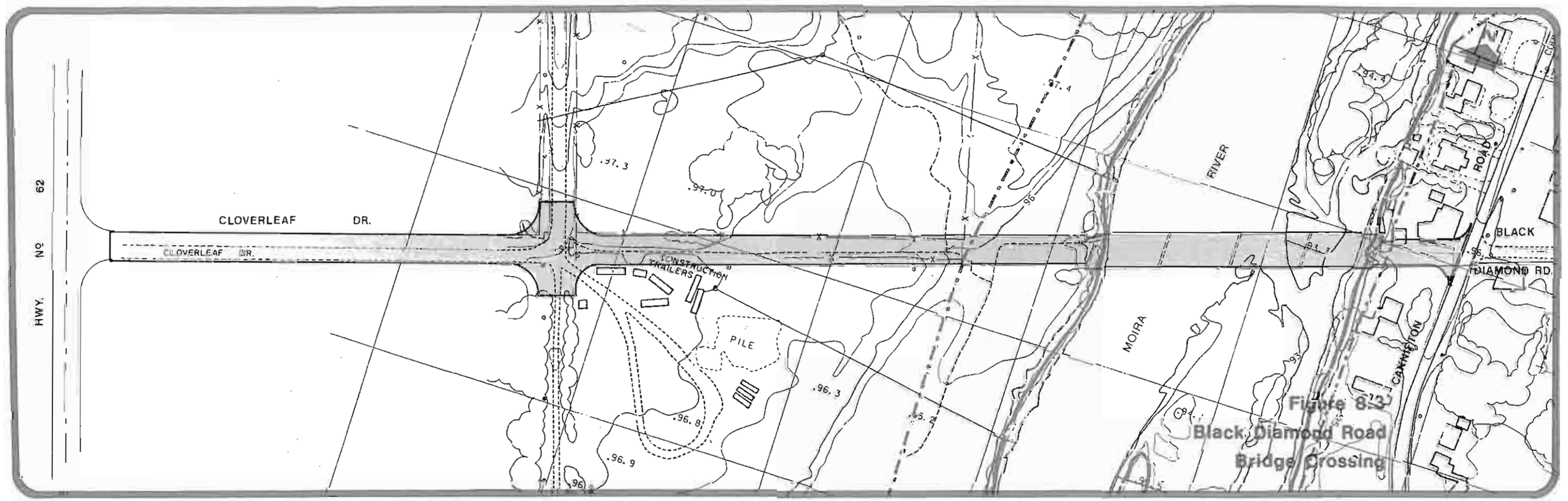
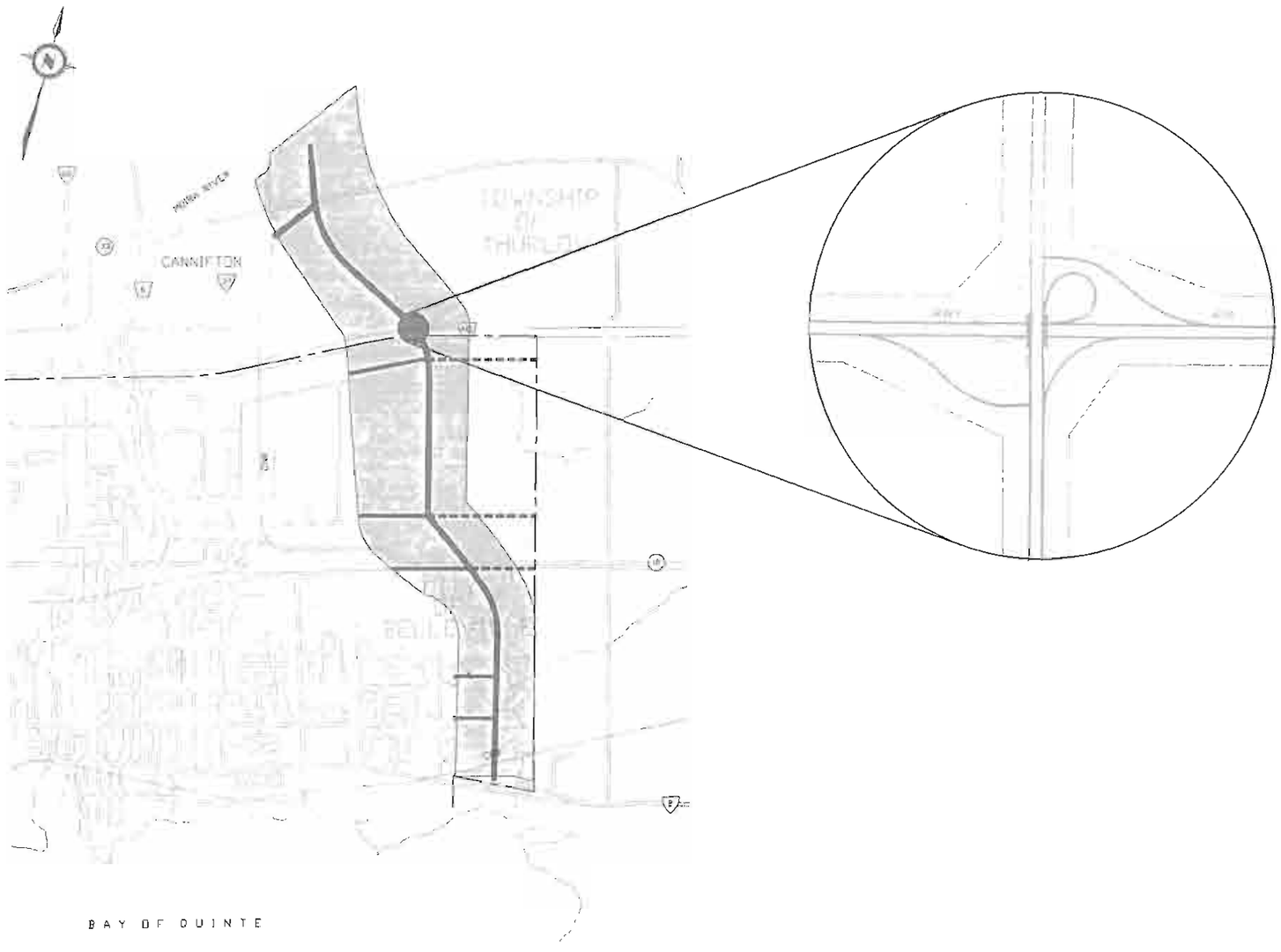


Figure 8.3
Black Diamond Road
Bridge Crossing



Hastings – Belleville Transportation Planning Study

LEGEND

- MUNICIPAL BOUNDARY
- HWY #401 INTERCHANGE
- EAST SIDE ARTERIAL
- PROPOSED EXTENSIONS
- STUDY AREA
- PROTECTION OF RIGHT-OF-WAY FOR FUTURE ROAD EXTENSIONS

NOTE:

LOCATION OF EAST SIDE ARTERIAL IS CONCEPTUAL ONLY AND SUBJECT TO CHANGE FOLLOWING FUTURE STUDY.

1000m 0 1000m 2000m 3000m

Consult Engineering Limited

East Side Arterial

Greer Galloway & Associates Ltd.

Figure 8.4

9 - Transportation Policies

Policy Options

Several policy options were examined in response to specific transportation issues. These included:

- roadway classification and jurisdiction
- access controls on classified roads
- reconstruction/widening of roads in developed areas
- rail consolidation
- intermunicipal public transit services

The following sections provide a brief overview of these policy alternatives.

Roadway Classification and Jurisdiction

Certain changes to roadway classifications are recommended as part of the staging of roadway improvements.

With completion of the east side arterial and extension of Station Street, it is recommended that Victoria Avenue be downgraded from an arterial to a collector in keeping with its residential nature. To maintain the functionality of the collectors, both Victoria Avenue and Bridge Street should not be extended east of the new East Arterial as classified roads.

With the new East Arterial extension from Highway 401 to existing Highway 37, it would be appropriate to designate the new facility as Highway 37. Existing Highway 37 from the East Arterial southerly to Highway 401 would be redesignated as a Suburban Road. Similarly, Suburban Road 6 would change to local jurisdiction.

Jurisdiction for the westerly extension of Bell Boulevard is recommended as a Suburban road.

Provision should be made for protection of future easterly road extensions east of the new East Arterial of University Avenue, College Street and Station Street. (Protection of right-of-way for an easterly road extension of County Rd. 33 should also be provided). As future development within the Township of Sidney is not yet clearly determined, protection of all current road crossings from the City of Belleville to the Township should be maintained, including Bridge St. W. and College St.

Access Controls

This analysis examined several different policy options for accesses to County/Suburban roads. These included:

- unlimited private access
- limits on private access
- public road access only (no private access)

Limits can be placed on private access at different levels including:

- limited only by safety concerns
- restricted to a specific number of entrances over a specific distance (e.g. 2 per 300 metres)
- ensuring minimum spacing of entrances (e.g. 300 metres (1000 ft.) between entrances)
- shared access, with adjacent properties using combined entrance

Private access can be eliminated completely, while still maintaining access links by:

- establishing parallel service roads, with private access to the service road only
- reverse frontages
- flankage accesses

This review recommended different approaches for urban or suburban road applications. For urban applications it is recommended that reverse frontage residential plans be established wherever possible. In commercial settings access should be spaced at least 150 metres (500 feet) apart.

In rural applications, it is recommended that access to local roads only be encouraged, and that private entrances, where required, be spaced a minimum of 150 metres (500 feet) for minor collector roads and 300 metres (1000 ft.) for major collector roads.

Reconstruction/Widening of Roads in Developed Areas

This policy review examined the specific issues relating to the Front/ Pinnacle Corridor. For Pinnacle Street, the following alternatives were reviewed:

- one way pair with Front
- one way pair with Church
- convert Front to two-way operation
- remove parking on Pinnacle Street
- five-lane operation
- do nothing

For North Front Street, the following alternatives were reviewed:

- fifth lane operation
- Sidney Street Interchange
- do nothing

For Pinnacle Street, the most viable option, from a technical viewpoint, would be to remove parking to allow four-lane operation. Removal could be staged to allow orderly replacement of lost parking. In addition, substantial spare capacity exists on parallel routes (Coleman, Church) to provide additional relief.

For North Front Street, five-lane operation is most practical. It will be costly to implement but desirable. The implementation should include acquisition of additional right-of-way. Several other transportation network changes have the potential to relieve traffic on North Front and defer the need for improvement. It is recommended that the right-of-way widening be acquired as redevelopment occurs and that widening to five lanes be undertaken when demand warrants.

Rail Consolidation

The issue of rail consolidation was addressed from a strictly transportation viewpoint. This review concluded that the current rail situation does not pose a serious constraint to traffic flows generally, however it does reduce the accessibility to the Belleville waterfront, which may restrict future development.

A significant safety issue was also identified, where proper access to the waterfront area can be seriously restricted or precluded by stopped trains on the tracks east of Pinnacle.

Intermunicipal Public Transit Services

Belleville Transit currently operates eight transit routes within the limits of the City of Belleville. No transit services are provided to the adjacent Townships with the exception of the Belleville Transit service to Loyalist College in Sidney Township.

Given the increasing development in the Townships, especially in the areas immediately north of the city, there will likely be increasing demand for transit services in these areas.

Transit routes should be designed from the passenger perspective, with attention to the origin-destination patterns of those demands, and without regard for municipal boundaries. Appropriate cost-sharing arrangements can be negotiated, in cooperation with the Ministry of Transportation, in order to accommodate these services.

Tourist Traffic

The Belleville area is subject to significant changes in travel patterns, largely as a result of seasonal tourist traffic. Major tourist travel patterns include

Railway crossing near bayfront area

trips to and from Prince Edward County to the south, and cottage areas to the north. There are also summer increases in stop-off traffic from Highway 401 at each of the major interchanges.

The major issue in controlling the routing of tourist traffic is the volume of traffic between Highway 401 and Prince Edward County having the greatest impact on area traffic. Options for directing tourist traffic are somewhat limited as it is impossible to apply restrictions to tourist vehicles. The traffic therefore is easiest to direct through highway signage.

Tourist traffic to or from the west could be provided with alternative route identification utilizing Wallbridge-Loyalist Road and Highway 2 (Dundas), resulting in reduced impact the downtown area of Belleville. This routing however has a negative impact on Belleville Area business as it limits their exposure to passby trips. With the construction of the east-side arterial, eastbound traffic could be diverted in a similar fashion. Alternate tourist routing informational signs are not recommended at this time.

Truck Routes/Dangerous Goods

During the origin-destination study a sampling of trucks and their contents indicated the absence of dangerous goods being transported into or through the study area. Therefore the issue of truck routing merely relates to balancing convenience to truck carriers versus traffic and residential impacts.

The policy review considered several important factors.

- trucks are not desirable on all streets
- trucks must have reasonably convenient access to their markets
- municipalities cannot restrict truck access to Provincial highways

The following options were reviewed.

- Do nothing
- Truck restrictions
- Comprehensive truck routing plan

In the Belleville study area appropriate truck routes might include:

- Highways 2, 37 and 62
- Cannifton Road, College, Sidney to connect Hwy. 401 to Hwy 2
- North Front and West Moira

Specific restrictions to through travel might include:

- Pinnacle Street
- Front Street
- Coleman Street

Belleville Transit vehicle

Complete restrictions to all truck traffic might include:

- Victoria Avenue
- Bridge Street
- Specific residential streets

At this time it is recommended that truck restrictions only be applied on specific streets where undesirable impacts are identified.

Appendices

Appendix A

Data Collection

TABLE A1
Automatic Traffic Recorder Counts

STATION

PERIOD ENDING	1	2	3	* 4	5	6	7	* 8	9	10	11	12
12:00 AM	84	N/A	77	629	142	100	49	71	212	202	79	67
1:00	36	N/A	85	409	139	69	21	35	130	124	84	56
2:00	17	N/A	58	385	408	33	4	16	108	100	60	47
3:00	19	N/A	29	200	22	33	10	8	49	30	17	13
4:00	29	N/A	25	184	27	38	11	102	31	53	12	10
5:00	98	N/A	75	57	207	40	35	223	17	10	15	8
6:00	1,219	N/A	155	38	405	287	149	312	13	12	9	5
7:00	2,685	N/A	200	21	765	649	281	390	194	167	13	10
8:00	1,177	N/A	555	326	870	1,319	316	N/A	386	360	158	130
9:00	997	N/A	592	458	616	885	208	N/A	480	412	214	200
10:00	938	N/A	403	733	N/A	846	178	N/A	590	533	212	195
11:00	860	N/A	391	892	576	781	212	211	560	521	200	183
12:00 PM	944	N/A	376	600	814	849	248	224	620	590	305	204
1:00	1,011	N/A	280	580	876	907	214	262	623	600	469	350
2:00	1,323	N/A	440	811	848	1,078	271	342	830	603	248	208
3:00	1,140	N/A	473	890	861	1,186	350	361	641	580	217	190
4:00	1,168	N/A	516	801	1,036	1,376	428	503	864	691	251	210
5:00	917	N/A	740	875	1,059	1,123	288	568	893	697	343	240
6:00	730	N/A	561	1,128	866	756	165	400	842	703	317	216
7:00	550	N/A	523	1,016	682	636	132	213	631	621	400	281
8:00	444	N/A	312	964	544	527	100	176	1,644	630	380	264
9:00	437	N/A	201	788	518	492	83	102	523	512	1,374	243
10:00	237	N/A	212	776	321	361	56	100	498	481	408	230
11:00	173	N/A	175	643	257	276	62	83	296	266	163	117
24-HOUR	17,233	6,200	7,434	14,164	N/A	* 14,827	3,859	N/A	11,495	9,498	5,938	3,677

STATION

PERIOD ENDING	13	14	15	* 18	17	18	19	20	21	22	* 23	24
12:00 AM	50	75	11	16	120	168	40	145	21	151	53	68
1:00	71	84	4	11	58	93	24	71	10	94	32	52
2:00	58	60	3	8	13	45	3	45	18	65	20	48
3:00	20	22	2	4	21	58	4	27	30	20	30	32
4:00	13	11	1	3	26	47	4	33	12	17	16	50
5:00	17	20	4	8	105	76	13	54	24	16	130	47
6:00	7	5	26	25	594	354	93	344	175	95	231	207
7:00	13	10	39	69	1,079	988	200	887	249	210	372	518
8:00	284	291	44	154	1,193	1,438	209	1,243	263	568	541	838
9:00	191	203	25	112	793	1,192	130	881	308	745	502	892
10:00	186	195	27	75	870	1,199	125	822	275	602	360	555
11:00	170	185	38	56	763	1,434	153	858	210	553	343	568
12:00 PM	203	217	44	66	802	1,549	175	944	157	670	332	778
1:00	412	400	26	77	926	1,600	136	1,001	181	671	354	883
2:00	300	313	39	69	706	1,373	204	1,031	231	693	361	846
3:00	213	330	75	96	1,102	1,558	275	1,223	289	673	443	913
4:00	219	339	67	133	1,177	1,613	312	1,566	305	761	560	945
5:00	306	316	54	178	978	1,362	245	1,218	410	810	821	832
6:00	277	291	31	129	685	1,009	135	794	412	820	951	514
7:00	298	308	26	100	535	792	140	697	268	671	740	471
8:00	290	310	23	73	589	704	107	481	149	541	320	304
9:00	284	303	43	65	554	648	106	458	128	339	222	301
10:00	303	318	9	39	353	493	71	334	100	400	131	197
11:00	140	165	17	28	246	298	69	267	75	278	71	116
24-HOUR	4,345	4,771	675	* 1,622	14,288	19,991	2,973	15,402	4,300	10,463	* 7,935	10,976

* ATR Counts are for one-way only
N/A Indicates counts not available

TABLE A2
Roadside Origin-Destination Survey Sample Size

Station	Number of Interviews	Traffic Count	Sample Size (%)
Bay Bridge	466	1597	29
Hwy. 2 West of Belleville	457	1313	35
West Moira Street	321	672	48
Wallbridge-Loyalist Road NB	268	622	43
Wallbridge-Loyalist Road SB	177	376	47
Highway 62	418	1349	31
Highway 37	382	704	54
County Road 6	86	109	79
County Road 18	83	98	85
Highway 2: East of Belleville	455	760	60
Hwy. 401/62 East to South Ramp	260	460	57
Hwy. 401/62 West to South Ramp	119	178	67
Hwy. 401/62 West to North Ramp	231	432	53
Hwy. 401/62 East to North Ramp	64	80	80
Hwy. 401/37 East to South Ramp	183	330	55
Hwy. 401/37 West to South Ramp	37	48	77
Hwy. 401/37 East to North Ramp	65	78	83
Hwy. 401/37 East to North Ramp	166	314	53
TOTAL	4238	9520	45

TABLE A3
Shopping Centre Questionnaire Survey Results

Shopping Centre	Surveys Distributed	Surveys Returned	Response Rate	Exit Count	Sample Size
Quinte Mall	1,375	411	30%	8,634	4.7%
Belleville Plaza	1,153	365	32%	3,196	11.4%
TOTAL	2,528	776	31%	11,830	6.5%

TABLE A4
Existing Land Use

LAND USE CATEGORY	UNITS	ZONES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
RESIDENTIAL																											
◦ SINGLE FAMILY DETACHED	units	591	26	967	297	1,411	606	13	334	4	7	94	93	0	884	1,408	1,473	7	132	206	33	254	126	215	67	299	9,547
◦ LOW RISE APARTMENT	units	333	24	1,270	198	559	425	156	112	0	0	74	174	0	329	102	371	31	58	66	0	0	0	20	0	10	4,312
◦ HIGH RISE APARTMENT	units	1,013	0	112	0	0	0	0	0	0	0	0	0	211	157	252	147	0	87	0	0	0	0	0	0	0	1,979
◦ MOBILE HOME PARK	units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19
◦ FARM	units	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	17	19	15	82
Sub-Total Residential		**1,937**	**50**	**2,349**	**495**	**1,970**	**1,031**	**169**	**446**	**4**	**18**	**168**	**267**	**211**	**1,370**	**1,762**	**1,991**	**38**	**277**	**272**	**33**	**254**	**126**	**252**	**88**	**343**	**15,919**
INSTITUTIONAL																											
◦ HOSPITAL	beds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	431	0	0	0	0	0	0	0	0	0	0	431
◦ NURSING HOME	beds	910	0	26	0	0	145	0	0	0	0	0	0	0	0		59	0	0	294	0	0	0	8	0	0	1,442
Sub-Total Institutional		**910**	**0**	**26**	**0**	**0**	**145**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**431**	**59**	**0**	**0**	**294**	**0**	**0**	**0**	**8**	**0**	**0**	**1,873**
EDUCATIONAL																											
◦ ELEMENTARY SCHOOL	students	891	0	364		850	622	0	137	0	0	0	0	0	884	779	672	0	0	578	0	0	151	470	0	123	6,521
◦ HIGH SCHOOL	students	1,073	0	230*	0	873	0	0	0	0	0	0	0	0	1,826	0	798	0	0	0	0	0	0	0	0	0	4,800
◦ COMMUNITY COLLEGE	students	0	0	0	0	0	0	0'	0	0	0	0	0	0	130	0	0	0	0	2,500*	0	0	0	0	0	0	2,630
Sub-Total Educational		**1,964**	**0**	**594**	**0**	**1,723**	**622**	**0**	**137**	**0**	**0**	**0**	**0**	**0**	**2,840**	**779**	**1,470**	**0**	**0**	**3,078**	**0**	**0**	**151**	**470**	**0**	**123**	**13,951**
RECREATIONAL																											
◦ PARK	acres	487.9	848.1	33.2	.0	.0	343.6	415.3	36.0	100.7	.0	77.1	5.3	.0	40.1	104.2	137.1	158.1	120.6	.0	.0	.0	.0	.0	.0	14.8	2,922.1
◦ MOTEL	rooms	18	125	0	0	0	102	281	0	0	0	0	0	0	0	0	0	0	0	14	0	30	0	0	0	0	570
COMMERCIAL/RETAIL																											
◦ SHOPPING CENTRE	K sq. ft.	88.3	.0	6.5	3.9	10.3	65.4	706.7	12.6	.0	.0	.0	.0	.0	3.4	.0	252.3	.0	80.4	119.9	.0	.0	60.3	.0	.0	.0	1,409.9
◦ GENERAL RETAIL	K sq. ft.	6.0	103.4	32.2	45.6	103.5	119.0	77.2	14.2	.0	.0	.0	72.2	312.4	10.9	12.4	59.4	28.3	68.3	36.9	53.6	8.7	168.4	20.2	.0	17.4	1,370.3
Sub-Total Commercial		**94.3**	**103.4**	**38.7**	**49.5**	**113.8**	**184.4**	**783.8**	**26.8**	**.0**	**.0**	**.0**	**72.2**	**312.4**	**14.3**	**12.4**	**311.7**	**28.3**	**148.7**	**156.8**	**53.6**	**8.7**	**228.7**	**20.2**	**.0**	**17.4**	**2,780.2**
OFFICE/INDUSTRIAL																											
◦ MEDICAL OFFICE	K sq. ft.	6.7	.0	.0	2.4	.0	.9	.0	.0	.0	.0	.0	.6	7.5	14.0	5.5	3.3	.0	21.2	5.2	.0	.0	.0	.0	.0	.0	67.3
◦ GENERAL OFFICE	K sq. ft.	22.5	12.1	9.2	3.3	51.6	30.1	40.5	2.4	73.9	.0	11.3	13.2	220.0	121.0	81.1	105.7	.0	29.9	2.2	.0	9.5	61.5	4.9	.0	.0	905.7
◦ GENERAL INDUSTRIAL	K sq. ft.	130.5	2.7	91.4	64.0	87.1	2.4	154.6	239.0	142.8*	.0	144.9*	31.0	.0	.0	21.7#	72.1	30.2#	84.6	15.8	.6#	94.0	77.1*	85.5*	.0	48.7	1,620.8
◦ GENERAL WAREHOUSE	K sq. ft.	27.4	.0	125.8	19.1	.0	.0	59.1	10.8	30.1	.0	45.4	65.5	.0	.0	.0	7.5	5.7	82.5	32.9	.0	4.8	59.2	7.0	.0	.0	582.9
◦ GENERAL AGRICULTURAL	K sq. ft.	.0	.0	.0	18.9	.0	.0	.0	.0	.0	.0	.0	3.4	.0	.0	.0	.0	.0	11.8	1.4	4.0	19.2	7.4	13.5	.0	.0	79.7
Sub-Total Office/Industrial		**187.2**	**14.8**	**226.3**	**107.6**	**138.7**	**33.4**	**254.2**	**252.2**	**246.9**	**.0**	**201.6**	**113.7**	**227.5**	**134.9**	**106.3**	**188.6**	**35.9**	**230.0**	**57.6**	**4.6**	**127.5**	**205.2**	**110.9**	**.0**	**48.7**	**3,256.4**
SPECIAL USES																											
◦ CHURCH	K sq. ft.	21.6	.0	34.5	3.9	13.5	21.0	.0	.0	.0	.0	.0	.0	N/A	19.4	10.5	51.7	.0	.6	126.9	.0	16.3	6.5	11.5	.0	7.1	344.9
◦ ARENA/AUDITORIUM	K sq. ft.	26.1	.0	7.6	8.8	.0	.0	.0	58.1	.0	.0	.0	10.8	N/A	.0	36.1	1.7	.0	4.7	.0	.0	2.4	3.2	7.5	.0	11.0	179.9
◦ HEALTH CLUB	K sq. ft.	.0	29.1	3.8	.0	.0	.0	.0	.0	.0	.0	.0	7.5	.0	.0	.0	32.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	72.7
◦ SELF-STORAGE RENTAL	K sq. ft.	6.8	.0	.0	.0	5.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	26.7	.0	.0	.0	.0	.0	.0	38.9
◦ P.U.C. METER STATION	K sq. ft.	8.2	.0	.0		.0	.0	.0	.0	.0	.0	.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	9.7
◦ AMBULANCE/FIRE/POLICE	K sq. ft.	.0	.0	.0	9.3	.0	.0	9.7	.0	.0	.0	.0	.0	N/A	.0	4.3	.0	.0	16.4	.0	.0	4.8	.0	.0	.0	1.6	46.0
◦ FUNERAL HOME	K sq. ft.	.0	.0	20.0	18.6	.0	.0	.0	.0	.0	.0	.0	.0	N/A	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	38.6
◦ POST OFFICE	K sq. ft.	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	N/A	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4	.0	.0	.4
◦ CEMETARY	K sq. ft.	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	68.5	.0	.0	.0	.0	.0	.0	68.5
Sub-Total Special Uses		**64.6**	**29.1**	**65.9**	**40.5**	**18.8**	**21.0**	**9.7**	**58.1**	**.0**	**.0**	**.0**	**19.8**	**.0**	**19.4**	**50.8**	**85.7**	**.0**	**21.6**	**222.0**	**.0**	**23.5**	**9.7**	**19.5**	**.0**	**19.7**	**799.6**

* Includes 180 residents

* plus 95.6 ac.

* plus 14.3 ac.

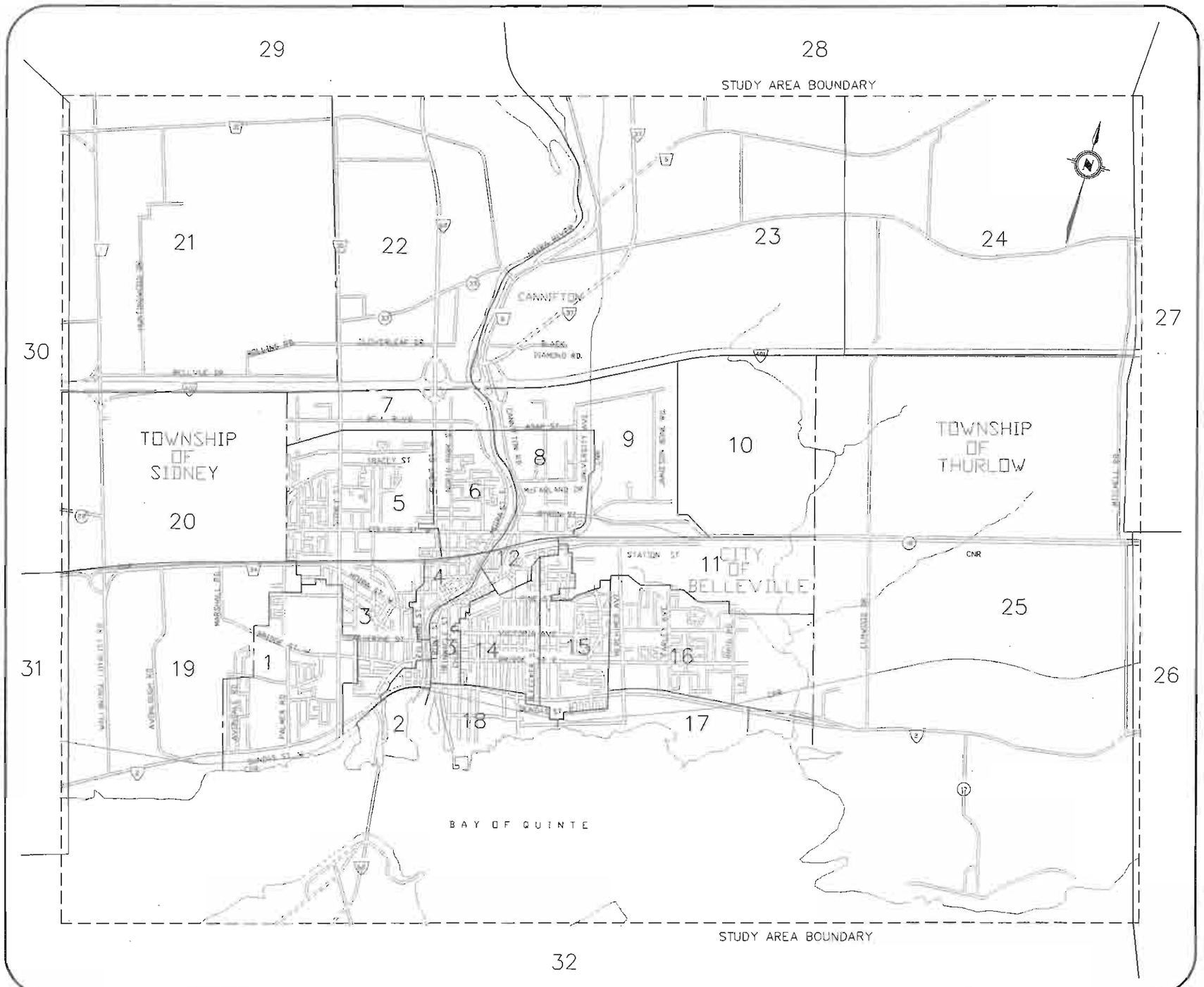
*Non-retail figures are estimated

based on 1000 sq.ft. per employee

* plus 3000 night students

* plus 15 a* plus 44 ac.

Hastings – Belleville Transportation Planning Study



LEGEND

MUNICIPAL BOUNDARY	
STUDY AREA BOUNDARY	
INTERNAL TRAFFIC ZONES	1–25
EXTERNAL TRAFFIC ZONES	26–32

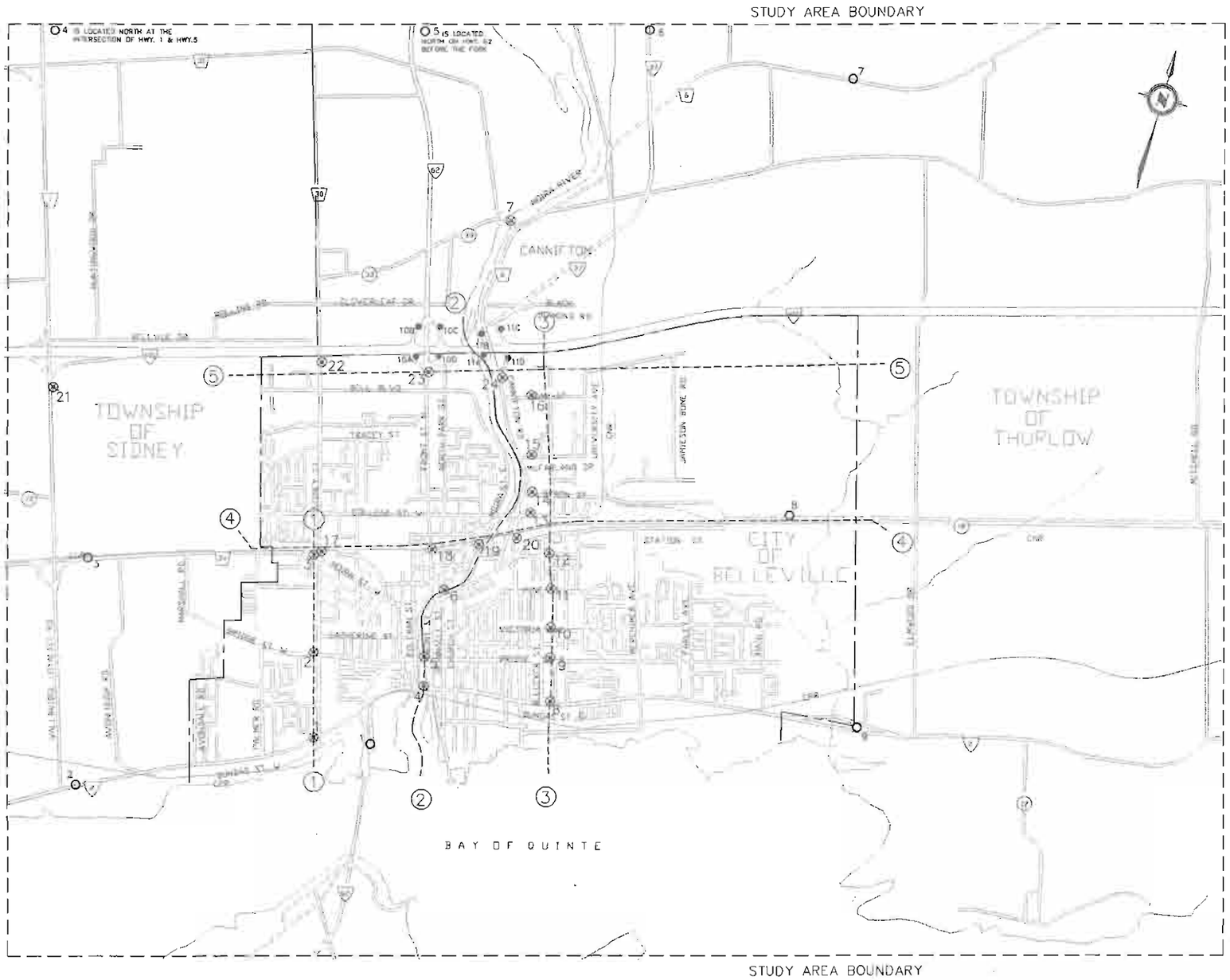
1000m 0 1000m 2000m 3000m

Consult Engineering Limited

Traffic Zones

Greer Galloway & Associates Ltd.

Figure A1



Hastings – Belleville Transportation Planning Study

LEGEND

- MUNICIPAL BOUNDARY
- STUDY AREA BOUNDARY
- SCREENLINES
- ORIGIN – DESTINATION SURVEY LOCATIONS
- AUTOMATIC TRAFFIC RECORDER LOCATIONS

1000m 0 1000m 2000m 3000m

Consult Engineering Limited

Traffic Count Locations

Greer Galloway & Associates Ltd.

Figure A2

Appendix B

Population and Employment Forecasts

TABLE B1
Population and Employment Forecasts

Municipality	Year	Total Population	Persons per Household	Percent Increase
Belleville, City	1976	35,311		
	1981	34,923	2.6	(1.1)
	1986	36,041	2.5	3.2
Sidney Township	1976	15,307		
	1981	16,086	3.4	5.1
	1986	16,263	3.0	1.1
Thurlow Township	1976	6,150		
	1981	6,513	3.2	5.9
	1986	6,688	3.1	2.7
Hastings County	1976	105,837		
	1981	106,883	2.9	1.0
	1986	109,352	2.7	2.3
Province of Ontario	1976	8,264,465		
	1981	8,625,107	2.9	4.4
	1986	9,101,694	2.8	5.5

Source: Census of Canada, 1981-1986

TABLE B2
New Population Growth

		LOW FORECAST			MOST PROBABLE FORECAST			HIGH FORECAST		
TRAFFIC ZONE	CURRENT POP. (1989)	0 - 5 Yrs.	6 - 10 Yrs.	11 - 20 Yrs.	0 - 5 Yrs.	6 - 10 Yrs.	11 - 20 Yrs.	0 - 5 Yrs.	6 - 10 Yrs.	11 - 20 Yrs.
Belleville										
1	4,736	150	175		356	200		556		
2	130									
3	5,807	125	115		362			362		
4	1,287									
5	4,822		425		241	500		641	1,510	1,500
6	2,681									
7	439	100	250		200	300			500	1,200
8	1,160	337	214		610	423		1,533		
9	10									
10	47									
11	437	300	200	625	1,000	300	1,276	1,500	1,022	500
12	694									
13	549									
14	3,562	58			58			58		
15	4,481									
16	5,033	122			122			122	1,944	
17	99									
18	720	29			29			29		
	36,694	**1,221**	**1,379**	**625**	**2,978**	**1,723**	**1,276**	**4,801**	**4,976**	**3,200**
Sidney										
19	707	200	400	478	30	300	3,372	1,500	1,600	5,029
20	86	5	10	20	5	100	400	300	400	375
21	660	26	27	30	26	27	30	26	100	150
	1,453	**231**	**437**	**528**	**61**	**427**	**3,802**	**1,826**	**2,100**	**5,554**
Thurlow										
22	328	1,500	1,200	350	2,500	2,000	900	3,200	3,600	1,200
23	655	100		450	200		1,350	300	200	1,500
24	224	23	27	29	23	27	29	23	27	29
25	892	150			282			282		
	2,099	**1,773**	**1,227**	**829**	**3,005**	**2,027**	**2,279**	**3,805**	**3,827**	**2,729**
TOTAL	**40,246**	**3,225**	**3,043**	**1,982**	**6,044**	**4,177**	**7,357**	**10,432**	**10,903**	**11,483**

TABLE B3
Employment Growth

		LOW FORECAST			MOST PROBABLE FORECAST			HIGH FORECAT		
TRAFFIC ZONE	CURRENT (1989) EMPLOYMENT	0 - 5 YRS.	6 - 10 YRS.	11 - 20 YRS.	0 - 5 YRS.	6 - 10 YRS.	11 - 20 YRS.	0 - 5 YRS.	6 - 10 YRS.	11 - 20 YRS.
Belleville										
1	1,484	130	100	100	200	100	100	200	100	100
2	636	50			50			50		
3	848								75	
4	659									
5	1,060									
6	911									
7	4,030	190	175	150	300	200	150	400	300	150
8	1,261									
9	1,012	200	150	150	250	150	100	300	200	150
10	0	1,700		104	1,700	150	300	1,700	1,200	1,736
11	895				50			50		
12	647									
13	2,333	50	50		50			50	100	
14	857								100	
15	1,364		75			100			100	
16	1,909		50			50			100	
17	212									
18	1,093					100	113		200	300
	21,211	**2,320**	**600**	**504**	**2,600**	**850**	**763**	**2,750**	**2,475**	**2,436**
Sidney										
19	341				75	100	100	75	100	100
20	117	200	150	249	350	200	493	350	200	493
21	268					50			150	275
	726	200	150	249	425	350	593	425	450	868
Thurlow										
22	682	200	600		500	700	200	700	1,700	800
23	231	50	200		250	300	233	250	500	316
24	40									
25	97		54		50	75		50	100	
	1,050	**250**	**854**	**0**	**800**	**1,075**	**433**	**1,000**	**2,300**	**1,116**
TOTAL	**22,987**	**2,770**	**1,604**	**753**	**3,825**	**2,275**	**1,789**	**4,175**	**5,225**	**4,420**

Appendix C

Model Development

Trip Generation Equations

Trip generation equations were developed for each of the trip purposes (home-based work, home-based other, non home-based) using the following inputs:

- dwelling units
- population
- retail employment
- non-retail employment
- total employment

Data inputs were limited by the availability of data and the generation equation constraints of the computer modelling package. However, the limited nature of the inputs was somewhat advantageous in that it allowed easy updating for all zones throughout the course of the study.

The results of regression analysis produced the following trip generation equations for attractions to internat study zones, generated within the study area:

- home-based work trips = $1.238 \times E_t$
- home-based other trips = $0.74\ DU + 0.07 \times E_o + 1.01 \times E_r$
- non home-based trips = $0.186 \times P_{op} + 0.482 \times E_r \times E_o$

where:

DU	=	dwelling units
P_{op}	=	population
E_r	=	retail employment
E_o	=	non-retail (other) employment
E_t	=	total employment

The modelling package used in the study does not require trip production figures (used in calculating the trip table) and the trip purpose splits are defined by the user. The productions and attractions are then balanced prior to trip assignment.

Based on the equations above, total trip attractions were calculated and compared to the survey attractions. Total attractions derived from the equations equal 104,526 trips, compared to 104,528 from the survey results.

TABLE C1
Comparison of Screenline ATR Counts to Adjusted Origin-Destination Survey Crossings

Screenline	ATR Count	Survey Crossings	Ratio
1	36,700	36,505	0.99
2	62,500	62,350	0.99
3	46,900	46,800	0.99
4	56,000	56,500	1.01
5	45,500	46,010	1.01

TABLE C2
Comparison of Observed Screenline Volumes to Modelled Screenline Volumes

Screenline	Observed Volume	Modelled Volume	Ratio
1	36,700	35,976	0.98
2	62,500	61,293	0.98
3	46,900	46,737	1.00
4	56,000	55,826	1.00
5	45,500	44,315	0.97

TABLE C3
External and Through Trips Table

		DESTINATION ZONES																																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	SUB-TOTAL	26	27	28	29	30	31	32	SUB-TOTAL	TOTAL
ORIGIN ZONES	1																											65	174	177	1122	535	169	588	2830	2830
	2																											10	17	28	111	136	94	135	531	531
	3																											66	183	98	432	364	121	443	1707	1707
	4																											8	73	62	297	138	52	82	712	712
	5																											35	141	156	417	348	98	362	1557	1557
	6																											33	246	190	458	470	145	297	1839	1839
	7																											78	651	670	1828	1612	485	722	6046	6046
	8																											16	129	36	337	268	65	169	1020	1020
	9																											5	121	22	197	362	0	58	765	765
	10																											0	0	0	0	0	0	0	0	0
	11																											0	14	0	42	46	0	17	119	119
	12																											0	85	46	61	173	50	82	497	497
	13																											99	220	339	787	1139	564	906	4054	4054
	14																											128	238	168	510	539	186	599	2368	2368
	15																											65	242	246	576	371	149	372	2021	2021
	16																											183	375	230	755	641	261	678	3123	3123
	17																											0	6	6	0	0	0	0	12	12
	18																											0	146	52	139	200	39	252	828	828
	19																											39	84	167	625	646	148	403	2112	2112
	20																											0	15	0	157	22	9	30	233	233
	21																											5	5	0	133	0	7	12	162	162
	22																											251	106	176	365	250	20	138	1306	1306
	23																											20	100	82	144	247	47	105	745	745
	24																											0	0	27	11	14	7	0	59	59
	25																											5	47	27	19	127	40	69	334	334
	SUB-TOTAL																											1111	3418	3005	9523	8648	2756	6519	34980	34980
	26	65	10	66	8	35	33	78	16	5	0	0	0	99	128	65	183	0	0	39	0	5	251	20	0	5	1111	0	0	7	63	89	24	73	256	1367
	27	174	17	183	73	141	246	651	129	121	0	14	85	220	238	242	375	6	146	84	15	5	106	100	0	47	3418	0	0	106	475	1737	127	164	2609	6027
	28	177	28	98	62	156	190	670	36	22	0	0	46	339	168	246	230	6	52	167	0	0	176	82	27	27	3005	7	106	0	39	421	78	186	837	3842
	29	1122	111	432	297	417	458	1828	337	197	0	42	61	787	510	576	755	0	139	625	157	133	365	144	11	19	9523	63	475	39	0	1019	305	416	2317	11840
	30	535	136	364	138	348	470	1612	268	362	0	46	173	1139	539	371	641	0	200	646	22	0	250	247	14	127	8648	89	1737	421	1019	0	190	558	4014	12662
	31	169	94	121	52	98	145	485	65	0	0	0	50	564	186	149	261	0	39	148	9	7	20	47	7	40	2756	24	127	78	305	190	0	495	1219	3975
	32	588	135	443	82	362	297	722	169	58	0	17	82	906	599	372	678	0	252	403	30	12	138	105	0	69	6519	73	164	186	416	558	495	0	1892	8411
	SUB-TOTAL	2830	531	1707	712	1557	1839	6046	1020	765	0	119	497	4054	2368	2021	3123	12	828	2112	233	162	1306	745	59	334	34980	256	2609	837	2317	4014	1219	1892	13144	48124
	TOTAL	2830	531	1707	712	1557	1839	6046	1020	765	0	119	497	4054	2368	2021	3123	12	828	2112	233	162	1306	745	59	334	34980	1367	6027	3842	11840	12662	3975	8411	48124	83104

TABLE C4
Internal (Home-Based Work) Trip Table

ZONES		DESTINATION																							SUB-TOTAL	26	27	28	29	30	31	32	SUB-TOTAL	TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25										
ZONES	1	0	16	307	53	512	179	27	80	53	5	24	11	88	192	456	253	19	37	131	11	53	203	272	0	93	3075									3075
	2	16	0	8	0	19	0	3	8	3	0	0	3	8	13	11	5	11	5	3	0	0	3	8	0	3	130									130
	3	307	8	0	37	48	32	43	45	56	0	45	13	107	43	312	32	67	40	43	8	27	19	83	0	16	1431									1431
	4	53	0	37	0	24	0	11	3	8	0	13	13	43	11	109	3	19	16	5	5	5	3	19	0	3	403									403
	5	512	19	48	24	0	35	40	8	93	0	37	27	128	40	443	48	109	35	53	8	29	37	96	0	19	1888									1888
	6	179	0	32	0	35	0	8	40	61	0	16	8	43	5	141	13	51	19	27	5	8	3	45	0	5	744									744
	7	27	3	43	11	40	8	0	13	5	0	3	3	5	21	19	21	3	3	5	0	3	8	19	0	5	268									268
	8	80	8	45	3	8	40	13	0	32	0	16	8	29	0	96	0	56	13	5	16	5	3	37	16	0	529									529
	9	53	3	56	8	93	61	5	32	0	0	3	5	8	59	64	32	0	5	19	3	13	16	59	0	11	608									608
	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10									10
	11	24	0	45	13	37	16	3	16	3	0	0	3	0	19	48	27	5	3	3	0	3	11	16	0	3	298									298
	12	11	3	13	13	27	8	3	8	5	0	3	0	5	13	32	5	13	3	8	0	3	5	13	0	0	194									194
	13	88	8	107	43	128	43	5	29	8	0	0	5	0	83	67	69	3	3	40	3	8	27	61	0	21	849									849
	14	192	13	43	11	40	5	21	0	59	0	19	13	83	0	432	93	53	32	75	13	16	21	40	0	13	1287									1287
	15	456	11	312	109	443	141	19	96	64	5	48	32	67	432	0	549	83	61	168	16	40	176	272	8	107	3715									3715
ORIGIN	16	253	5	32	3	48	13	21	0	32	0	27	5	69	93	549	0	109	40	93	0	3	3	35	0	8	1441									1441
	17	19	11	67	19	109	51	3	56	0	0	5	13	3	53	83	109	0	8	27	0	16	13	32	0	21	718									718
	18	37	5	40	16	35	19	3	13	5	0	3	3	3	32	61	40	8	0	11	0	8	11	21	0	21	395									395
	19	131	3	43	5	53	27	5	5	19	0	3	8	40	75	168	93	27	11	0	8	8	35	24	0	3	794									794
	20	11	0	8	5	8	5	0	16	3	0	0	0	3	13	16	0	0	0	8	0	3	11	3	0	3	116									116
	21	53	0	27	5	29	8	3	5	13	0	3	3	8	16	40	3	16	8	8	3	0	5	13	0	0	269									269
	22	203	3	19	3	37	3	8	3	16	0	11	5	27	21	176	3	13	11	35	11	5	0	13	0	0	626									626
	23	272	8	83	19	96	45	19	37	59	0	16	13	61	40	272	35	32	21	24	3	13	13	0	0	13	1194									1194
	24	0	0	0	0	0	0	0	16	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	24									24
	25	93	3	16	3	19	5	5	0	11	0	3	0	21	13	107	8	21	21	3	3	0	0	13	0	0	368									368
SUB-TOTAL		3075	130	1431	403	1888	744	268	529	608	10	298	194	849	1287	3715	1441	718	395	794	116	269	626	1194	24	368	21374									21374
	26																																		
	27																																		
	28																																		
	29																																		
	30																																		
	31																																		
	32																																		
SUB-TOTAL																																			
TOTAL		3075	130	1431	403	1888	744	268	529	608	10	298	194	849	1287	3715	1441	718	395	794	116	269	626	1194	24	368	21374									21374

TABLE C5
Internal Trip Table

ZONES		DESTINATION																							SUB-							SUB-	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL	26	27	28	29	30	31	32	TOTAL	TOTAL
ZONES	1	0	34	659	115	1101	384	900	172	115	11	52	23	189	413	980	826	40	80	281	23	115	436	585	0	201	7735									7735
	2	34	0	17	0	40	0	52	17	6	0	0	6	17	29	23	29	23	11	6	0	0	6	17	0	6	339									339
	3	659	17	0	80	103	69	1021	97	120	0	97	29	229	92	671	218	143	86	92	17	57	40	178	0	34	4149									4149
	4	115	0	80	0	52	0	69	6	17	0	29	29	92	23	235	23	40	34	11	11	11	6	40	0	6	929									929
	5	1101	40	103	52	0	75	1101	17	201	0	80	57	275	86	952	287	235	75	115	17	63	80	206	0	40	5258									5258
	6	384	0	69	0	75	0	877	86	132	0	34	17	92	11	304	161	109	40	57	11	17	6	97	0	11	2590									2590
	7	900	52	1021	69	1101	877	0	338	178	0	46	6	768	384	505	1473	52	178	92	40	46	269	499	0	11	8905									8905
	8	172	17	97	6	17	86	338	0	69	0	34	17	63	0	206	149	120	29	11	34	11	6	80	34	0	1596									1596
	9	115	6	120	17	201	132	178	69	0	0	6	11	17	126	138	86	0	11	40	6	29	34	126	0	23	1491									1491
	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	22									22
	11	52	0	97	29	80	34	46	34	6	0	0	6	0	40	103	75	11	6	6	0	6	23	34	0	6	694									694
	12	23	6	29	29	57	17	6	17	11	0	6	0	11	29	69	11	29	6	17	0	6	11	29	0	0	419									419
	13	189	17	229	92	275	92	768	63	17	0	0	11	0	178	143	373	6	6	86	6	17	57	132	0	46	2803									2803
	14	413	29	92	23	86	11	384	0	126	0	40	29	178	0	929	1003	115	69	161	29	34	46	86	0	29	3912									3912
	15	980	23	671	235	952	304	505	206	138	11	103	69	143	929	0	1967	178	132	361	34	86	378	585	17	229	9236									9236
ORIGIN	16	826	29	218	23	287	161	1473	149	86	0	75	11	373	1003	1967	0	310	333	292	75	40	46	92	0	138	8007									8007
	17	40	23	143	40	235	109	52	120	0	0	11	29	6	115	178	310	0	17	57	0	34	29	69	0	46	1663									1663
	18	80	11	86	34	75	40	178	29	11	0	6	6	6	69	132	333	17	0	23	0	17	23	46	0	46	1268									1268
	19	281	6	92	11	115	57	92	11	40	0	6	17	86	161	361	292	57	23	0	17	17	75	52	0	6	1875									1875
	20	23	0	17	11	17	11	40	34	6	0	0	0	6	29	34	75	0	0	17	0	6	23	6	0	6	361									361
	21	115	0	57	11	63	17	46	11	29	0	6	6	17	34	86	40	34	17	17	6	0	11	29	0	0	652									652
	22	436	6	40	6	80	6	269	6	34	0	23	11	57	46	378	46	29	23	75	23	11	0	29	0	0	1634									1634
	23	585	17	178	40	206	97	499	80	126	0	34	29	132	86	585	92	69	46	52	6	29	29	0	0	29	3046									3046
	24	0	0	0	0	0	0	0	34	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	51									51
	25	201	6	34	6	40	11	11	0	23	0	6	0	46	29	229	138	46	46	6	6	0	0	29	0	0	913									913
	SUB-TOTAL	7735	339	4149	929	5258	2590	8905	1596	1491	22	694	419	2803	3912	9236	8007	1663	1268	1875	361	652	1634	3046	51	913	69548									69548
	26																																		
	27																																		
	28																																		
	29																																		
	30																																		
	31																																		
	32																																		
	SUB-TOTAL																																		
	TOTAL	7735	339	4149	929	5258	2590	8905	1596	1491	22	694	419	2803	3912	9236	8007	1663	1268	1875	361	652	1634	3046	51	913	69548									69548

TABLE C6
Combined Trip Table

ZONES		DESTINATION																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	SUB-TOTAL	26	27	28	29	30	31	32	SUB-TOTAL	TOTAL
ZONES	1	0	34	659	115	1101	384	900	172	115	11	52	23	189	413	980	826	40	80	281	23	115	436	585	0	201	7735	65	174	177	1122	535	169	588	2830	10565
	2	34	0	17	0	40	0	52	17	6	0	0	6	17	29	23	29	23	11	6	0	0	6	17	0	6	339	10	17	28	111	136	94	135	531	870
	3	659	17	0	80	103	69	1021	97	120	0	97	29	229	92	671	218	143	86	92	17	57	40	178	0	34	4149	66	183	98	432	364	121	443	1707	5856
	4	115	0	80	0	52	0	69	6	17	0	29	29	92	23	235	23	40	34	11	11	11	6	40	0	6	929	8	73	62	297	138	52	82	712	1641
	5	1101	40	103	52	0	75	1101	17	201	0	80	57	275	86	952	287	235	75	115	17	63	80	206	0	40	5258	35	141	156	417	348	98	362	1557	6815
	6	384	0	69	0	75	0	877	86	132	0	34	17	92	11	304	161	109	40	57	11	17	6	97	0	11	2590	33	246	190	458	470	145	297	1839	4429
	7	900	52	1021	69	1101	877	0	338	178	0	46	6	768	384	505	1473	52	178	92	40	46	269	499	0	11	8905	78	651	670	1828	1612	485	722	6046	14951
	8	172	17	97	6	17	86	338	0	69	0	34	17	63	0	206	149	120	29	11	34	11	6	80	34	0	1596	16	129	36	337	268	65	169	1020	2616
	9	115	6	120	17	201	132	178	69	0	0	6	11	17	126	138	86	0	11	40	6	29	34	126	0	23	1491	5	121	22	197	362	0	58	765	2256
	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	22
	11	52	0	97	29	80	34	46	34	6	0	0	6	0	40	103	75	11	6	6	0	6	23	34	0	6	694	0	14	0	42	46	0	17	119	813
	12	23	6	29	29	57	17	6	17	11	0	6	0	11	29	69	11	29	6	17	0	6	11	29	0	0	419	0	85	46	61	173	50	82	497	916
	13	189	17	229	92	275	92	768	63	17	0	0	11	0	178	143	373	6	6	86	6	17	57	132	0	46	2803	99	220	339	787	1139	564	906	4054	6857
	14	413	29	92	23	86	11	384	0	126	0	40	29	178	0	929	1003	115	69	161	29	34	46	86	0	29	3912	128	238	168	510	539	186	599	2368	6280
	15	980	23	671	235	952	304	505	206	138	11	103	69	143	929	0	1967	178	132	361	34	86	378	585	17	229	9236	65	242	246	576	371	149	372	2021	11257
ORIGIN	16	826	29	218	23	287	161	1473	149	86	0	75	11	373	1003	1967	0	310	333	292	75	40	46	92	0	138	8007	183	375	230	755	641	261	678	3123	11130
	17	40	23	143	40	235	109	52	120	0	0	11	29	6	115	178	310	0	17	57	0	34	29	69	0	46	1663	0	6	6	0	0	0	0	12	1675
	18	80	11	86	34	75	40	178	29	11	0	6	6	6	69	132	333	17	0	23	0	17	23	46	0	46	1268	0	146	52	139	200	39	252	828	2096
	19	281	6	92	11	115	57	92	11	40	0	6	17	86	161	361	292	57	23	0	17	17	75	52	0	6	1875	39	84	167	625	646	148	403	2112	3987
	20	23	0	17	11	17	11	40	34	6	0	0	0	6	29	34	75	0	0	17	0	6	23	6	0	6	361	0	15	0	157	22	9	30	233	594
	21	115	0	57	11	63	17	46	11	29	0	6	6	17	34	86	40	34	17	17	6	0	11	29	0	0	652	5	5	0	133	0	7	12	162	814
	22	436	6	40	6	80	6	269	6	34	0	23	11	57	46	378	46	29	23	75	23	11	0	29	0	0	1634	251	106	176	365	250	20	138	1306	2940
	23	585	17	178	40	206	97	499	80	126	0	34	29	132	86	585	92	69	46	52	6	29	29	0	0	29	3046	20	100	82	144	247	47	105	745	3791
	24	0	0	0	0	0	0	0	34	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	51	0	0	27	11	14	7	0	59	110
	25	201	6	34	6	40	11	11	0	23	0	6	0	46	29	229	138	46	46	6	6	0	0	29	0	0	913	5	47	27	19	127	40	69	334	1247
SUB-TOTAL		7735	339	4149	929	5258	2590	8905	1596	1491	22	694	419	2803	3912	9236	8007	1663	1268	1875	361	652	1634	3046	51	913	69548	1111	3418	3005	9523	8648	2756	6519	34980	104528
	26	65	10	66	8	35	33	78	16	5	0	0	0	99	128	65	183	0	0	39	0	5	251	20	0	5	1111	0	0	7	63	89	24	73	256	1367
	27	174	17	183	73	141	246	651	129	121	0	14	85	220	238	242	375	6	146	84	15	5	106	100	0	47	3418	0	0	106	475	1737	127	164	2609	6027
	28	177	28	98	62	156	190	670	36	22	0	0	46	339	168	246	230	6	52	167	0	0	176	82	27	27	3005	7	106	0	39	421	78	186	837	3842
	29	1122	111	432	297	417	458	1828	337	197	0	42	61	787	510	576	755	0	139	625	157	133	365	144	11	19	9523	63	475	39	0	1019	305	416	2317	11840
	30	535	136	364	138	348	470	1612	268	362	0	46	173	1139	539	371	641	0	200	646	22	0	250	247	14	127	8648	89	1737	421	1019	0	190	558	4014	12662
	31	169	94	121	52	98	145	485	65	0	0	0	50	564	186	149	261	0	39	148	9	7	20	47	7	40	2756	24	127	78	305	190	0	495	1219	3975
	32	588	135	443	82	362	297	722	169	58	0	17	82	906	599	372	678	0	252	403	30	12	138	105	0	69	6519	73	164	186	416	558	495	0	1892	8411
SUB-TOTAL		2830	531	1707	712	1557	1839	6046	1020	765	0	119	497	4054	2368	2021	3123	12	828	2112	233	162	1306	745	59	334	34980	256	2609	837	2317	4014	1219	1892	13144	48124
TOTAL		10565	870	5856	1641	6815	4429	14951	2616	2256	22	813	916	6857	6280	11257	11130	1675	2096	3987	594	814	2940	3791	110	1247	104528	1367	6027	3842	11840	12662	3975	8411	48124	152652

Appendix D

Transportation System Analysis

TABLE D1
Estimated Traffic Link Volumes

STREET LINK	FROM	TO	ESTIMATED TRAFFIC VOLUMES (1)		
			Pop'n 50000	Pop'n 60000	Pop'n 70000
Dundas St. W.	Wallbridge-Loyalist Rd.	Palmer Rd.	13,600	21,400	23,900
Dundas St. W.	Palmer Rd.	Highland Ave.	18,600	26,600	26,600
Dundas St. W.	Highland Ave.	Church St.	31,400	35,100	36,900
Dundas St. E.	Church St.	Bleecker St.	17,100	20,600	20,600
Dundas St. E.	Bleecker St.	Herchimer Ave.	15,900	18,400	19,200
Dundas St. E.	Herchimer Ave.	Haig Rd.	12,100	14,800	15,700
Dundas St. E.	Haig Rd.	Study Limit	6,400	8,100	8,800
Bridge St. W.	Moira St. W.	Palmer Rd.	7,200	10,500	12,400
Bridge St. W.	Palmer Rd.	Sidney St.	7,700	10,100	11,000
Bridge St. W.	Sidney St.	Coleman St.	11,400	13,500	15,600
Bridge St. E.	Coleman St.	Church St.	9,700	11,900	12,400
Bridge St. E.	Church St.	Bleecker St.	6,800	6,800	6,800
Bridge St. E.	Bleecker St.	Herchimer Ave.	6,500	6,800	6,700
Bridge St. E.	Herchimer Ave.	Haig Rd.	8,200	8,900	9,100
Moira St. W.	Wallbridge-Loyalist Rd.	Palmer Rd.	14,600	14,900	16,600
Moira St. W.	Palmer Rd.	Sidney St.	7,200	14,600	15,200
Moira St. W.	Sidney St.	Coleman St.	11,300	13,700	15,600
College St. W.	Sidney St.	Moira St.	11,500	12,200	14,600
College St. W.	Moira St.	Cannifton Rd.	13,200	14,400	17,400
Bell Blvd.	Sidney St.	N. Front St.	13,800	16,300	18,200
Highway No. 401	Wallbridge-Loyalist Rd.	Sidney St.	12,200	15,700	17,400
Highway No. 401	Sidney St.	Highway No. 37	16,000	20,600	22,700
Highway No. 401	Highway No. 37	Study Limit	9,900	11,700	12,800
County Rd. 33	Suburban Rd. 30	Highway 62	15,400	21,100	26,700
County Rd. 33	Highway 62	Suburban Rd. 31	9,800	13,600	18,500
County Rd. 31	County Rd. 33	Suburban Rd. 6	11,300	14,800	18,700
Suburban Rd. 6	Suburban Rd. 31	Highway No. 401	6,000	7,600	10,500
Highway No. 37	Suburban Rd. 6	Highway No. 401	7,200	10,800	11,800
Wallbridge-Loyalist Rd.	Dundas St. W.	Moira St. W.	3,200	5,300	6,600
Wallbridge-Loyalist Rd.	Moira St. W.	Highway No. 401	1,900	2,900	3,800
Suburban Rd. 1	Highway No. 401	Study Limit	1,100	900	2,100
Sidney St.	Dundas St. W.	Bridge St. W.	10,700	13,200	16,900
Sidney St.	Bridge St. W.	Moira St. W.	14,200	16,900	19,300
Sidney St.	Moira St. W.	College St. W.	18,100	22,500	28,300
Sidney St.	College St. W.	Bell Blvd.	12,100	15,300	18,900
Sidney St.	Bell Blvd.	Cloverleaf Dr.	19,200	25,500	31,500
Coleman St.	Dundas St. W.	Moira St. W.	10,100	12,000	13,200
Upper Bridge	N. Front St.	Front St.	5,000	6,200	6,700
Front/Pinnacle Corridor	Dundas St.	N. Front St.	12,000	13,800	14,700
Pinnacle St. Bridge	N.Front St.	Pinnacle St.	12,300	12,600	13,500
N. Front St.	Moira St. W.	College St. W.	17,300	19,600	21,700
N. Front St. (2)	College St. W.	Bell Blvd.	15,400	18,000	20,100
N. Front St.	Bell Blvd.	Highway No. 401	15,800	20,400	23,000
Highway No. 62	Highway No. 401	Coverleaf Dr.	18,000	24,200	27,300
Victoria Ave.	Church St.	Bleecker St.	9,000	9,400	9,400
Victoria Ave.	Bleecker St.	Herchimer Ave.	10,100	10,200	10,100
Victoria Ave.	Herchimer Ave.	Haig Rd.	13,200	13,500	13,500
Bleecker St.	Dundas St. E.	Victoria Ave.	3,000	3,500	3,500
Bleecker St.	Victoria Ave.	Station St.	9,200	10,700	11,500
Herchimer Ave.	Dundas St. E.	Victoria Ave.	900	1,100	1,100
Herchimer Ave.	Victoria Ave.	Station St.	1,700	2,000	2,200
Station St.	Church St.	Cannifton Rd.	9,800	11,800	13,000
Station St.	Cannifton Rd.	End	4,500	6,000	7,400
County Rd. 18	College St. W.	Study Limits	5,100	10,500	10,500
Cannifton Rd.	Station St.	College St. E.	20,000	24,000	26,800
Cannifton Rd.	College St. E.	McFarland Dr.	13,000	18,700	22,000
Cannifton Rd.	McFarland Dr.	Adam St.	15,600	22,100	26,000
Cannifton Rd.	Adam St.	Highway No. 401	17,500	24,600	28,800
McFarland Dr.	Cannifton Rd.	University Ave.	2,600	3,500	4,100
Adam St.	Cannifton Rd.	University Ave.	3,700	4,300	4,600

(1) Volumes shown are projected volumes on the existing roadway network with no road improvements
(2) Previous city counts indicate existing higher daily volumes of 17,600

Appendix E

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