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CITY OF
North York

Transportation Department

CONSULTING ENGINEERING SERVICES FOR
THE CITY OF NORTH YORK - TRANSPORTATION DEPARTMENT

DOWNTOWN PLAN SOUTH OF SHEPPARD AVENUE

ENVIRONMENTAL STUDY REPORT

TRANSPORTATION
INFRASTRUCTURE
REQUIREMENTS

SEPTEMBER, 1996

APPENDICES

COLE,
SHERMAN

CITY OF North York

Transportation Department

APPENDIX A

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North York
Transportation Department

CONSULTING ENGINEERING SERVICES FOR
THE CITY OF NORTH YORK - TRANSPORTATION DEPARTMENT

SOUTH DOWNTOWN SECONDARY PLAN REVIEW

ENVIRONMENTAL ASSESSMENT STUDY

STATUS REPORT

OCTOBER, 1995

PREAMBLE

INTRODUCTION

In January, 1992 Council directed staff to commence with a draft plan for the South Downtown area of the North York Centre. The planning process which followed has been extensive and the road requests in support of the various planning scenarios are documented in this report.

North York has employed a Master Plan approach to address land use and transportation concept for the South Downtown. The approach allows the process requirements of the Planning Act and the Environmental Assessment Act to be considered concurrently which is consistent with recent MOEE recommendations.

This document was originally compiled in a "draft" form in June 1995, and was finalized in a more complete form in October 1995. It is a "status report" which documents the process, the progress and the extent of the work undertaken by Cole, Sherman & Associates up to June of 1995. It was prepared recognizing that North York Council could be directing staff to report on a plan which could have significant change to the plan being proposed at that time.

In view of North York Council's decision in January, 1996 to reduce the scale of development in the South Downtown, this document forms the "Background" to an evolutionary planning process arriving at an Environmental Study Report.

This report is an Appendix to the Environmental Study Report for the Transportation Infrastructure Requirements for the Downtown Plan South of Sheppard Avenue. It has not been endorsed by North York Council as a "stand alone" report, therefore it does not have official status. Further, it cannot be considered a completed environmental assessment study for the transportation infrastructure required in support of the "vision" developments levels.

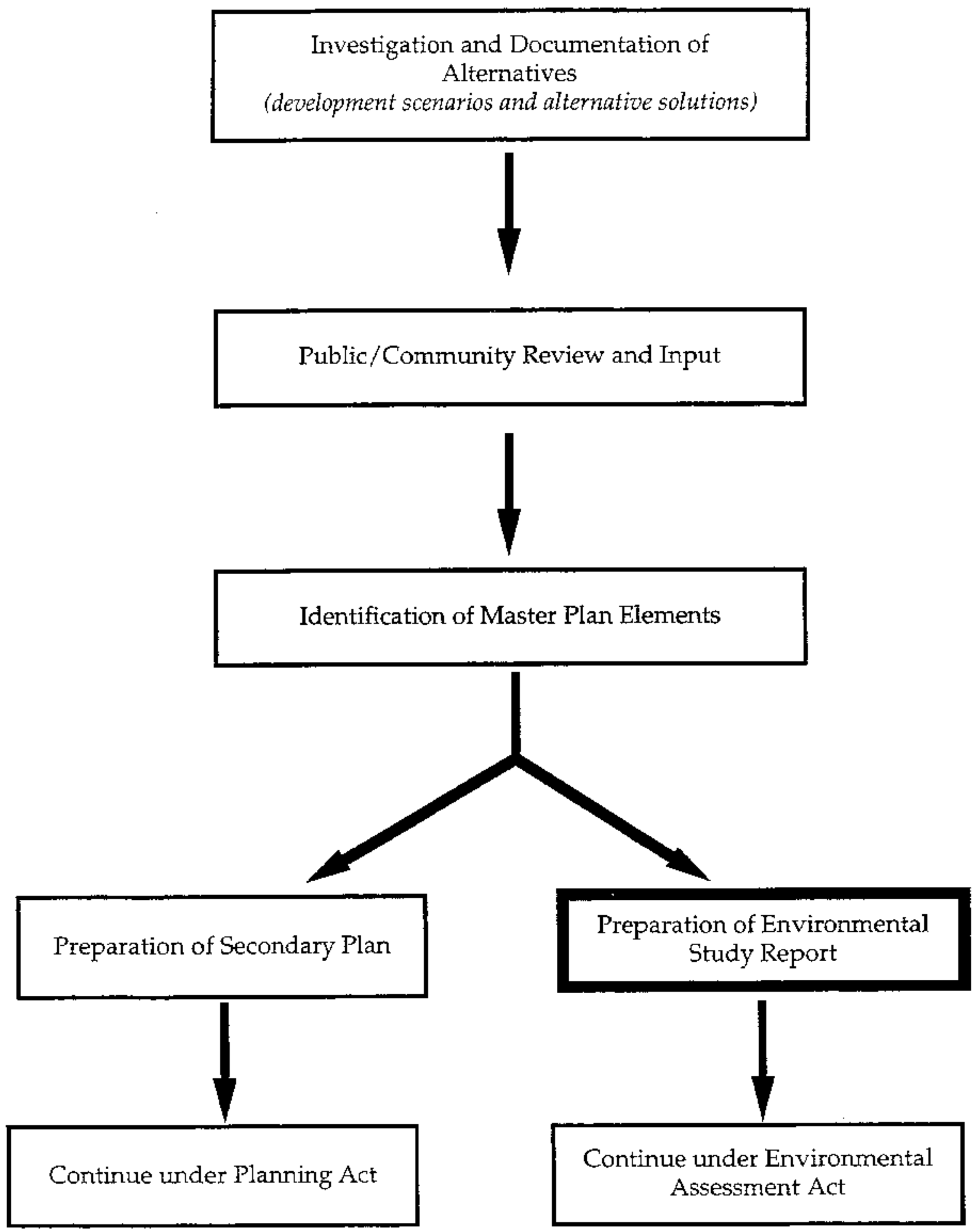
Planning objectives and principles which guide the land use policies reached in the Secondary Plan act in part as a screen to the systematic analysis and evaluation of transportation alternatives under the EA Act. Master Planning attempts to analyze and evaluate alternative land use and transportation scenarios in parallel, establish a balance, and report them in a traceable manner. **Exhibit P.1** outlines the Master Planning process. This ensures that infrastructure improvements are considered at the same time as land use matters providing for a more comprehensive planning approach. The result is that the infrastructure improvements are not pre-determined during the land use exercise, but are part of this exercise.

Council's decision to embark on a Master Planning approach for the South Downtown commenced in October, 1992 when Council made a commitment to process the Secondary Plan and Class EA for the South Downtown together as a comprehensive approach. This approach allows for land use, density, policy and undertakings such as roads and transit improvements to be viewed and documented concurrently and to avoid the duplication encountered in sequential processes.

The Master Planning approach hopefully allows the public to understand more fully the relationship and implications of land use and transportation decisions made throughout the process. The resulting Environmental Study Report is a product of the Master Plan approach and may not reflect a typical Class EA process. The Official Plan Amendment, south of Sheppard Avenue, is being processed in parallel with the Class EA. Individuals that are interested in the final outcome of the Master Plan process are encouraged to review the OPA application in conjunction with the Class EA.

EXHIBIT P-1

MASTER PLAN APPROACH



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1.0 INTRODUCTION

1.1 BACKGROUND

The City of North York and Metropolitan Toronto have consistently promoted the development of a major metropolitan centre along the Yonge Street corridor between Highway 401 and Cummer/Drewry Avenues **(see Exhibit 1.1).**

During the early 1970s, North York restructured its Official Plan planning areas to separate the City into five Planning Districts at which time District Plan 11 for the Yonge Street area was approved. In 1979, Council adopted an amendment to District Plan 11 (Official Plan Amendment D-11-48) which was confirmed by the Ministry of Municipal Affairs and Housing and the Ontario Municipal Board (OMB) in October 1980. OPA D-11-48 forms the basis to planning in the "North York Centre" and provides a framework for the review of individual development proposals in and around the City Centre.

In 1986, the City of North York separated the City Centre into two distinct planning areas, the "Downtown" and the "Uptown" areas. Subsequently, Council further recognized the "South Downtown" planning area **(see Exhibit 1.2)**. Together, the three planning areas form the "North York Centre" which is a metropolitan urban centre consistent with the planning objectives of Metroplan, (1990).

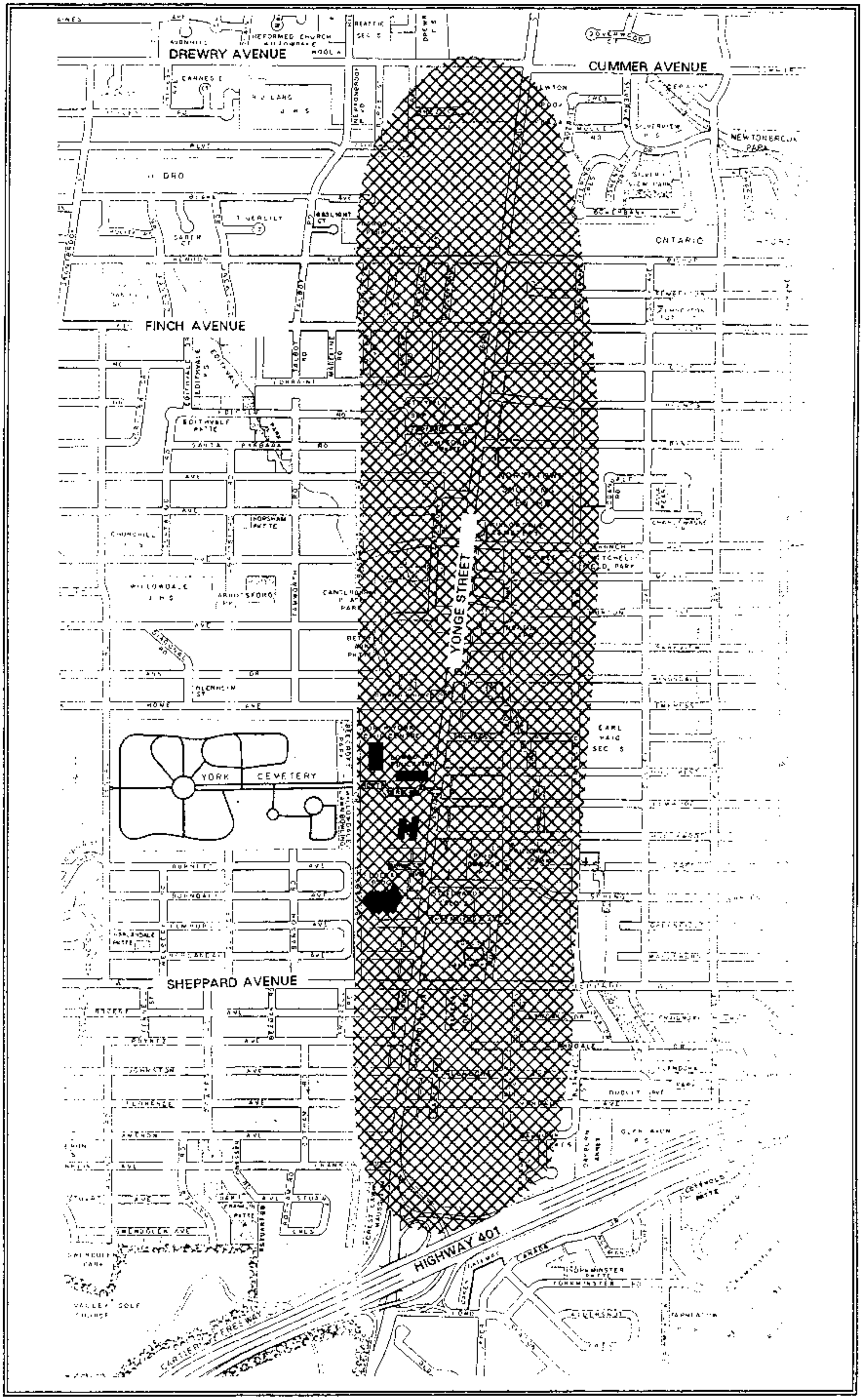
Approval for the Downtown Secondary Plan were granted by the OMB in March, 1989. Following the approval, the City of North York undertook a separate Schedule 'C' Class Environmental Assessments for the transportation networks. Approval of the Class EA was granted in August 1991.

The Uptown Plan followed an approach whereby the Official Plan Amendment and the required road infrastructure were considered concurrently. That process was consistent with the new requirements of the Class E.A. for Municipal Road Projects i.e. Master Plan.

The Uptown Plan was approved by Council and the Class E.A. for the road network was granted approval in December, 1993.

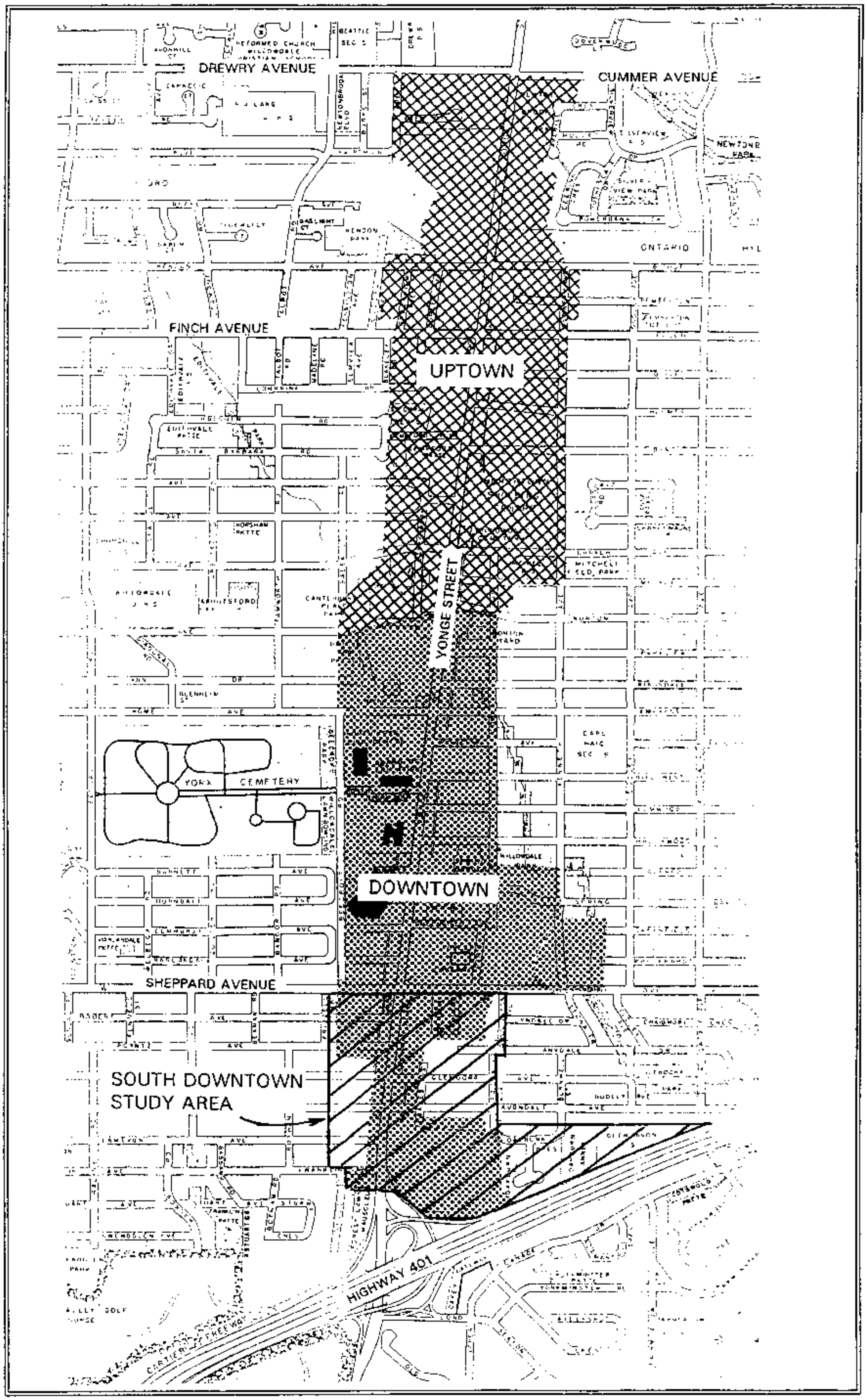
Since 1992, the City of North York has been engaged in a Master Plan process which will lead to the approval of an Official Plan Amendment and Class Environmental Assessment for the corresponding transportation network. The proposed multi-use

EXHIBIT 1.1



METROPOLITAN CENTRE

EXHIBIT 1.2


DREWRY AVENUE
CUMMER AVENUE
FINCH AVENUE
UPTOWN
YONGE STREET
YORK CEMETERY
DOWNTOWN
SHEPPARD AVENUE
SOUTH DOWNTOWN
STUDY AREA
HIGHWAY 401
ONTARIO

South Downtown area which North York is aiming to achieve cannot be developed without a balanced transportation network. The existing road network is not sufficient to allow carefully planned growth of this area and must be upgraded in conjunction with other transportation plans.

1.2 SOUTH DOWNTOWN SECONDARY PLAN

Subsequent to applications for amendment to the Official Plan and Zoning By-law made on behalf of Westnor Limited to redevelop its lands on the northeast corner of Highway 401 and Yonge Street, Council directed Planning Staff in 1992 to review the lands south of Sheppard Avenue along Yonge Street to Highway 401 (**see Exhibit 1.2**). The application by Westnor created the impetus for the review, not the need for it.

A Steering Committee was established consisting of several members of Council and the Planning Advisory Committee along with selected Staff from the Planning and Transportation Departments. Guided by the Steering Committee, a number of Technical Committees and the Community Consultation Committee were created.

The Secondary Plan Review consisted of regular meetings of the Technical Committees and the Steering Committee and periodic newsletters to local area residents and land owners. Open houses and public meetings were held to ensure that the process was open to all of those impacted.

The Secondary Plan Review has set as its goal or "Vision" the following statement:

> *"The conclusion of the South Downtown Secondary Plan review process should result in the development of a Secondary Plan which is sensitive to the needs and desires of all residents and property owners in the area, as well as others traveling through and around the South Downtown. It will provide a gateway to the City Centre, while adding to the vitality and viability of the City Centre as a whole. It will provide for development of a human scale, pedestrian friendly environment, which is compatible with and complements the surrounding residential areas. It will strive to create a community where people will want to live and work."*

The South Downtown Secondary Plan Review initially took on two distinct phases or levels of development which have different transportation infrastructure implications. The Phase One Plan would permit development to proceed according to a redistribution of the existing Official Plan density levels without having to undertake extensive transportation improvements. The second phase (the "Vision") would envisage much higher densities which would require significantly greater transportation infrastructure support. The timing of infrastructure improvements and ultimate phasing of related development would be controlled by financial feasibility.

Through the cooperation of Westnor Limited, Anndale Properties and Crestview Investments, an application to the Canada, Ontario Infrastructure Works (COIW) program to fund some of the transportation infrastructure improvements was made in May 1994 . As a result, the Secondary Plan was drafted to set the goals, objectives and planning principles for the ultimate development (vision) for the South Downtown area. The Class EA must then assess the transportation improvements needed to support this development.

The South Downtown Secondary Plan has been reviewed by City Staff and undergone extensive community consultation and input. The details of the Community Consultation will be outlined in Chapter 2. Draft Secondary Plan, completed in September of 1994, incorporates the community input that was received and is now awaiting completion of the Environmental Assessment for the transportation improvements.

1.3 RELATED STUDIES

As part of development of the Phase Two development, the City of North York Transportation Department has undertaken a transportation analysis. Along with traffic analyses that have been completed by Westnor representatives (for local development), this environmental assessment reviewed the supporting documentation when analyzing the most appropriate transportation system to allow for development of the South Downtown area. The Transportation Department's transportation capacity analysis was based on a variety of land use and density scenarios developed by the Planning Department for the Secondary Plan. These scenarios are detailed in Chapter 3.

A study completed by the Transportation Technical Committee and the Transportation Department includes a detailed analysis of the proposed Service Road alignment. Further studies that were used in developing the Secondary Plan include a Fiscal Impact Study, a Retail and Market Analysis and a Ravine and Urban Landscapes Connected Spaces Study.

1.4 PURPOSE OF THE UNDERTAKING

The transportation analysis undertaken in support of the land use Vision demonstrated that significant transportation network improvements are required. The Undertaking must therefore provide the transportation network capacity that is needed for the proposed development levels. When constructed, the Undertaking would satisfy the metro centre planning aspiration of the City of North York and Metropolitan Toronto, secure development potential in the South Downtown area and provide a level of certainty in the minds of those impacted by the change.

1.5 CLASS EA PROCESS AND RATIONALE

The Undertaking proceeded as a Schedule 'C' project under the Class Environmental Assessment for Municipal Road Projects. The rationale for proceeding in this manner is described below.

In the initial appraisal of the Undertaking, a number of components were identified as falling within the category of a Schedule 'A' type project, including such elements as the reconstruction and normal maintenance of existing roads. Other elements of the project fell within a Schedule 'B' type project and include such actions as the retiring of existing roads and related facilities to accommodate the overall road network.

More importantly, elements such as the construction of new roads, new intersections, grade separations, road widenings, and the establishment of new rights-of-way fall within a Schedule 'C' type project. Therefore, as this schedule has the more prominent ranking, the scope of this report embodies all elements within Schedules A, B, and C.

The process followed in the planning and design of this Class EA is illustrated in **Exhibit 1.3.** The chart incorporates steps considered essential for compliance with the requirements of the Act which may be summarized as follows:

Phase 1 Identifies the problem or deficiency the Undertaking must address.

Phase 2 Identifies alternative solutions to the problem. Factors to be taken into consideration before selecting a preferred solution include the existing environment, and public/agency review and input.

Phase 3 Examines alternative designs of implementing the preferred solution. Factors taken into consideration include: the existing environment, public and government agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.

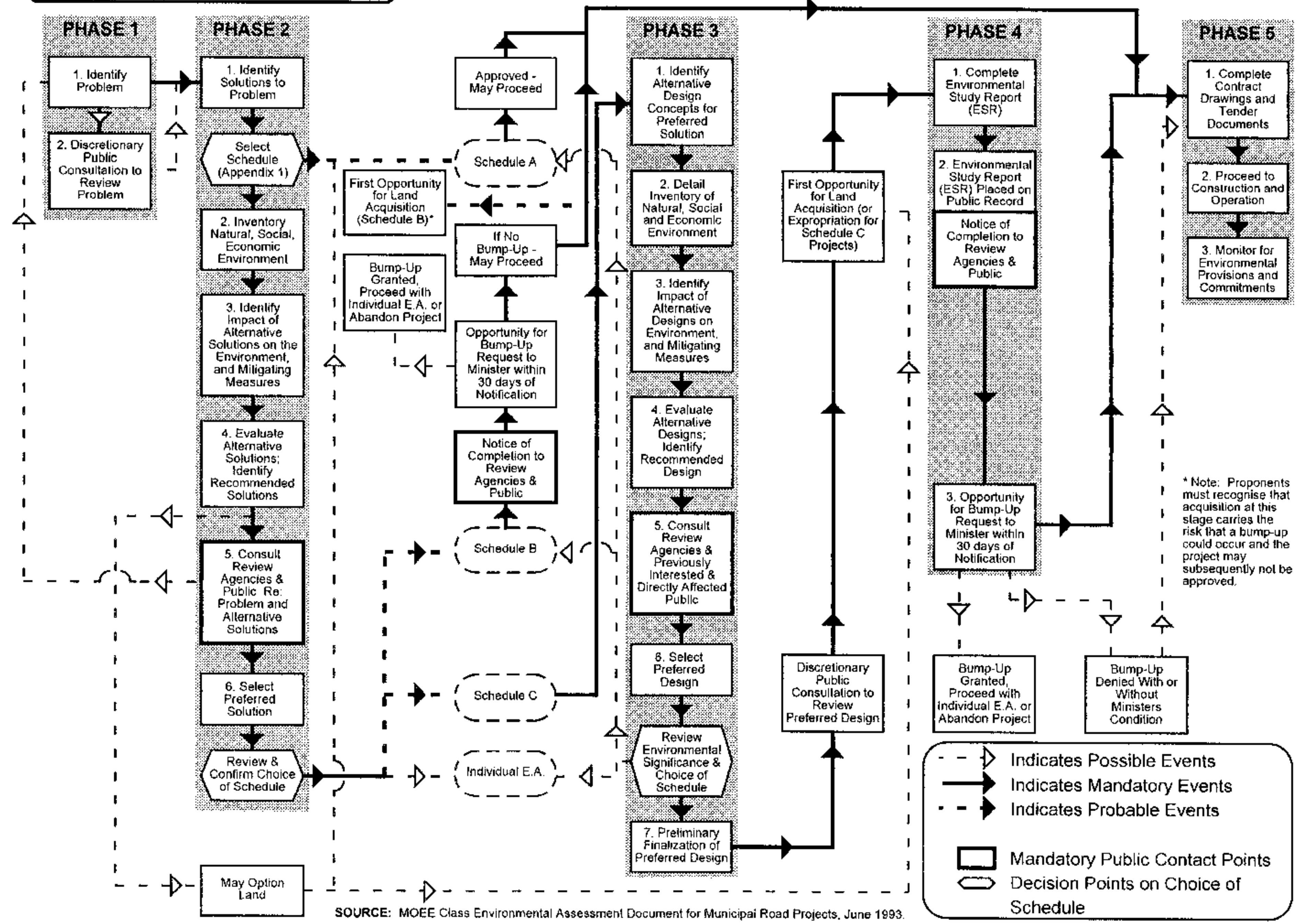
Phase 4 Documentation in an Environmental Study Report (ESR), that includes: a summary of the rationale, and the planning, design and consultation process of the project as established through the above Phases 1 - 3 (see Section 1.6).

Phase 5 Completion of contract drawings and documents. The Undertaking then proceeds to construction and operation; during this time construction monitoring for adherence to environmental provision's also carried out.

The planning and design process has been undertaken in such a way as to allow a reviewer to trace easily each step of the process.

EXHIBIT 1-3

Planning and Design Process for Municipal Road Projects



SOURCE: MOEE Class Environmental Assessment Document for Municipal Road Projects, June 1993.

1.6 ENVIRONMENTAL STUDY REPORT

One of the key principles of successful planning under the EA Act is:

> *"to provide clear and complete documentation of the planning process followed, to allow for the "tractability" of decision making with respect to the project."*

Documentation of the planning and design process followed in developing a Schedule "C" project is, a mandatory requirement of the Class EA process. Schedule "C" projects, therefore, carry the requirement for the preparation of a formal Environmental Study Report (ESR).

When completed, the City of North York is required to place the ESR with the City Clerk for inspection by the public, government agencies, and private agencies for a period of 30 calendar days. Any person/party objecting to the contents or the conclusions of the ESR is required to bring those concerns to the attention of the City. Should the issues be of such a nature that they cannot be resolved to mutual satisfaction, then the person/party may, in that 30 day period, request the Minister of the Environment and Energy to "bump-up" the project to an individual environmental assessment. The Minister shall consider both sides of the argument and make a decision. If there are no objections to the ESR, the project will proceed.

1.7 STUDY TEAM

As the Master Plan process evolved, a Project Team was formed to guide the Class EA process. Unlike the Downtown and Uptown ESRs, which were completed "in-house" by North York staff, the ESR for the South Downtown is being prepared by an outside consultant, Cole, Sherman & Associates Ltd., on behalf of the proponent, North York. The Project Team consists of representatives from the following:

- North York Transportation Department;
- North York Planning Department;
- North York Public Works Department;
- North York Parks and Recreation Department;
- North York Legal Department;
- North York Property and Economic Development Department and ;
- Cole, Sherman & Associates Ltd.

Cole, Sherman has expertise in the fields of transportation and roadway engineering and environmental planning/consultation. This group of experts has led the EA process for the South Downtown area by conducting detailed analysis and public participation programs.

In the areas of noise and air quality assessment, the Cole, Sherman Team retained the services of the following sub consultants:

- S.S. Wilson & Associates (Noise Assessment);
- R.W.D.I. (Air Quality Assessment).

2.0 PUBLIC PARTICIPATION

2.1 INTRODUCTION

Throughout the Master Planning process, North York has undertaken considerable efforts to obtain public input to both the South Downtown Secondary Plan and Class EA. Since early 1992, North York Staff and Technical Committees have met with various land owner groups and public agencies to elicit feedback as the Secondary Plan review progressed. This process involved the initial Public Information Centre (PIC) required under the Class EA as well as seven (7) public record reports to the Planning Advisory Committee and Council and seven (7) installments of the South Downtown Secondary Plan Review newsletter that were mailed to all stakeholders (see **Exhibit 2.1**). Beginning in January of 1995, ten (10) additional stakeholder meetings were held to obtain valuable input. The second PIC, as required by the Class EA, was scheduled for March of 1995, however the PIC was postponed until further notice.

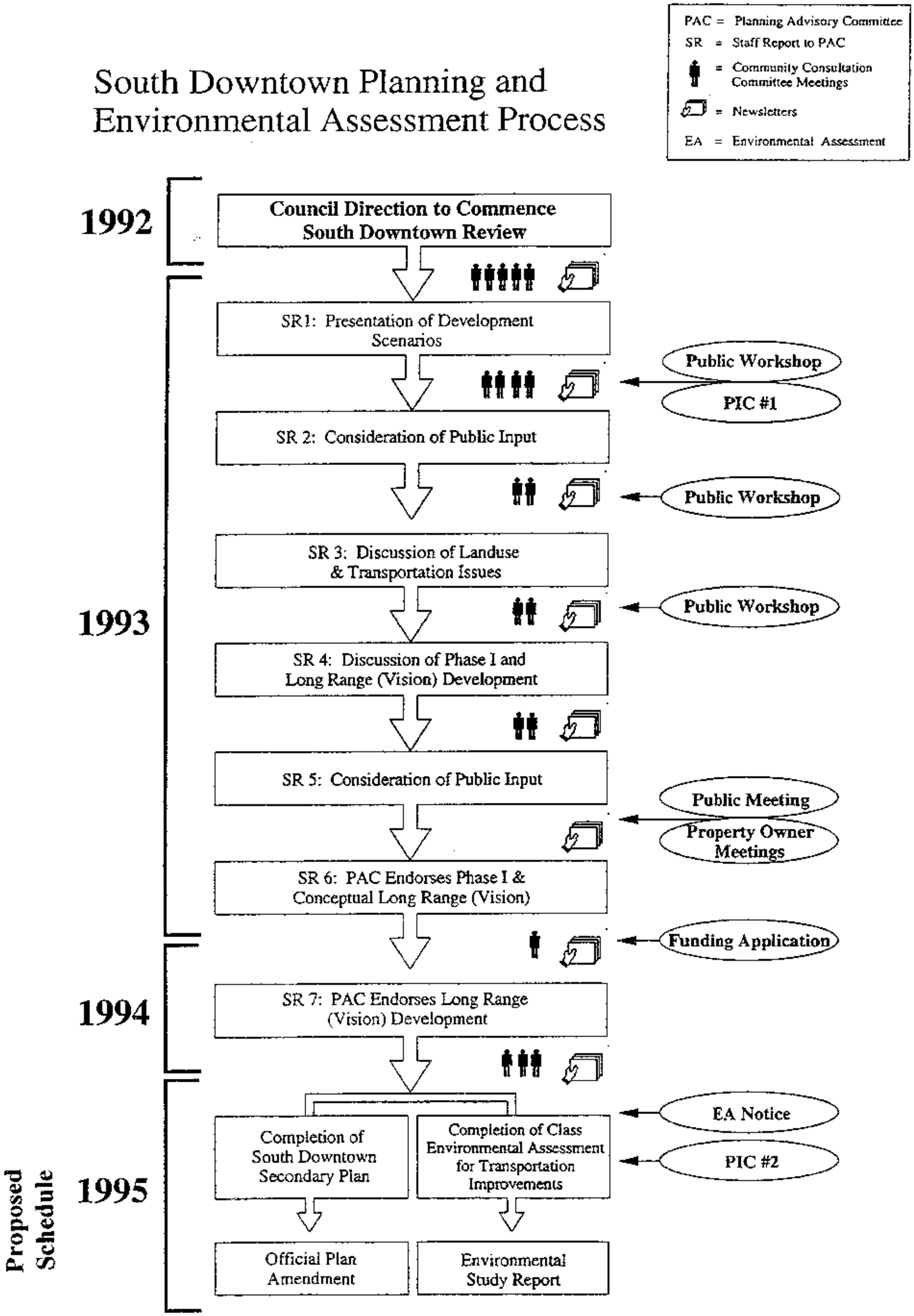
The overall objective of the consultation process is to involve as many stakeholders in an interactive process of goal setting for the South Downtown Plan. This has included involvement in the Secondary Plan process as well as the Class EA. Combined, this input forms the feedback for the Master Planning process. Other techniques used included the formation of the Community Consultation Committee which was made up of local area representatives and provided a critical link between area residents/ landowners and the project team guiding the Master Planning process. Focus groups or workshops were also held and attended by City Staff and Cole, Sherman. These workshops acted to give more detailed information on specific issues from the general surveys that were distributed at the first workshops. Public input was considered to be essential to establishing the policies of the South Downtown Secondary Plan.

2.2 STAKEHOLDERS

The following is a general listing of those interested in or impacted by the South Downtown Secondary Plan.

- Municipality of the City of North York
- Metropolitan Toronto
- Ministry of Transportation
- Toronto Transit Commission
- Province of Ontario- Ministry of Transportation, Ministry of Municipal Affairs, Ministry of the Environment and Energy

South Downtown Planning and Environmental Assessment Process



- North York Board of Education and the Metropolitan Separate School Board
- Residents of Wards 8, 9, 11, Central Willowdale Ratepayers Association, Lansing Community Association, Yonge Ridge Homeowners Association, Avondale Ratepayers Association, Residents of the "Transition" and Redevelopment" areas
- Developers
- Land owners
- Workers in the area using the transportation network
- Utilities-Bell, Hydro, Consumers Gas etc.
- Metropolitan Toronto and Region Conservation Authority

2.3 CONSULTATION PROCESS

As described previously, the overall consultation process consisted of public meetings, focus groups, newsletters, Community Consultation Committee and regular staff reports. The following briefly outlines the various components that made up the public participation process. Summary tables have been created to document more specific comments received during the community input process.

- Seven (7) public Staff reports to the PAC and Council. Each elicited feedback from interested parties.
- In view of the scope and complexity of certain components of the study area, seven (7) "Technical Committees" were formed to focus on the general principles of specific issues.

  These Technical Committees included the following:
  - Transportation
  - Servicing
  - E.A.
  - Land Use and Urban Design
  - Parks and Open Space
  - Economic and Finance
  - Community Consultation

  The Committees met on a rotational basis approximately once every six weeks. Minutes of the meetings were forwarded to interested parties. However as the review evolved, and certain issues overlapped the mandate of several committees, the need for the individual committees came to closure when the "project" focused on one general concept and the various elements "meshed" together.

- Seven (7) Newsletters were sent to area land owners and other stakeholders summarizing the Staff Reports and the Technical Committee meetings. These also served to give notice of public meetings, open houses and workshops.
- The workshops and open house meetings were specifically arranged to inform the public and elicit input into the process. Numerous other public PAC meetings were held to receive and discuss the Staff Reports as they were completed. These meetings were well notified and attended by stakeholders.
- Ten (10) stakeholder meetings were held with specific interests to obtain more in-depth information that may not have been shared during larger public meetings.

Note: From the initiation of the Secondary Plan Review Process, all correspondence, notice and minutes of meetings included information on the proposed transportation improvements and the requirement for a Class EA.

2.4 MEETINGS/WORKSHOPS/PUBLIC INFORMATION CENTRES

Open Houses, Work Shops and Public Information Centres (PICs) were held on the following dates:

Workshop	January 30, 1993
PIC	February 18, 1993
Open house	May 20, 1993
Workshop	June 5, 1993
Community Meeting	September 27, 1993
Public meeting	October 27, 1993

Feedback and comments received during and as a result of these meetings were analyzed and addressed by Staff and discussed in subsequent Staff reports to the PAC. These public meetings included information on the proposed transportation infrastructure improvements so that they constitute part of the EA public participation process.

Stakeholder meetings were held with the following to introduce the alternative roadway design concepts which would be considered in the Environmental Assessment Study:

Avondale Ratepayers	January 25, 1995
Transition Areas Residents	January 30, 1995
Yonge Ridge Homeowners	February 1, 1995
Central Willowdale Ratepayers	February 7, 1995
Ward 8 Ratepayers	February 20, 1995
Redevelopment Area Residents	February 23, 1995
Marathon Realty	January 17, 1995
Westnor Properties	January 23, 1995
Anndale/Crestview	February 6, 1995
Business Interest Group*	February 13, 1995

*Includes; North York Board of Education, Seneca College, Petro-Canada, Premium Properties, Colonial Life.

Other business interests that were contacted directly regarding the study include: First Professional Management, Gemeiner/Irez, Sunlife, Ivanhoe Developments.

This input was used in concert with the previous public consultation feedback to develop criteria of evaluation to be used in assessing various alternative infrastructure improvements being considered by the City.

2.5 ISSUES/CONCERNS

The following lists some of the concerns raised during the overall public consultation process;

- Alignment of the Service Road,
- Transition zone, redevelopment pressure,
- Buffering from Service Road alignment,
- Density and height along Yonge Street and Sheppard Avenue and relation to stable residential areas,
- Access to neighbourhoods without excessive through traffic,
- Community Cohesion,
- Angular planes (%),
- Property values,
- Noise
- Air Quality

- Study Area boundary,
- Appropriate mix of land uses (residential/commercial),
- Appropriateness of regional retail component,
- Urban design guidelines - built term, massing and phasing,
- Open space and parkland,
- Visual impact of Flyover.

These concerns were raised during open houses and workshops but also through surveys, comment sheets, petitions, form letters and private letters. Each was addressed by Staff directly as well as being summarized and responded to in Staff Reports to the PAC and in subsequent Newsletters.

Exhibit 2.2 outlines the detailed input gained throughout the stakeholder meeting process as part of the Class EA study. These comments were considered when developing evaluation criteria for the infrastructure improvements.

North York South Downtown Class Environmental Assessment
Highway 401 / Yonge Street Series of Workshops
Issues and Concerns

Our Ref.: 18094

ISSUE/CONCERN	COMMENTS	ISSUE/CONCERN	COMMENTS
1) NOISE	• single family homes that do not redevelop will be heavily impacted by noise generated by service road • noise will change the character of old established neighbourhood • transition area homes should be protected like "stable residential" • if mitigation such as berms, walls etc. cannot be provided, more landscaping is requested • 12 metre buffer is inadequate • if noise impact is beyond Provincial standards, we may request bump up • would prefer linear park along the road • more trees and landscaping may be better than distance • want to see noise isobar mapping for the area to compare impact to existing Hwy. 401 noise • noise will be generated from flyover and tunnel under Yonge Street • flyover will cause echoing in ravines south Hwy. 401 • Hwy. 401 at 12 lanes is already too noisy, flyover will make it worse	2) AIR QUALITY 3) TRAFFIC	• 4-lane road throughout neighbourhood will decrease air quality for remaining single family homes • not enough buffering • address air quality in analysis • where do fumes go from the flyover • major 4 lane road with heavy traffic through the middle of our neighbourhood • pedestrian safety • residents do not want or need change to roads and traffic - this is all for the developers • do developers really need roads and traffic to go through our neighbourhood • restrict 401 connection to Westnor site • do not want infiltration of Hwy. 401 traffic through our area • link to Hwy 401 will make the service road very busy • we want to maintain access to Yonge/Sheppard • 60% modal split seems arbitrary, more research to support it should be done • do not signalize Bales and Avondale intersection • neighbourhood accessibility is critical., want to be able to get in and out of area • pedestrian access to Yonge Street and area amenities is why we live in the Avondale area

EXHIBIT 2-2

ISSUE/CONCERN	COMMENTS	ISSUE/CONCERN	COMMENTS
3) TRAFFIC (cont'd)	• consider more specialized pedestrian friendly amenities such as walkways cross walks, for access and safety • what about the termination or through movement on Avondale Ave. • traffic generation assumption of 1,200 sq.ft. units is too large, likely they will be smaller and therefore more abundant. Limit density by number of units as well as sq.ft. • show worst case traffic scenario at full build out to account for uncertainty of timing • consider/look at decking of Yonge St. • concerned about potential for increase in cars/lane/hour (700) as used in uptown and downtown studies • southbound traffic on Yonge Street from northern area will still cause congestion on Yonge Street if not properly rerouted • concerned that the Service Road will be busier than Yonge Street which is not the City's intention • north bound traffic on Yonge Street moves very quickly and has increased in volume making Lord Seaton congested • traffic coming north uses Old Yonge to by-pass Yonge Street traffic, this will not change		• rush hour traffic is a concern • concerned Service Road will become a speedway
		4) PROPERTY VALUE	• density assigned is not enough to provide for viable re-development once Service Road is built • real estate agents cannot sell our homes now due to uncertainty. We cannot leave • home beside alignment that is not expropriated looses value • transition area homes value plummets • increased density is not enough compensation • may want to stay in single family residence for a long time, property value will decline over whole area • do not want to be stuck with decreasing home values • want to remain pleasant and inviting place to live • transition area should be east of Service Road and treated as stable residential • opposed to expropriation
		5) TIMING OF CON-STRUCTION	• long time until build these roads and see development. This leaves residents with a lot of uncertainty in the interim • if COIW input does not come through, go with Phase I only. With COIW, must come into our area sooner. We are not ready to sell. • we need to know when the road will go through our houses.

ISSUE/CONCERN	COMMENTS	ISSUE/CONCERN	COMMENTS
6) FINANCING	• we do not want to pay for the infrastructure through realty taxes. It is the developers who benefit, they should pay • if COIW financing is not available, ESR remains useful for 5 years • roads can be completed in functional section as development occurs through development changes		• would like a 3D model at PIC #2 to make proposed changes clear • want the EA and the road pattern reviewed every 5 years similar to the OPA • fear Westnor is driving this process • request additional meetings after evaluation, however, before a recommendation comes forward at PIC #2 • access to Lord Seaton area is difficult, address this in the EA study • we want certainty from OPA so we can plan
7) PROCESS	• what is the process and where else do we get to have input • what constitutes an objection • how do we apply for a "bump up" request • explain staging of analysis • do not look at Tradewind as the only eastern alignment if it goes over Marathon's land since that is prohibitively expensive. Another route further east would not incur this cost and might be more attractive • should evaluation criteria be weighted • solution should come first (i.e., alignment) then assessment of the cost • if study is bumped up, can we drop it due to cost? • comments can be made after PIC #2 and newsletter • do not turn this into a popularity contest (i.e. more people against Mid-block	8) CHANGE IN LAND USE PATTERNS	• we do not want to be a transition area, want to be considered stable residential. Highest and best use may be single family residential • not necessarily opposed to development, we want to ensure compatible development. Do not want developers driving the process • do not want to see any alterations to Stanly Park (Poyntz & Beecroft) • concerned about homes that are in the loop of the Service Road (redevelopment area) if decide to stay single family residential • want to ensure road system accounts for proper land use mix (either 50/50 or 60/40 residential/commercial) • close Bales Ave. for redevelopment

NORTH YORK SOUTH DOWNTOWN CLASS ENVIRONMENTAL ASSESSMENT
HIGHWAY 401 / YONGE STREET SERIES OF WORKSHOPS
ISSUES AND CONCERNS

ISSUE/CONCERN	COMMENTS
9) SERVICE ROAD ALIGNMENT Transition Area	• prefer Tradewind to Mid-block so it does not go through our neighborhood
Avondale	• prefer Mid-block to Tradewind. Consider Bales Avenue again so the Service Road is as far away from our neighbourhood as possible • Tradewind should not be an alternative. Will fight this alignment • want a minimum of 46 meters from the stable residential to the pavement of the Service Road
Central Willowdale Lansing	• do not want E-W link to continue through to Bayview or up to Sheppard • concerned that E-W link in the uptown may be a long time before it is completed and will hinder the effectiveness of the Service Road in total • concerned about west alignment curve to protect heritage site • want as little infiltration into neighbourhood as possible through road loops and closure
Yongeridge	• realign Beecroft west to Hwy. 401 as a ramp
Redevelopment Area	• prefer Tradewind Alignment, Mid-block severs our neighbourhood community

ISSUE/CONCERN	COMMENTS
10) 401/YONGE STREET INTERCHANGE	• flyover ramp will cause tremendous visual disruption north and south along Yonge Street • this is the gateway to North York. Flyover is not an attractive entrance feature • fear that flyover with 1 lane and 2 wide shoulders could become 2 lanes if future demand warrants • concerned about height of flyover and tilting • consider flyover or under at the Hoggs Hollow Bridge where it does not impact homes • flyover will come into Yongeridge neighbourhood without buffers • perhaps lower cost to upkeep tunnel may offset construction cost • flyover will ruin the gateway effect of the Yonge/401 interchange • could Lord Seaton traffic and EB ramp be separated?
11) SERVICING	• concern that there is not enough servicing capacity in the North York sanitary trunk sewer
12) NATURAL ENVIRONMENT	• criteria for natural environment only accounts for existing vegetation, not for making it better through this process

3.0 PROBLEM STATEMENT/NEEDS ASSESSMENT

3.1 INTRODUCTION

The Class Environmental Assessment for Municipal Road Projects asks proponents to identify and describe the problems or opportunities which the project (undertaking) expected to address. In this instance, the transportation network capacity/deficiency may or may not be obvious to the public, nevertheless it is necessary to document the rationale which leads to a conclusion that certain improvements are needed.

As stated in Section 1.4 , the purpose of the original undertaking was to provide the transportation network capacity that is needed to support the development aspirations of the South Downtown Plan.

There are three "rationales" which demonstrate the need for the Undertaking:

i) The "Transportation Network Capacity" Rationale

The existing transportation network contains an integrated highway, arterial road collector road, local road and transit system. When viewed as whole, the transportation system will not have the capacity during rush hour periods to adequately support the development associated with the South Downtown Secondary Plan.

ii) The "Planning" Rationale

Municipal planning undertaken by both the City of North York and the Municipality of Metropolitan Toronto recognizes the need for development of a metropolitan centre in North York. The studies and official plans undertaken in this regard all recognize the need for this project.

iii) The "Cost Sharing" Rationale

Improved access to North York Centre will support and provide an impetus for the economic growth and commercial activity associated with the continued development of a city centre. Funding for the greater undertaking will require significant support from the private sector partners which may or may not exist in the future.

3.2 DESCRIPTION OF THE PROBLEM

3.2.1 Transportation Network Capacity Rationale

The Transportation Department of North York is responsible for monitoring the transportation patterns in the North York Centre. An annual cordon count of traffic in and around this area is used to monitor the changes in the traffic patterns. In addition to the cordon count program, a biennial survey of employee travel patterns assists in determining changes of the mode of travel, distribution, etc.

The existing components of the transportation network are illustrated in **Appendix A-Traffic Study** and are described below. Details of all transportation analysis are outlined in **Appendix A.**

Public Transit - The Toronto Transit Commission (TTC) Yonge Subway is the backbone of the North York Centre transit system. It supplies a vital public transit service for employees, customers, clients and the residential population as a whole. Development has generally been approved to take advantage of this major transit facility. The TTC Sheppard Station provides the most immediate access to the South Downtown area.

The TTC bus service particularly on Sheppard Avenue is another integral part of the public transit system, albeit, presently lacking the passenger capacity to accommodate the demand. Developments focusing towards the Yonge/Sheppard node rely on this service.

The Transportation Analysis for the South Downtown Plan, as prepared by North York, assumed a future overall average modal split of 60% in favour of public transit, which includes a Sheppard Subway. **(See Appendix A-Traffic Study)**

Highway and Expressways - Yonge Street provides access to the provincial highway system. Highway 401 is a major east/west distributor of medium to long distance trips and provides the necessary link to the regional expressway system. During certain periods within the established rush hours, access to Highway 401 is reaching capacity.

Arterial Roads - The primary arterial roadways within the Study Area are Yonge Street and Sheppard Avenue. These major roadways are within the jurisdiction of Metropolitan Toronto.

Yonge Street is the north/south artery of the South Downtown and is recognized as North York's main street. It is the critical segment of the North York Centre road network and has been traditionally recognized as an accepted route south to the Central Business District of Toronto, and its interchange with Highway 401 provides access and attracts traffic to the Provincial highway system. Much of the traffic is neither generated by nor destined for the South Downtown, and was identified in the Transportation Analysis as background traffic. Background traffic restricts, significantly the free movement within the South Downtown. During certain periods within the established rush hours, the arterial roadway is reaching capacity.

Sheppard Avenue is also an integral part of the road network. In 1991, Metropolitan Council directed the preparation of an ESR to address the need to widen this roadway to six lanes. Approval was finalized in 1992.

Notwithstanding the available capacity on the collector roads and local roads, the transportation network as a whole is an interlocking system and must be assessed in its entirety.

Collector Roads - The collector road network are within the jurisdiction of the City of North York. North York's monitoring program shows that the collector road network is currently not operating at capacity even during rush hours.

Local Roads - North York's monitoring program indicates that, generally, the traffic patterns on the local road network have been stable over time.

The analysis of transportation requirements conducted by the City in relation to the development of the Downtown and the Uptown Plan, determined that the assumed road and transit networks serving them would not have sufficient capacity to accommodate additional development.

3.2.2 Planning Rationale

While the specific planning policies for the South Downtown falls within the jurisdiction of the City of North York, the Official Plan of Metropolitan Toronto sets out the broader planning principles and policies of the urban structure which include such elements as population, household and employment activities, and it commits Metropolitan Toronto to the coordination of the physical infrastructure necessary to permit forecasted growth. This infrastructure includes the Metropolitan transit system, the Metropolitan road system, water supply and sewage treatment facilities and the Metropolitan open space system.

The Official Plan of Metropolitan Toronto obliges the local municipalities to be responsible for the designation of land uses, zoning and development control. The Metropolitan Planning Department reviews the local planning policies and their implementation to ensure conformity with Metroplan.

3.2.2.1 Metropolitan Toronto - Metropolitan Centre Planning

In 1972, Metropolitan Toronto initiated a program which consisted of a series of background planning policy reports and formed the basis for the Official Plan for Metropolitan Toronto. The program was known as "Metroplan".

In May, 1976, a report entitled Concept and Objectives identified a number of goals and policies for the development for the urban structure. The policies included the development of Metropolitan Centres located along rapid transit facilities.

In October 1978, the Planning Committee of the Municipality of Metropolitan Toronto presented a document known as the Plan for the Urban Structure: Metropolitan Toronto, which was adopted by Metropolitan Council on January 15, 1980, and approved by the Ministry of Housing on October 10, 1980. That plan is based upon a multi-centred urban structure and it identifies North York Centre as one of the Major Metropolitan Centres.

A Major Centre is multi-functional in land use, compact and pedestrian oriented in its internal organization and design, and intensive in its development relative to those areas which are not centres.

The designation of the South Downtown (part of the North York Centre), for redevelopment consistent with these criteria is therefore, in accordance with the goals, aims and policies of the Metropolitan Toronto Official Plan.

Recently, a new draft of Metroplan has been prepared. That plan continues to recognize the importance of a multi-centred metropolitan structure with urbanization occurring primarily in the Major Metropolitan Centres, including North York.

3.2.2.2 North York - City Centre Planning

In 1976, the North York Department of Planning and Development prepared the framework for future development in North York by developing planning policies. The proposal to establish a "centre" in the Yonge Street corridor between Highway 401 and Cummer/Drewry Avenues ("the Yonge Street Centre") was specifically identified. The preparation of these planning policies was in keeping with the concept and objectives of the planning policies being developed by Metropolitan Toronto.

Subsequently, the Yonge Street Redevelopment Study report was prepared. It described many of the constraints and/or advantages of attempting to create a Yonge Street "Centre" (North Yonge Centre). The report was first considered by the North York Planning Board in June, 1977, and by Council in July, 1977. In July, 1977 a joint meeting of the Planning Board and Council conducted a hearing and presented the report to the public which can be considered as the start of a lengthy and complex planning process in respect of the redevelopment of the North York Centre. This process has, at all stages, included extensive public consultation and participation.

In February 1978, a report entitled Yonge Street Centre Strategy was presented to the Planning Board and recommended policies which attempted to settle areas of conflict while promoting the desired planning goals. In September 1978, Council directed that an official plan amendment be prepared to address the planning goals and policies for the North York Centre based on the conclusions of the Yonge Street Centre Strategy. This gave rise to District Plan Amendment D-11-48 as previously mentioned, which formed the foundation for the redevelopment of the North York Centre.

The approval of this District Plan Amendment was subject to a five year review. This review was initiated in April of 1983, and included recommendations to expand the limits of the North York Centre and to increase maximum densities on a number of sites.

In January 1985, a transportation analysis conducted by Metropolitan Toronto, found that the proposed amendments to the plan would necessitate a "ring" road system from Poyntz Avenue to Cummer Avenue among other road improvements to facilitate traffic circulation and access. The analysis suggested that the ring road could serve one of two purposes. It could be used either to provide an arterial function (thus freeing Yonge Street to operate as an arterial road) or to provide a collector function. The analysis recognized that both concepts had merit, but concluded that the former should be preferred, because it would be easier to implement.

The transportation analysis concluded, more specifically:

i) the predicted traffic volumes associated with the development of the North York Centre indicated a specific need for a transfer of traffic, particularly shorter distance trips destined to the Centre from Yonge Street to a parallel route;

(ii) as traffic volumes increase, Yonge Street would not be able to support additional direct site access and maintain its role as an arterial road; and

iii) if the ring road was not implemented, severe congestion on Yonge Street and the connecting arterial roads would promote inappropriate and extensive infiltration of the adjacent residential neighbourhoods.

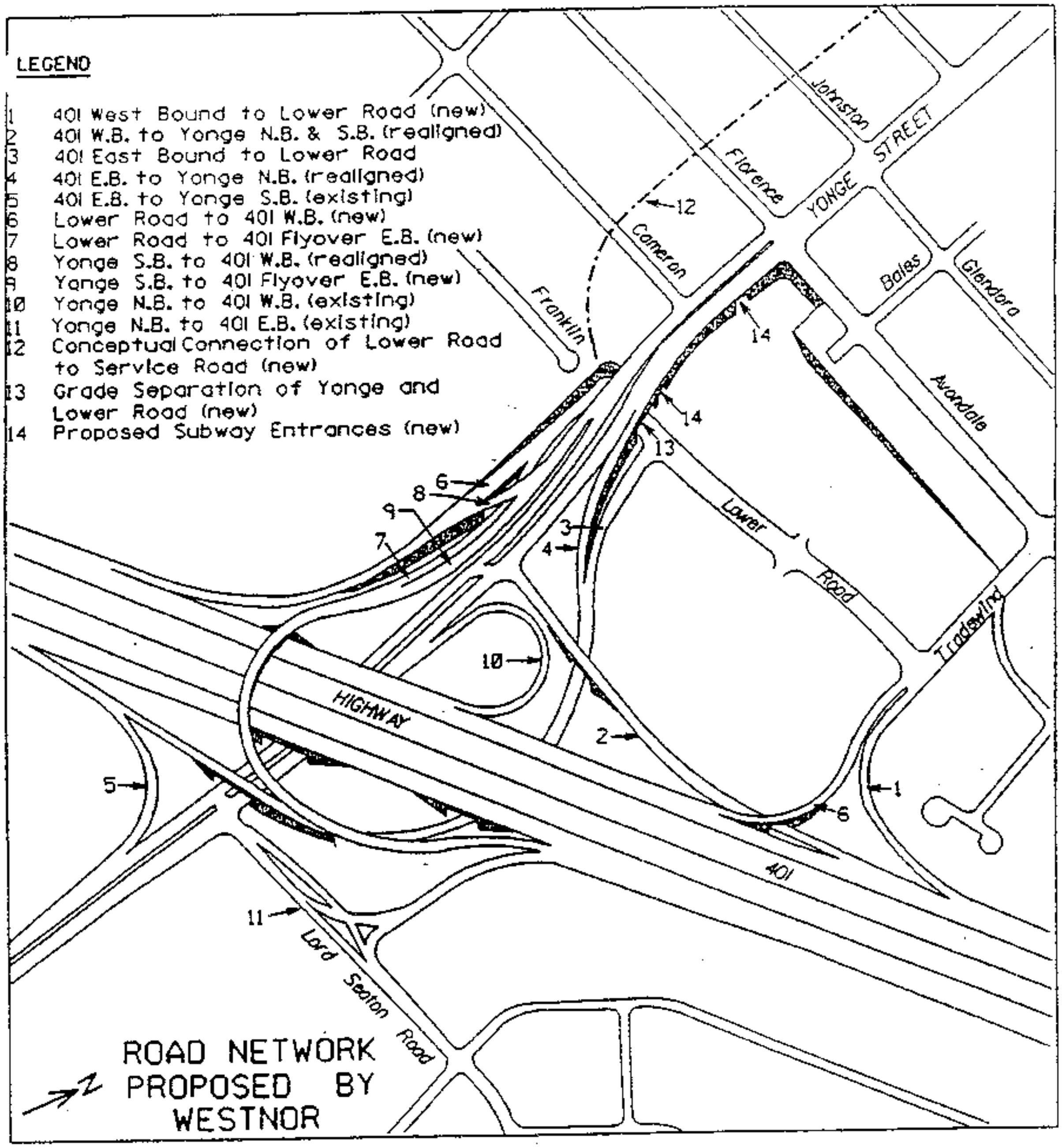
The scale of the proposed road improvements provoked considerable reaction from the residential communities which resulted in Council directing that the North York Centre Plan be separated into two plans, the "Downtown" Plan and the "Uptown" Plan.

3.2.2.3 Developing the South Downtown Secondary Plan

Council first directed staff to commence drafting a plan for the South Downtown Area in January of 1992 in order to complete the North York Centre initiative and in response to the development proposal made by Westnor Limited on lands previously recognized as the McLean Hunter site.

Staff completed the background, research, committee and community consultation and documentation for the first of seven (7) reports in November 1992. Report Number One outlined the land use, the density and transportation network capacity scenarios generated by discussions with the committees and the conceptual work of Westnor's Transportation Consultant, BA Consulting Group. Planning staff initially developed seven (7) land use scenarios with varying densities and land use splits between residential and commercial uses. As part of the Master Planning Process, the Transportation Department, examined minimum, medium and maximum transportation capacity scenarios based on the seven (7) conceptual secondary plan options. Because of the number of combinations of conceptual secondary plan options, three possible scenarios were initially chosen as the basis for further study. Evaluation for each of all three scenarios assumed a 50/50 split between residential and commercial land uses, and a 50% modal split. The evaluations were also based on a road network shown in **Exhibit 3.1** as prepared by BA Consulting Group for Westnor. It should be noted that for analysis purposes, it was considered acceptable if any component of the network was over capacity by less than 5%.

The three initial transportation capacity scenarios and a subsequent fourth (average option) are presented below:



INITIAL ROAD NETWORK PROPOSAL

1. **The Maximum Scenario**

   The Maximum Scenario included approximately 1,250,000 m2 (13.5 million square feet) of gross floor area, representing a Floor Space Index (F.S.I.) of 4.5 over the entire area. It should be noted that this gross floor area is in addition to gross floor area permitted by the existing Official Plan.

   In this scenario, all parallel routes were over capacity. Even though they were over by less than the 5% acceptable limit, this scenario was not pursued further because <u>all</u> parallel routes were over capacity.

2. **The Medium Scenario**

   The Medium Scenario included approximately 700,000m^2 (7.5 million square feet) of gross floor area, representing a variation in Floor Space Indexes across the study area from 1.5 to 4.5 As with the maximum scenario, this gross floor area is in addition to that currently permitted by the Official Plan. In this scenario, all routes were within acceptable capacity limits with room to maneuver.

3. **The Minimum Scenario:**

   A Minimum Scenario of 580,000m^2 (6.2 million square feet) of gross floor area was also evaluated. This evaluation revealed that only Yonge Street was slightly over capacity.

4. **The Average Scenario**

   Due to the amount of maneuvering room available in the Medium Scenario, a fourth scenario based on 75% of the Maximum Scenario was also evaluated. It included approximately 900,000 m^2 (9.7 million square feet) of gross floor area and represents the maximum capacity that the road network could support, at a 50% modal split. As with the Medium Scenario, all routes were within acceptable limits of capacity.

Further analysis of the Average and Maximum Scenarios, assuming a 60% transit modal split for the South Downtown, revealed that the Maximum Scenario at 60% of modal split had similar results to the Average Scenario at a 50% modal split. A 60% modal split could be achieved through the realization of a Sheppard Subway line.

Staff also analyzed the Maximum and Average scenarios with and without the southbound Tradewind to westbound Highway 401 ramp. The Maximum Scenario without this ramp put some components of the road network over capacity and Sheppard Avenue, both east and west of the North York Centre, over capacity, which indicated that the diverted trips cannot be managed. This was the case in each scenario tested. It has therefore been concluded that this ramp is crucial.

3.2.2.4 Conclusion of the South Downtown Capacity Analysis

North York's Capacity Analysis set the parameters within which detailed land use and density evaluations could be undertaken. The maximum gross floor area figure of 900,000 m^2 (9,687,836 square feet) presented by the Average Scenario was considered to be the ceiling for further consideration and would require certain network improvements as previously discussed.

Staff indicated that a subway station at Avondale Avenue and Yonge Street would be desirable if a high density commercial development close to Highway 401 is to be pursued. Concerns were raised that the subway station in combination with a major "node" or focus south of Sheppard Avenue could detract from the existing focus between Sheppard Avenue and Park Home/Empress Avenues. The south entrance to the Sheppard Station is at the north end of the Proctor and Gamble building, two blocks from the Westnor site. Staff concluded that, at this time, Council not pursue this new station.

Once the Average Scenario was established as the maximum and optimum land use and transportation option, North York began its elicitation of public input.

Having completed Report Number One for Public review, North York requested that public comment on the scenarios be obtained. A public workshop was held on January 1993 and an official Public Information Centre in February, 1993 to provide the public an opportunity to see the options and give feedback to staff.

In March, 1993 staff presented Report Number Two to the PAC which detailed all of the comments received during the public consultation process. Comments, where appropriate, were integrated into the conclusions of Report Number One.

Report Number Three was brought before the PAC in May, 1993 which narrowed the alternative transportation network based on comments received from the public and the Technical Committees. An open house and public workshop were held in May, 1993 and June, 1993 respectively to obtain feedback on the preferred option set out in Report Number Three. The results of these public meetings gave rise to Staff's Report Number Four which was presented to the PAC in July, 1993. Report Number Four outlined the Phase One Plan and the Vision (as previously outlined) for the land use and transportation infrastructure for the South Downtown area.

3.2.3 The "Cost Sharing' Rationale

During the preparation of Report Number Four concern was raised over the financial feasibility of the ultimate transportation infrastructure for the Vision. As a result, in Report Four, Staff recommended that only the Phase One Plan be pursued with a view to completing the Vision when funding could become available.

In October, 1993 the PAC received Report Number Five which outlined the responses regarding the recommendations of Report Number Four to proceed with the Phase One Plan only. A public meeting of the PAC was held in October, 1993 to receive public submission regarding Report Numbers Four and Five. At this meeting, members of the PAC endorsed the Phase One Plan and directed staff to meet with the Technical Committees, Community Consultation Committee and property owners. These meetings were held in November 3, 1993.

In December of 1993 the PAC received and endorsed staff Report Number Six which discussed densities for the Transition Areas using the Phase One Plan.

In May, 1994 Westnor, Anndale Properties and Crestview Investments offered to contribute the municipality's share of a Canadian Ontario Infrastructure Works project should an application be successful. Council accepted such offer, and a formal COIW application was submitted for the transportation infrastructure improvements required to support the long term Vision for the South Downtown Secondary Plan.

Finally on July 13, 1994 the members of the PAC received and endorsed the recommendations of Report Number Seven which suggested that the long term Vision for the area be pursued assuming that funding would be available through the COIW program.

3.2.4 The Problem Statement Summary

For purposes of the greater undertaking, the Problem Statement was prepared and presented to the stakeholder groups as follows:

"A road network has been developed to support the existing and future development level in the North York Centre as defined in the current Official Plan. However, this network will not have sufficient capacity to support auto traffic that will be generated by future development in the South Downtown as proposed in the Draft South Downtown Secondary Plan."

The comments received during the presentation of this problem statement to the public indicated that Stakeholders generally agreed with the statement and the fact that future development proposed in the Draft South Downtown Secondary Plan could not be supported with the proposed road network. Constituents did not necessarily agree with the densities of development being proposed, however, did agree that some level of development is appropriate for the south downtown and that infrastructure improvements are required to lessen the impact of such development on the surrounding neighbourhood.

4.0 EXISTING AND FUTURE CONDITIONS

4.1 BACKGROUND

The establishment of an existing and future baseline environmental condition is integral to the prediction of net environmental effects. By definition, the description of the environment must consider natural social, economic and cultural features. The existing and expected future conditions within the study area are used as baseline conditions from which to project the likely impacts of various roadway alignments including socio-economic factors and the character of the existing development. Certain socio-economic elements have been reviewed throughout the South Downtown Secondary Plan process, however, this report looks at the specific impacts of the transportation infrastructure improvements on the neighbouring properties.

4.2 STUDY AREA

For the purposes of the South Downtown Secondary Plan and this report, the overall study area is depicted in **Exhibit 4.1**. The boundaries of this study area have evolved through numerous community consultation and feedback sessions with area landowners. As it is currently delineated, the study area encompasses the "Vision" of the South Downtown Secondary Plan, including all areas that might potentially be affected by the Plan, and the roadway infrastructure alternatives.

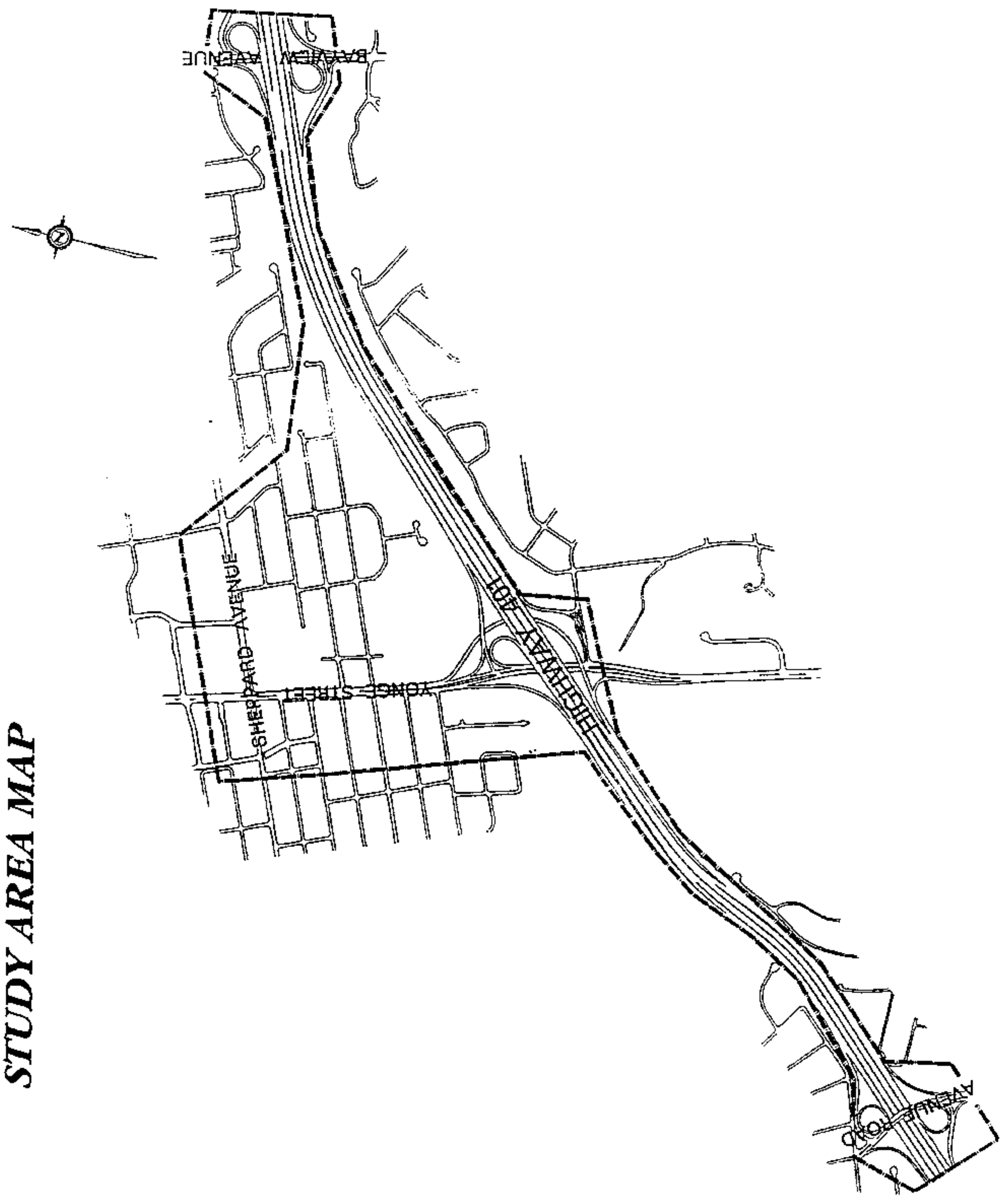
4.3 THE NATURAL ENVIRONMENT

With exception to the west Don River Tributary, little remains of the natural environment endogenous to the study area. The Draft Secondary Plan endeavors to rectify this situation by requiring extensive buffering and linked park open space throughout. Also, through future development applications, the City will secure open space to contribute to the natural environment.

The valleyland associated with the West Don River tributary that flows under the Hoggs Hollow bridge is the most prominent natural environment found within the study area. It appears that the Hoggs Hollow bridge west to Avenue Road is required to be widened in order to accommodate the new ramping system to Highway 401 from Yonge Street. Impacts to the valleyland under the Hoggs Hollow bridge may occur if this improvement is undertaken.

EXHIBIT 4-1

STUDY AREA MAP



The Metropolitan Toronto and Region Conservation Authority, (MTRCA) provided flood plain mapping for the Hoggs Hollow area. **Exhibit 4.2** shows the limit of the floodline under the Hoggs Hollow bridge between Yonge Street and Avenue Road. Physical obstructions are not permitted within this zone and will place certain restrictions on the construction alternatives for the bridge design.

The MTRCA also provided the following information with respect to surficial geology, recreational uses and valley vegetation:

Surficial Geology: The majority of the Yonge Street/Highway 401 area is covered by Till; a silt to clayey silt (Halton, Kettleby, Sunnybrook, Meadowcliffe). The area immediately below the Hoggs Hollow bridge closest to the river bed is Alluvium which consists of sand, silt, clay and muck including Pleistocene Alluvium. Surrounding the flood zone, the earth consists of Undifferentiated Glacial and Interglacial Deposits. **Exhibit 4.3** delineates surficial geology zones.

Valley Vegetation: The Hoggs Hollow valley corridor contains a variety of vegetation types including; manicured, meadow, successional and woodlands. There are no significant wetland designations or environmentally significant sites. **Exhibit 4.4** shows the limits of vegetation types within the Hoggs Hollow bridge area

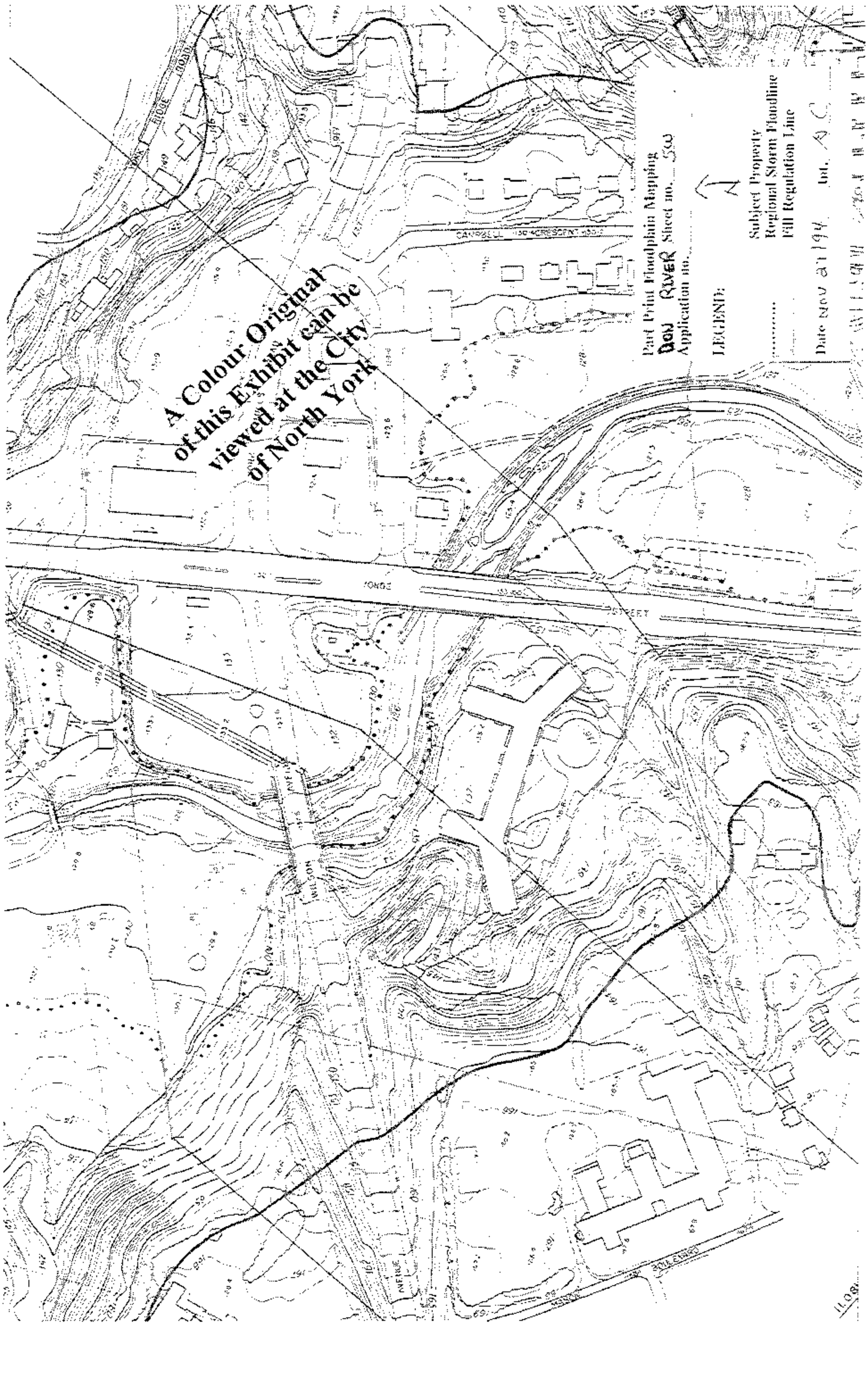
Recreation: **Exhibit 4.5** provides a view to the various recreational uses in the Don River Valley. The Hoggs Hollow bridge area is entirely used for the Don Valley Golf Course which is a public course owned by the Municipality of Metropolitan Toronto.

4.4 THE SOCIO-ECONOMIC ENVIRONMENT

4.4.1 Existing Land Use

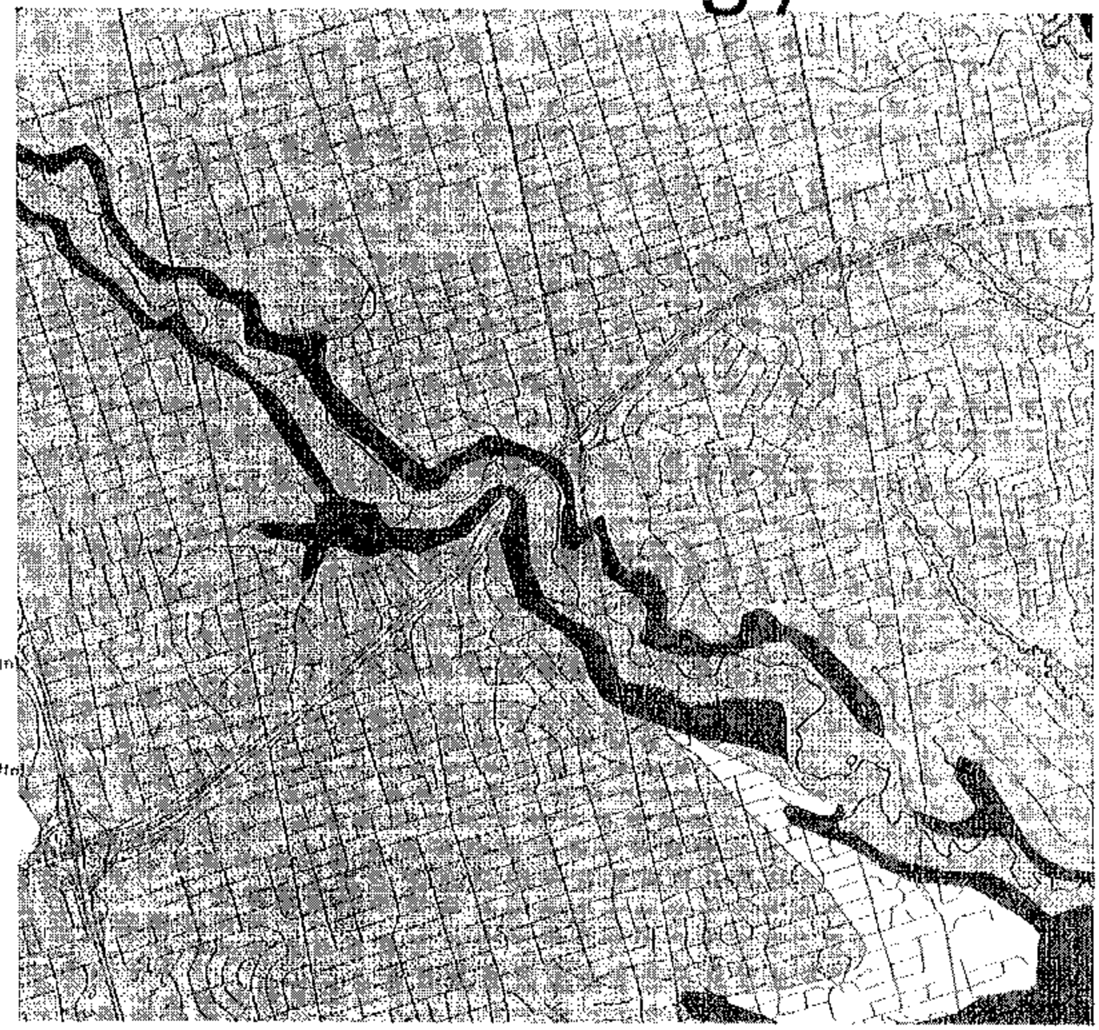
The South Downtown area is characterized by a mix of low density residential housing, large commercial developments, institutional uses and strip retail businesses associated with Yonge Street activity. While

EXHIBIT 4-2


A Colour Original of this Exhibit can be viewed at the City of North York
Part Print Floodplain Mapping
DON RIVER Sheet no. 5
Application no.
LEGEND:
Subject Property
Regional Storm Floodline
Fill Regulation Line
Date NOV 21 1994 Int. A.C.
YONGE STREET
WILSON AVENUE
CAMPBELL CRESCENT

Surficial Geology

A Colour Original of this Exhibit can be viewed at the City of North York



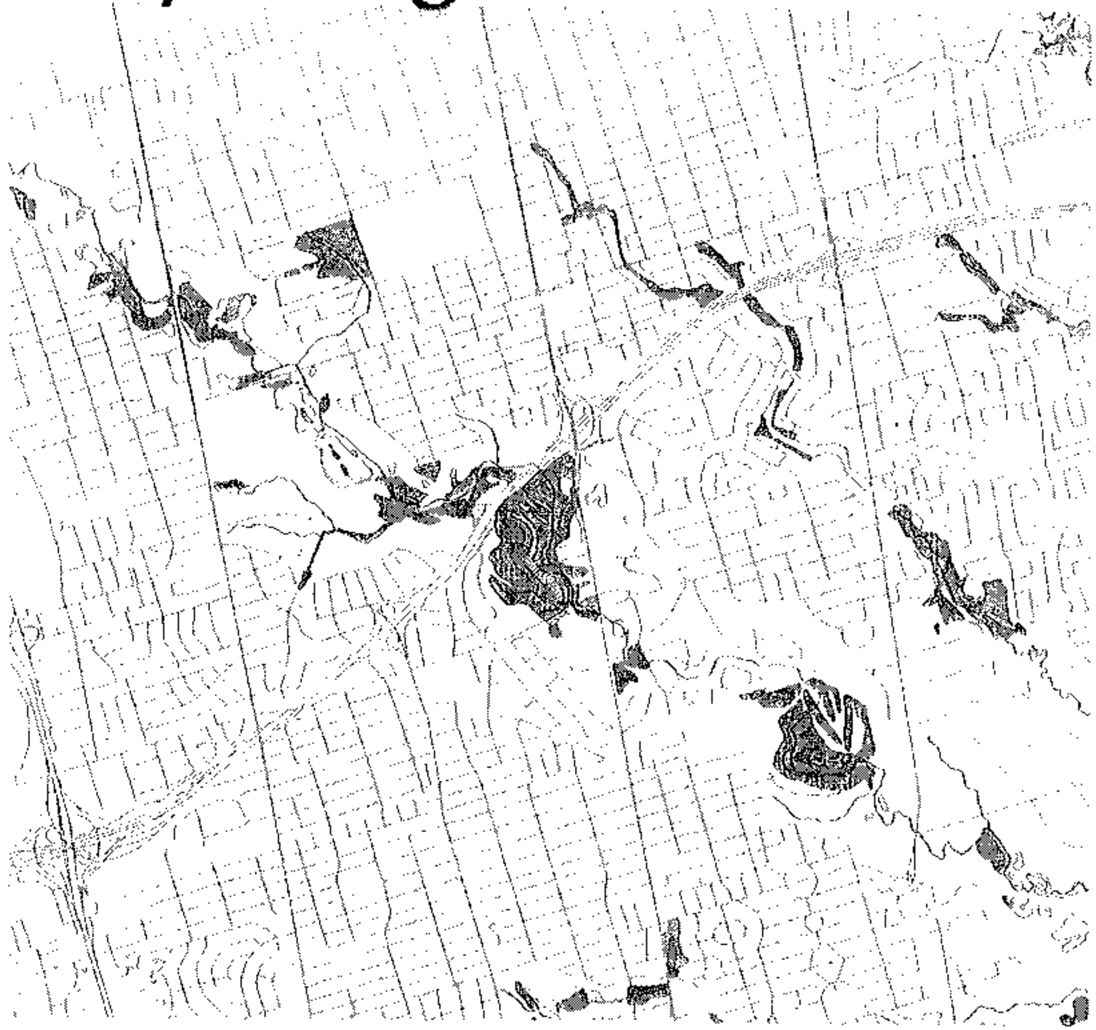
River
Street
Roads
Surficial Geology

- Alluvium : gravel, sand, silt, clay, muck. (incl. Pleistocene alluvium)
- Organic Deposits : peat, muck
- Glaciolacustrine Deposits : sand and silty sand; gravelly sand
- Glaciolacustrine Deposits : massive to laminated silt and clay
- Glaciofluvial Deposits : mainly sand; mainly gravel
- Ice Contact Drift Deposits : mainly sand; mainly gravel
- Till : silt to clayey silt (Halton; Kettleby; Sunnybrook; Meadowcliffe)
- Undifferentiated Glacial and Interglacial Deposits

meters
0 900 1800

Valley Vegetation

A Colour Original of this Exhibit can be viewed at the City of North York



River

Corridoor Vegetation

manicured

meadow

plantation

successional

wetareas

woodland

Street

Roads

meters

0 900 1800

Recreation

A Colour Original of this Exhibit can be viewed at the City of North York

River

Trails

Parks

Golf Courses

Street

Roads

meters

0 900 1800

primarily residential in nature, it is a vibrant and changing neighbourhood, full of viable enterprises that attract workers, users and residents to the area. However, upon examination, there is evidence of instability in the South Downtown, specifically associated with Yonge Street.

There are a number of absentee landlords who own residential property in the vicinity of the South Downtown. This suggests that the owners could be speculating on the possibility of seeing a change in land use designations in the next few years. The incidence of absentee landlords seems to decrease with distance from Yonge Street, suggesting that this area is in fact in transition and should be considered for residential intensification and redevelopment. Moving further away from Yonge Street, the residential area becomes more stable with residents of the area who have displayed less affinity for transitional movement.

Along Yonge Street there exist a number of large developments that provide a commercial element to the South Downtown. These include: the Proctor and Gamble site (.73 ha, 1.8 ac), the North York Square site (1.21 ha, ac), the Warner Bros. building (.28 ha, .69 ac) and the National Grocers /Westnor site (9.47 ha, 23.4 ac.) being the best examples. These developments and others commercial businesses along Yonge Street, south of Sheppard Avenue provide employment for the South Downtown and the City of North York.

Yonge Street, south of Sheppard Avenue also hosts a variety of lower density mixed use developments such as the Willowdale Plaza (Miracle Food Mart, National Sports), a funeral home, a mausoleum, several gas stations, fast food and sit in restaurants and a number of other convenience, commercial and retail businesses.

There are a number of vacant parcels of land, some of which are under construction and others that have applications for redevelopment pending. These "special sites" are detailed in section 4.4.2, Proposed Development-Special Sites.

4.4.2 Proposed Development-Special Sites

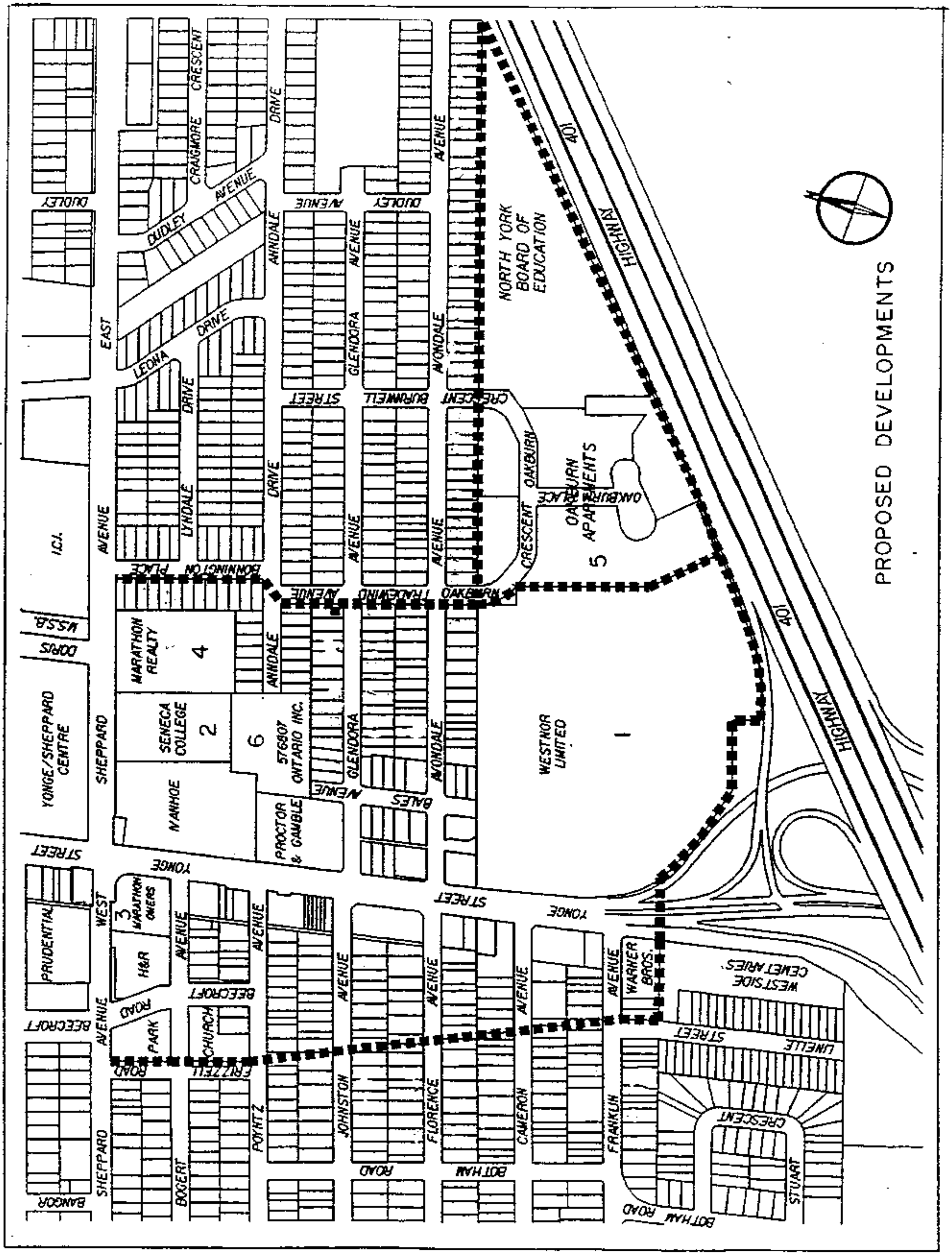
The are a number of development applications either pending or under construction in the South Downtown area that warrant discussion here (see **Exhibit 4.6**).

1) Westnor Limited owns a significant property assembly in the north east quadrant of Yonge Street and Highway 401 which consists of approximately 9.47 hectares (23.4 acres) of gross site area. An application was made by the owners on June 10, 1994 and has since been revised to account for public input. Circulation of the application commenced in December of 1994 and is yet to be completed. Westnor has referred its application to the Ontario Municipal Board for consideration. It is the Westnor site that provided the momentum for the South Downtown Secondary Plan Review. In order to accommodate the proposed density of use proposed for this site, certain infrastructure improvements are required.

   The applicant is proposing to develop the site for a large, high quality, mixed use project that will function as the "gateway" to the City of North York. Uses are to include office and residential, retail and hotel to a total of 5.5 million square feet and a maximum density of approximately 5.0 times the area of the site. In order to construct this project, both Official Plan and By-law amendments are required.

2) Seneca College owns land located on the south side of Sheppard Avenue immediately east of Yonge Street comprised of 0.98 hectares (2.47 acres). An application for rezoning has been submitted, however, the applicant continues to search for financial partners prior to proceeding. The proposal consists of two parts; the office portion (43,665 square meters, 470,021 square feet) and the school portion (14,642 square meters, 157,610 square feet). Approval has been granted for the school portion only.

EXHIBIT 4·6



PROPOSED DEVELOPMENTS

3) One application has received approval and is currently under construction on the south west corner of Yonge Street and Sheppard Avenue. Southwest Sheppard Investments Ltd. have commenced construction of a 1,002 sm (10,785 sf.) retail and 33,407 sm (359,601 sf.) office project on a 0.44 hectare (1.08 acre) site adjacent to Yonge Street.

4) Marathon Realty has received approval for a 3,937 sm (42,379 sf.) retail and a 34,933 sm (376,028 sf.) office building on 0.40 hectares (0.98 acres) on the south side of Sheppard Avenue immediately west of Yonge Street. Construction has not yet commenced.

5) Anndale Investments Limited and Crestview Investment Corporation own the lands bounded by Oakburn Crescent and Highway 401 known at the Oakburn Apartment Site. The site is approximately 3.9 hectares (9.65 acres) in area housing 26 low-rise residential buildings containing 286 rental housing units. A proposal has been developed by the owners for 1,500 residential units both condominium and rental type and a certain amount of open space. The application for Official Plan Amendment is currently being reviewed along with the South Downtown Secondary Plan Review. An application to amend the zoning and an application under the Rental Housing Protection Act is expected by City of North York Staff.

6) Finally, discussions have occurred with the owner of a block of land known as the Lansing Court Apartments located at the north end of Bales Avenue and the west end of Anndale Avenue. The proposal would consist of three (3) high-rise apartment buildings and some street townhouses along the service road frontage with a maximum gross floor area of 4.5 time the area of the lot. The site's zoning currently permits only 3.5 GFA. Applications have not yet been submitted for this site.

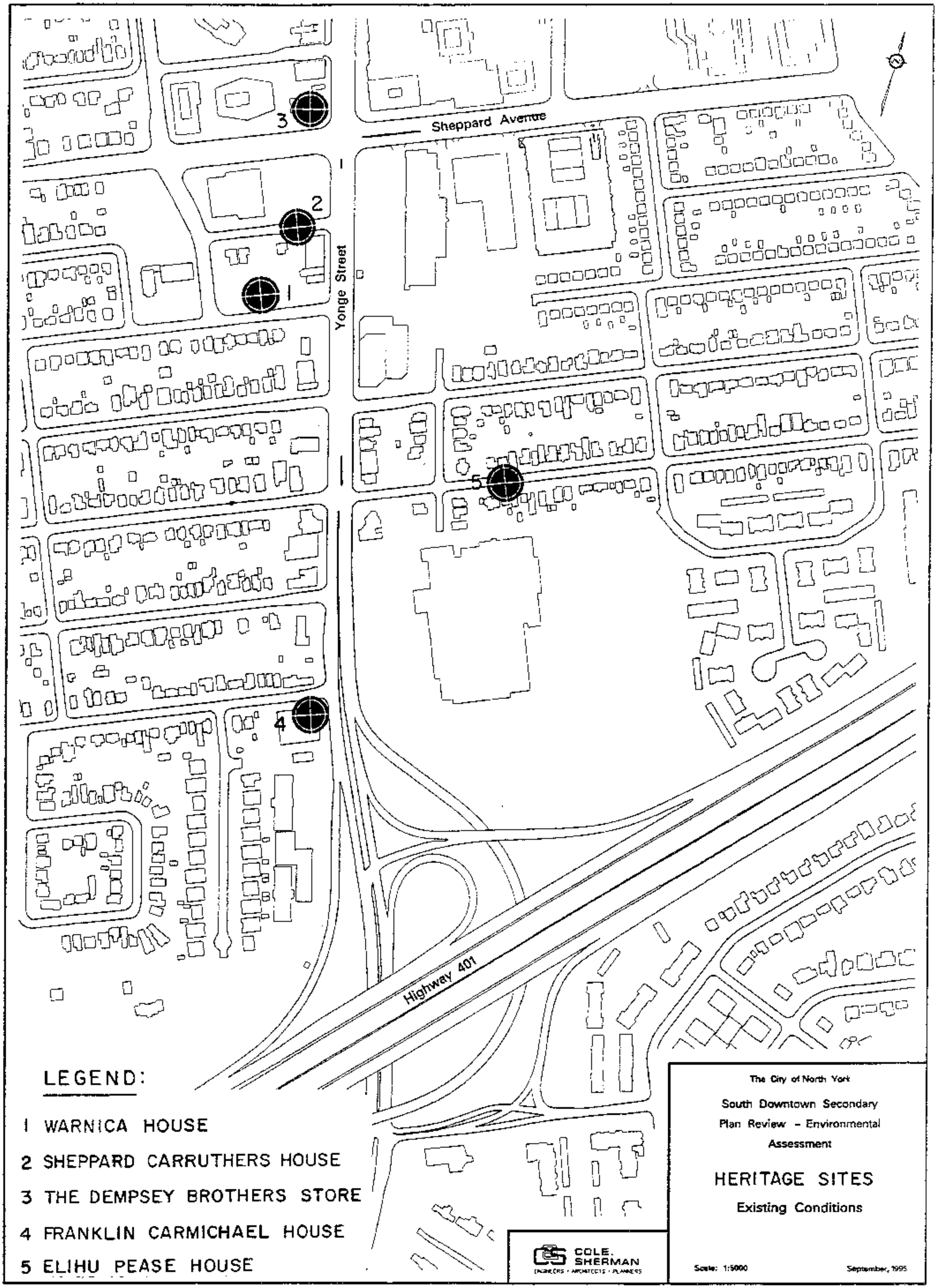
4.5 THE CULTURAL ENVIRONMENT

The City of North York, in concert with the North York Historical Board have developed an inventory of historically and architecturally significant sites and buildings that contribute to the cultural environment of the South Downtown area, **(see Exhibit 4.7)**. There are five (5) such sites within the study area, two (2) of which have been demolished, two (2) of which exist but are not *designated* and one (1) of which is fully designated as an historically significant site. To be designated, a site must have undergone a public process which includes public input and the passing of a site specific by-law which ultimately is registered on title. Once designated, the property cannot be demolished without considerable delay, or altered in any way that would jeopardize the heritage values recognized in the underlying reasons for the designation. A designation does not prohibit demolition, however it makes the process extremely cumbersome.

The two demolished properties include the Warnica House (1915) at 40 Poyntz Avenue and the Sheppard-Carruthers House (1865) at 25 Sheppard Avenue West. The two properties that are of some importance however, have never been designated include The Dempsey Brothers Store (1860) at 4804 Yonge Street and the Franklin Carmichael House (1920) at 21 Cameron Avenue. The Franklin Carmichael House is so named for its early owner, Franklin Carmichael of the Group of Seven. He lived in the house until his death, along with his wife. His daughter is the current owner of the home. A Heritage Structure Report was presented to the Historical Board in 1991 for consideration.

Finally, the one designated property is the Elihu Pease House (1834) at 34 Avondale Avenue (designation by-law #31251). The Pease House is a rare survivor of the rural Village of Lansing and has connections with important early North York settlers, the Pease and Cummer families. It preserves the scale and ambiance of an Upper Canada home and a vanished way of life. The house has been moved from its original location, however remains on the original farm lot. The Pease family built the tannery business at Yonge Street and Sheppard Avenue in 1834.

EXHIBIT 4·7



Sheppard Avenue
Yonge Street
Highway 401
1
2
3
4
5
LEGEND:
1 WARNICA HOUSE
2 SHEPPARD CARRUTHERS HOUSE
3 THE DEMPSEY BROTHERS STORE
4 FRANKLIN CARMICHAEL HOUSE
5 ELIHU PEASE HOUSE
COLE, SHERMAN
The City of North York
South Downtown Secondary Plan Review - Environmental Assessment
HERITAGE SITES
Existing Conditions
Scale: 1:5000
September, 1995

4.6 TRANSPORTATION

The existing transportation infrastructure consists of a combination of roadway, highway, subway, bus and pedestrian facilities.

The arterial roads within the study area include Yonge Street (six lanes) and Sheppard Avenue (four basic lanes being widened to six). Bayview Avenue and Avenue Road are at the limits of the study area and as such are unaffected by this project. To the east and west of Yonge Street there exists minor arterial, collectors, and local roads that serve stable residential neighbourhoods.

Highway 401, a major core/collector freeway, runs east-west at the south end of the study area. Yonge Street and Highway 401 meet at a full interchange configured in a modified partial cloverleaf design.

The Yonge Street TTC subway line runs under the Yonge right-of-way and serves the area through the Sheppard Subway Station. The Sheppard Subway line is currently under construction and is assumed to be in operation for the future conditions. It will also serve the area through the Sheppard Subway Station.

There is skeleton bus service on Yonge Street, including all-night service from downtown Toronto. On Sheppard Avenue, there is very high frequency all-day bus service, that will be replaced, at least in part, by the Sheppard Avenue subway line.

Due to the existing transit modal split and the high density in this area, pedestrian activity is relatively significant and is assumed to increase in the future. All arterial and collector roads in the area have concrete sidewalks on both sides of the street. Pedestrian access is maintained through the east portion of the Yonge Street and Highway 401 interchange by use of the tunnel for the ramp W-N.

5.0 ALTERNATIVE SOLUTIONS TO THE UNDERTAKING

5.1 INTRODUCTION

The need for the South Downtown Secondary Plan was created through the joint commitment by the City of North York and Metro Toronto to create an urban centre along Yonge Street. In preparing the policies for the South Downtown Secondary Plan, North York has prescribed a level of development that will create a significant influx of traffic congestion. This traffic generation will ultimately exceed the capacity offered by the existing transportation network. This results in the problem statement as set out in Chapter 3.

In order to generate alternative solutions to this problem, this report has assessed the following options:

- Do Nothing (i.e., assumes future development will be accommodated by the existing road network and provides a benchmark against which all other alternatives are assessed);
- Transit Improvements (i.e., increase Subway, Municipal Bus and/or Provincial Bus Service beyond a 60% modal split); and
- Roadway Improvements (i.e., construct new and/or widen Local, Collector, Arterial and Provincial Roads).

5.2 DO NOTHING

The 'do nothing' alternative represents what is expected to happen if none of the alternatives being considered are carried out. Normal on-going roadway maintenance or improvements (including the Sheppard Avenue widening) and a 60% transit modal split, are included as part of the 'do nothing' alternative.

Impacts on South Downtown vehicle access and circulation caused by the 'do nothing' alternative would be unacceptable to the public and transportation authorities involved in this study because of severe traffic congestion and higher safety risks (i.e., North York, Metropolitan Toronto and the Ministry of Transportation).

As indicated in Chapter 3, Section 3.1-Planning Rationale, the Uptown, Downtown, and South Downtown planning areas together form the North York Centre. A transportation analysis conducted by Metropolitan Toronto in

1985 for the North York Centre concluded that a "ring" road system would be needed to facilitate circulation of traffic, particularly shorter distance trips destined for the Centre from Yonge Street. If the ring road was not implemented, severe congestion on Yonge Street and the connecting arterial roads could promote inappropriate and extensive infiltration of traffic into the adjacent residential neighbourhoods. Therefore, the evaluation of alternatives must take into consideration transportation requirements of both the South Downtown area and North York Centre as a whole.

5.3 TRANSIT IMPROVEMENTS

As previously noted, the City of North York and the Toronto Transit Commission (TTC) have analyzed the potential improvements of the transit system in the South Downtown area. Aside from the Sheppard Subway (which is already scheduled for construction) the most significant improvement to transit could be the addition of a subway station south of Sheppard Avenue at Avondale. Since the entrances to the Sheppard station on the Yonge line are at Poyntz Avenue, it is unlikely that a new subway station would improve the transit modal split beyond the assumed 60%. Furthermore a review of transit modal split information (1986-91 Transportation Tomorrow Survey) for areas with development and transportation characteristics similar to those proposed for the South Downtown (e.g.. Bloor/Yonge, St. Clair/Yonge, Eglinton/Yonge), has indicated that the assumed 60% modal is an acceptable target but is unlikely to be exceeded. Consequently, the ideal of improved transit to solve the future traffic congestion was eliminated as an alternative to the to the problem identified in Chapter 3.

5.4 ROADWAY IMPROVEMENTS

After screening each alternative, it has been concluded that roadway improvements are needed to address the peak period capacity deficiency problem previously identified. Improving the road network will allow auto traffic to move through intersections and along roadways efficiently. In keeping with the previous studies and the analysis of future baseline traffic conditions the study team concluded that the improved road network would have to incorporate the following characteristics to provide sufficient traffic capacity:

- extensions of the east and west service roads
- grade separated connection of the service roads across Yonge Street.
- new and/or improved ramp access to and from Highway 401.

5.5 CONCLUSION

In summary, throughout the Secondary Plan review and identification of the problem statement for this undertaking, it has been demonstrated that the alternative of improving the road network is the one that best satisfies the goals of the Plan and the municipality. Chapter 6 will outline the generation of alternative road network improvements to be used in the evaluation process.

6.0 ALTERNATIVE DESIGNS

6.1 INTRODUCTION

As concluded in the previous section, roadway infrastructure improvements are required to solve the problem. These will include reconfiguration of the Yonge Street and Highway 401 interchange as well as additional service road links and improvements to Yonge Street. This chapter of the report will describe the criteria used to generate the alternatives, describe the alternatives which were generated and analyze/evaluate the alternate roadway networks developed.

6.2 ROAD NETWORK DESIGN OBJECTIVES

Roadway networks were developed to meet the future development objectives of the North York South Downtown Area. This process was divided into five sections: i) East Service Road, ii) West Service Road, iii) East-West Link (Lower Service Road) iv) Yonge and 401 Interchange and v) Hogg's Hollow Bridge Widening/Highway 401 capacity.

Alternatives were developed for these portions of the total network following the "Rationale Used to Select Alternatives Studied" as shown below.

East Service Road (North-south continuation of the existing Service Road in the Downtown, east of Yonge Street)

- Must connect to Doris Avenue at the north end
- Must connect to east-west link and Highway 401 ramps at the south end
- Alignment far enough east of Yonge Street to allow a signal at Avondale Avenue
- Capacity sufficient to service the proposed development in the South Downtown, the Downtown and the Uptown Official Plans

West Service Road (North-south continuation of the existing Service Road in the Downtown, west of Yonge Street)

- Must connect to Beecroft Road at the north end
- Must connect to east-west link and Highway 401 ramps at the south end
- Alignment far enough west of Yonge Street to allow a signal at Florence Avenue
- Capacity sufficient to service the proposed development in the South Downtown, the Downtown and the Uptown Official Plans

East-West Link (Lower Service Road) (East-west link between the West Service Road and the East Service Road)

- Alignment far enough north of Highway 401 to allow the ramps to terminate at signals
- Capacity sufficient to service the proposed development in the South Downtown, the Downtown and the Uptown Official Plans
- Grade separated at Yonge Street
- Acceptable traffic delays during construction

Interchange

- Provide additional E-N ramp into the Westnor site
- Provide additional N-W ramp out of the Westnor site
- Provide access to East-West link from the west
- Provide new free-flow N-E ramp off of Yonge Street
- Provide access to 401 east and west from the West Service Road
- Ramp capacity sufficient to service the proposed development in the South Downtown, the Downtown and the Uptown Official Plans
- Acceptable traffic delays during construction

Hogg's Hollow Bridge Widening - Highway Capacity

- Must provide an extra westbound-collector lane over the valley to allow proper lane continuity and balancing
- Acceptable traffic delays during construction

6.3 GENERATION OF ALTERNATIVE ROAD NETWORK DESIGNS

Using the rationale discussed above, alternative designs were generated to solve the problem.

There were many alternatives considered for the interchange including i) N-E ramp tunnel, ii) N-E ramp inner loop (south-west quadrant) iii) N-E ramp from the East Service Road and iv) N-E ramp under the Hogg's Hollow Bridge. All of the above were considered at a draft level of detail and screened due to geometric constraints (e.g. not buildable to acceptable standards). The remaining interchange alternative as seen in Exhibits 6.1, 6.2 and 6.3 was developed to a higher level of detail and matches into any of the service road scenarios considered.

Only one east-west link design was considered, for the following reasons. To service future development, it was determined that the link should be between Avondale Avenue and the terminus of the additional Highway 401 ramps. As well, it was necessary to grade separate the link with Yonge Street, while avoiding the existing Yonge subway tunnels. These criteria placed the east-west link in its position as shown in **Exhibits 6.1, 6.2 and 6.3**.

Analysis of the lane balancing, continuity, weaving and operations of Highway 401 show that an additional westbound collector lane is required over the Hogg's Hollow Bridge (Appendix A). Various lane realignment and structural alternatives were considered including substandard shoulders widths and a cantilever off of the existing structure. The only acceptable widening technique was determined to be structural widening utilizing additional piers to the valley floor.

All of the service road alternatives carried forward to the evaluation stage can be seen in **Exhibits 6.1, 6.2 and 6.3.** For the East Service Road these include 3 alternatives namely, Tradewind, the Combination and the Midblock. For the West Service Road Alternatives #1 and #2 were carried forward.

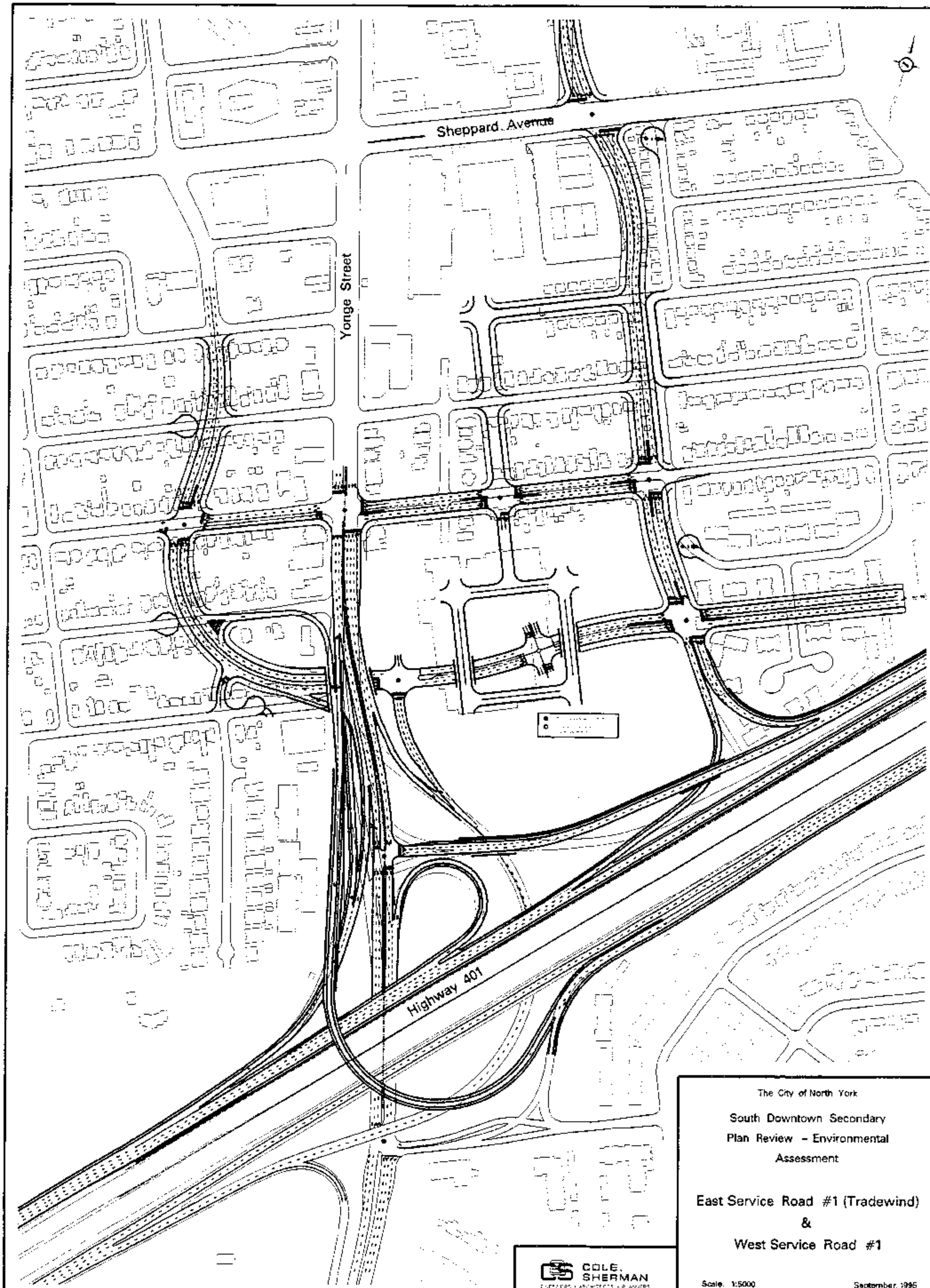
6.4 EVALUATION CRITERIA

The criteria used to evaluate the alternatives were developed by the study team utilizing evaluation factors from "South Downtown Secondary Plan Review Report 1 to 7", the comments received from stakeholders (stemming from initial stakeholder meetings) and other relevant Environmental Assessment factors. This criteria considers the traffic operations, natural environment, socio-economic environment, cultural environment and the cost of each alternative. The criteria used in the evaluation can be seen in **Exhibits 6.4, 6.5, 6.6** (The evaluation matrices)

6.5 EVALUATION OF ALTERNATIVES

Only the East Service Road and the West Service Road were taken to the evaluation process. Therefore as discussed above, alternatives for the east-west link and the interchange were screened during the alternative generation process.

EXHIBIT 6-1



The City of North York

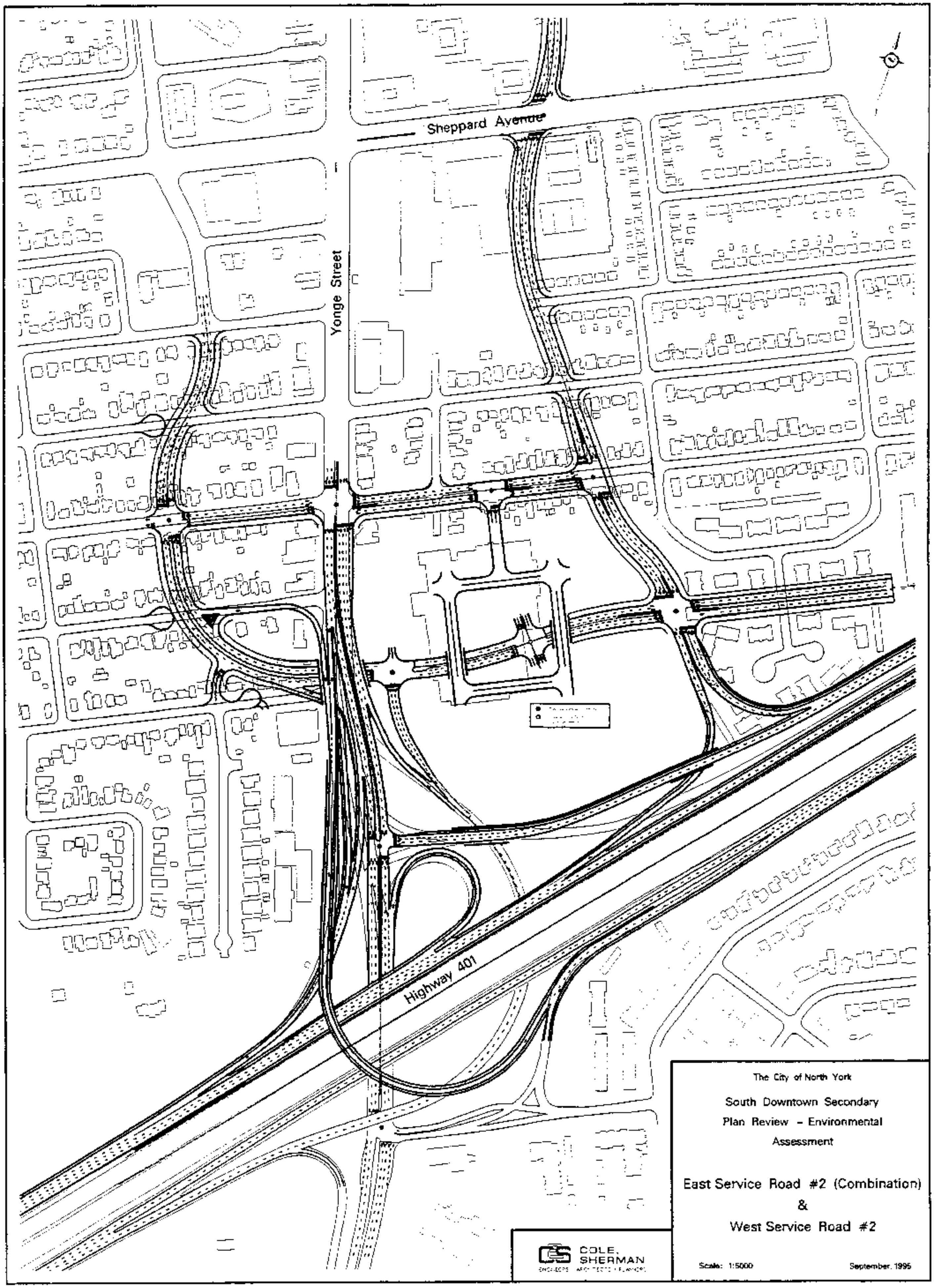
South Downtown Secondary Plan Review - Environmental Assessment

East Service Road #1 (Tradewind) & West Service Road #1

COLE, SHERMAN

Scale 1:5000

September, 1995



The City of North York

South Downtown Secondary Plan Review - Environmental Assessment

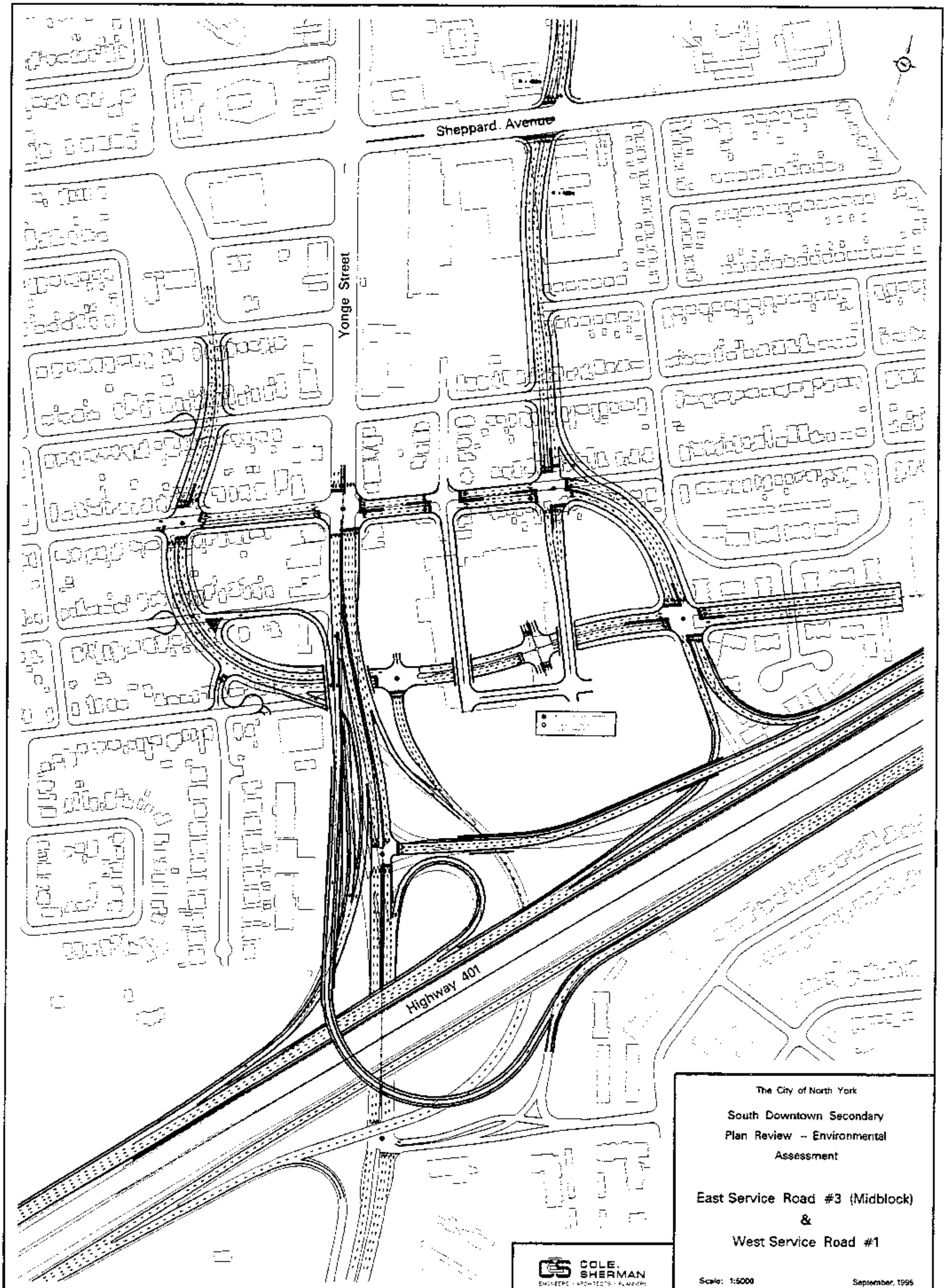
East Service Road #2 (Combination) & West Service Road #2

COLE, SHERMAN

Scale: 1:5000

September, 1995

EXHIBIT 6·3



Sheppard. Avenue
Yonge Street
Highway 401
The City of North York
South Downtown Secondary Plan Review – Environmental Assessment
East Service Road #3 (Midblock) & West Service Road #1
COLE, SHERMAN
Scale: 1:5000
September, 1995

EXHIBIT 6-4

The City of North York
SOUTH DOWNTOWN SECONDARY PLAN REVIEW
Environmental Assessment Study
Service Road Analysis/Evaluation

EVALUATION FACTOR	INDICATOR	East Service Road Alternatives			West Service Road Alternatives		RATIONALE
		Alternative #1 Tradewind Alignment	Alternative #2 Combination Alignment	Alternative #3 Midblock Alignment	Alternative #1	Alternative #2	
Transportation							
a. Local Traffic Operations	• number of movements with insufficient queue lengths	East Service Rd./Avondale AM traffic moving south bound through right	East Service Rd./Avondale AM traffic moving south bound through right	East Service Rd./Avondale AM traffic moving south bound through right and left	None	None	Insufficient length can result in blockage of adjacent intersections
	• number of problem movements at intersections during the AM and PM peak hour	Yonge/Avondale AM north bound left and through moving traffic, and PM south bound right and east bound right moving traffic	Yonge/Avondale AM north bound left and through moving traffic, and PM south bound right and east bound right moving traffic	Yonge/Avondale AM north bound left and through moving traffic, and PM south bound right and east bound right moving traffic	No movement problems	No movement problems	Problem movements at intersections will result in traffic congestion and delays
b. Roadway Design	• qualitative assessment of a driver's roadway design expectations	The straight N/S roadway alignment allows the East Service Road/Avondale intersection to cross in a perpendicular manner	The slightly skewed N/S roadway alignment forces the East Service Road/Avondale intersection to cross at a 70 degree angle	The curvature of the N/S roadway alignment creates a East Service Road/Avondale intersection design that is not typical of the area	The West Service Road/ Florence intersection is skewed at 70 degrees.	The West Service Road/ Florence intersection is perpendicular. However, the section further north contains a tight reverse curve.	Access to and from the residential community may have to be re-routed to Yonge or Sheppard
Natural Environment							
a. Vegetation	• number, type and condition of trees removed	approx. 101, predominately silver maple trees showing signs of stress and strain.	approx. 57, predominately silver maple trees showing signs of stress and strain.	approx. 57, predominately silver maple trees showing signs of stress and strain	approx. 41, predominately silver maple trees showing signs of stress and strain.	approx. 41, predominately silver maple trees showing signs of stress and strain.	Roadway construction may result in the removal of trees from existing urban landscapes
Socio-Economic Environment							
a. Noise Impact	• number of sensitive land uses with a significant change in noise	Noticeable change in ambient noise between Sheppard and Avondale.	Noticeable change in ambient noise between Sheppard and Avondale.	Noticeable change in ambient noise between Sheppard and Avondale.	Noticeable change in ambient noise between Sheppard and Franklin.	Noticeable change in ambient noise between Sheppard and Franklin.	More traffic in combination with new or widend roads will move the noise source (auto traffic) closer to the sensitive receivers (i.e. houses)
b. Air Quality Impact	• qualitative assessment of air quality impact to sensitive receivers	Does not exceed MOEE air quality standards.	Does not exceed MOEE air quality standards.	Does not exceed MOEE air quality standards.	Does not exceed MOEE air quality standards.	Does not exceed MOEE air quality standards.	More traffic in combination with new or widened roads may lower local air quality below provincial standards
c. Residential Displacement	• number and type of residential properties requiring total acquisition	39, single family	25, single family	26, single family	46, single family	46, single family	Will require acquisition of residential property
d. Residential Disruption	• number, type and area of residential properties partially impacted	6, single family, 200 sm	3, single family, 100 sm, and 1, 28 floor, apartment building, 20 sm	3, single family, 50 sm 1, 28 floor, apartment building, 20 sm	1, single family, 20 sm	2, single family, 80 sm	Will require acquisition of residential property
e. Separation Distance	• distance of the stable residential development from the service road curb at the closest point	21m	64m	67m	20m	20m	Need to establish buffer area that will minimize impacts to stable residential area
f. Consistency of Blocks	• qualitative assessment of consistency of street and block pattern to urban design principles contained in the South Downtown Secondary Plan.	Limited possibilities to accommodate extension of street and block pattern south of Avondale Avenue. Rating: Moderate	Creates some smaller and some irregular remnant parcels that are not consistent with the street and block pattern. Limited possibilities to accommodate extension of street and block pattern south of Avondale Avenue. Rating: Low	Accommodates extension of street and block pattern south of Avondale Avenue. Rating: Good	Road alignment swings easterly to meet Beecroft Road earlier creating more regular shaped blocks. Rating: Good	Road alignment swings further west before meeting Beecroft Road creating smaller, more irregular shaped blocks. Rating: Moderate to Good	Proposed roadway should create blocks that are consistent with the surrounding area

IMPACTS ARE THE SAME THEREFORE THE EVALUATION FACTOR IS NOT DECISION RELEVANT

The City of North York
SOUTH DOWNTOWN SECONDARY PLAN REVIEW
Environmental Assessment Study
Service Road Analysis/Evaluation

EVALUATION FACTOR	INDICATOR	East Service Road Alternatives			West Service Road Alternatives		RATIONALE
		Alternative #1 Tradewind Alignment	Alternative #2 Combination Alignment	Alternative #3 Midblock Alignment	Alternative #1	Alternative #2	
g. Pedestrian and Vehicular Connections	• qualitative assessment of connections to North York City Centre and surrounding stable residential areas.	Does not afford connection of Bales Avenue into large development parcel south of Avondale Avenue (Westmor). Rating: Moderate	Does not afford connection of Bales Avenue into large development parcel south of Avondale Avenue. (Westmor). Rating: Moderate	Affords connection of Bales Avenue into large development parcel south of Avondale Avenue. Affords major pedestrian/vehicular linkage via the East Service Road into Westmor. Rating: Good	Affords pedestrian and vehicular connections Rating: Good	Affords pedestrian and vehicular connections Rating: Good	Sufficient space must be available to establish public open spaces that form continuous system throughout the South Downtown
h. Open Space Provision	• qualitative assessment of size, configuration, location, access and linkage potential for open space in the area	Poor allotment of open spac due to small parcel size and access constraints	Good allotment of open space given the relatively large parcel size, efficient shape and easy access potential	Good allotment of open space given the relatively large parcel size, efficient shape and easy access potential	Good allotment of open space because it provides convenient pedestrian linkage through south downtown	Good allotment of open space because it provides convenient pedestrian linkage through south downtown	
i. Businesses Displaced	• number and type of business property requiring total acquisition	0	0	0	Three including: Petro Canada, Nautilis and Video Outlet	Three including: Petro Canada, Nautilis and Video Outlet	Construction of a new or widened roadway will require acquisition of commercial or institutional property
	• number of employees affected	0	0	0	37	37	
j. Businesses Disrupted	• number, type and size of business property impacted	1 (Marathon), 7 and 9 floor office buildings,1650 sm (impact on the east side displaces access and parking spaces)	1 (Marathon), 7 and 9 floor office buildings, 3000 sm (impact on the west side displaces parking spaces and landscaped open space)	1 (Marathon), 7 and 9 floor office buildings,2500 sm (impact on the west side displaces parking spaces and landscaped open space)	0	0	Construction of a new or widened roadway will require acquisition of commercial or institutional property
	• disruption during construction	Marathon access relocation will disrupt parking activity	Marathon access relocation will disrupt parking activity	Marathon access relocation will disrupt parking activity	Highway 401's lengthy ramp construction period will eliminate Yonge St. pedestrian access to Warner Bros.	Highway 401's lengthy ramp construction period will eliminate Yonge St pedestrian access to Warner Bros.	Disruption during construction including noise, dust, vibration and pollution may impact existing businesses
k. Institutions Displaced	• number and type of institutional property requiring total acquisition • number of employees affected	0 0	0 0	0 0	0 0	0 0	Construction of a new or widened roadway will require acquisition of institutional property
l. Institutions Disrupted	• number, type and size of institutional property impacted	1 (Metro Catholic School Board), 300 sm	1 (Seneca College), 1410 sm	1 (Seneca College), 1200 sm	0	0	Construction of new or widened road may impact existing institutional uses
	• disruption during construction	Minimal	Minimal	Minimal	0	0	
m. Future Development	• length of development block exposure to service road • number of unreasonably constrained development blocks	1070 m 1 (area between the alignment and Bonnington)	1220m 0	1270m 0	720m 1 (area bounded by the alignment, Yonge St. and Cameron Ave.)	790m 1 (area bounded by the alignment, Yonge St. and Cameron Ave.)	Development of sites should not be unreasonably constrained by roadway location
n. Traffic Infiltration	• qualitative assessment of infiltration of outside traffic into stable residential areas	Same	Same	Same	Same	Same	Traffic that will accompany this level of development may infiltrate the stable residential areas that abut the

EXHIBIT 6.5

The City of North York

SOUTH DOWNTOWN SECONDARY PLAN REVIEW

Environmental Assessment Study

Service Road Analysis/Evaluation

EVALUATION FACTOR	INDICATOR	East Service Road Alternatives			West Service Road Alternatives		RATIONALE
		Alternative #1 Tradewind Alignment	Alternative #2 Combination Alignment	Alternative #3 Midblock Alignment	Alternative #1	Alternative #2	
Cultural Environment							
a. Heritage Features Displaced	• number and type of heritage feature requiring total acquisition	1 (Elihu Pease House), designated under by-law 31251	0	0	1 (F. Carmichael House), not designated	1 (F. Carmichael House), not designated	Heritage features are an important part of any community
b. Heritage Features Disrupted	• number, type and size of heritage feature partially impacted	0	0	0	0	0	Heritage features are an important part of any community
Cost							
a Total Cost	• present day cost to acquire necessary property, construct roadway and provide mitigation	$18,500,000 ($14.6M + $2.8M + $1.1M)	$16,100,000 ($11.6M + $2.3M + $2.2M)	$16,000,000 ($11.9M + $1.9M + $2.2M)	$24,200,000 ($22.7M + $1.5M)	$24,200,000 ($22.7M + $1.5M)	Roadway construction will require acquisition of property Cost of construction of infrastructure works

EXHIBIT 6·6

During the evaluation process, each of the service road alternatives are considered against the various evaluation criteria. The decision irrelevant criteria are highlighted as these are factors that are common to each alternative and therefore do not aid in the decision making process. The next step would be to create a concise table showing only those decision relevant factors that will aid in the decision making process. The results of this evaluation process can be seen in **Exhibits 6.4, 6.5 and 6.6.** Relevant background data used to complete these evaluation matrices are held on file.

6.6 DECISION MAKING PROCESS

The next step in the evaluation process would be to assess the final table, make trade-offs and recommend a preferred alternative. This step was not completed at the time of writing. The alternatives developed and the evaluation method to be used was presented to the Steering Committee, however no formal recommendation has been carried forward to Council or the public.

7.0 PROPOSED PROJECT DESIGN

At the time of the preparing this report, no decision was made on the selection of the preferred service road alignments. This section of the report will serve as a forum for discussing and displaying engineering work that is complete to date.

MTO has given approval in principle to the engineering and construction staging and will require specific endorsement of the appropriate ESR as well as at construction design and implementation stage.

7.1 ROADWAY

7.1.1 Cross-Section

Typical cross-sections were developed for most of the major components of the roadway network. The proposed cross-section for the east and west service road is typical through-out the project with the exception of taper and turning lane widenings. This can be seen in **Exhibit 7.1**

Exhibit 7.2 displays the existing and future typical cross-sections for Yonge Street between Highway 401 and Avondale Avenue. The details of the construction staging required on Yonge Street can be seen in Section 7.2 of this report.

Typical ramp sections were developed for all of the proposed ramps based on OPSD standards and MTO Geometric Design standards. These can be seen in **Exhibits 7.3, 7.4 and 7.5**, referring to one lane, two lane and three lane ramps respectively.

Structural sections for the N-E flyover ramp and the Hogg's Hollow Bridge are referred to in Section 7.3.

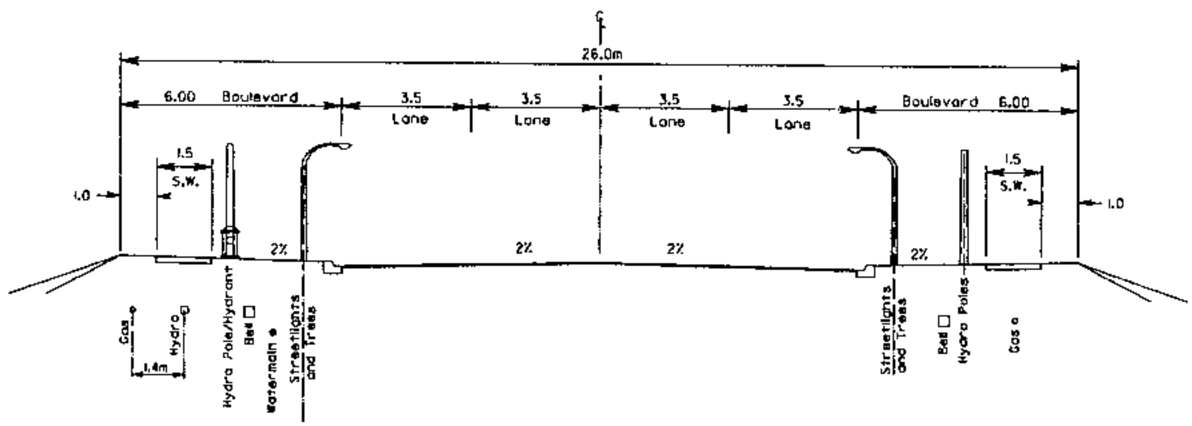
7.1.2 Horizontal Alignment

The details of the horizontal alignment, including all ramp and roadway geometrics at 1:1000 scale have been prepared. Final Exhibits of the project have not been prepared at this time.

7.1.3 Vertical Alignment

Profiles of all ramps and roads within the proposed network have been prepared on roll section paper. Formal Exhibits of the vertical alignment have not been prepared at this time.

Exhibit 7.1

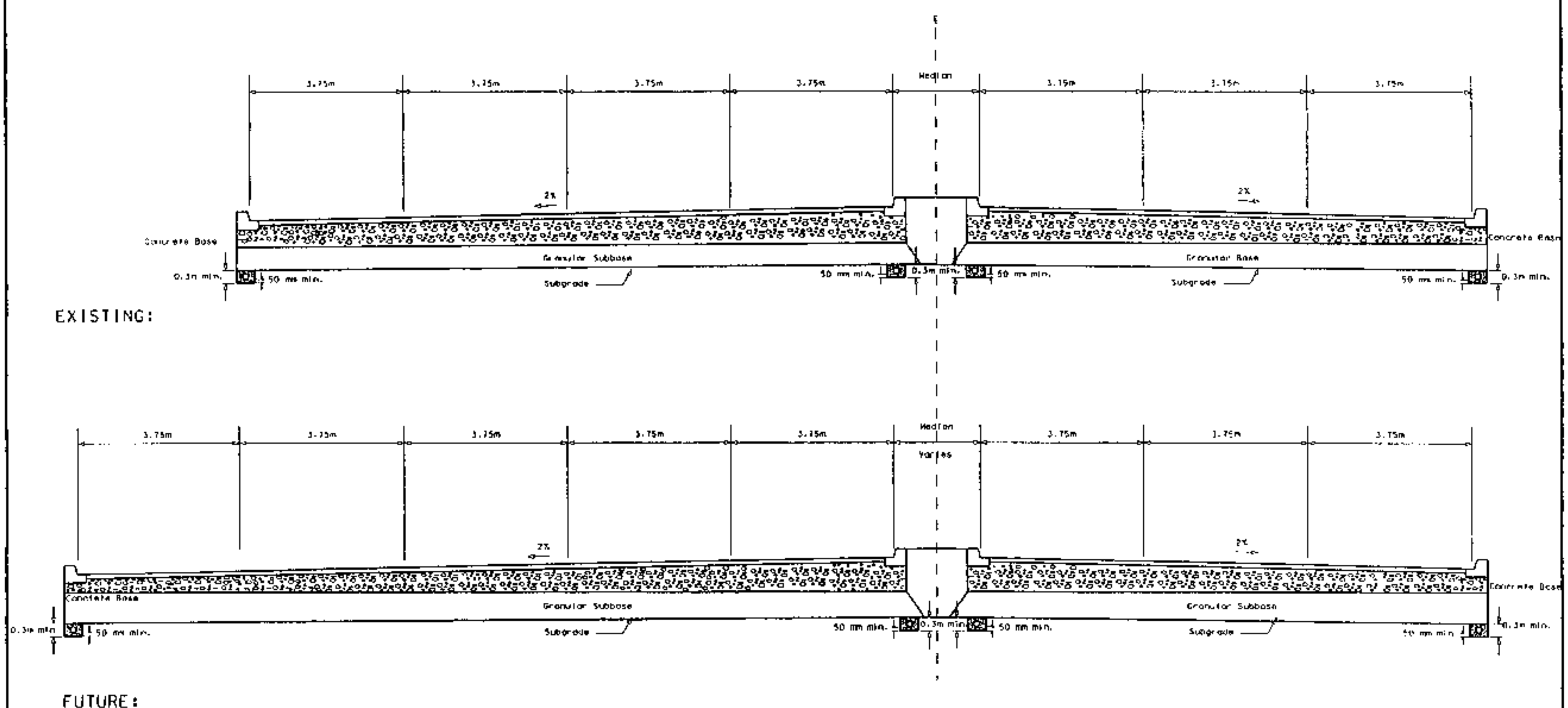


SERVICE ROAD TYPICAL SECTION (26.0m RIGHT-OF-WAY)

COLE, SHERMAN
ENGINEERS • ARCHITECTS • PLANNERS

Scale 1:200

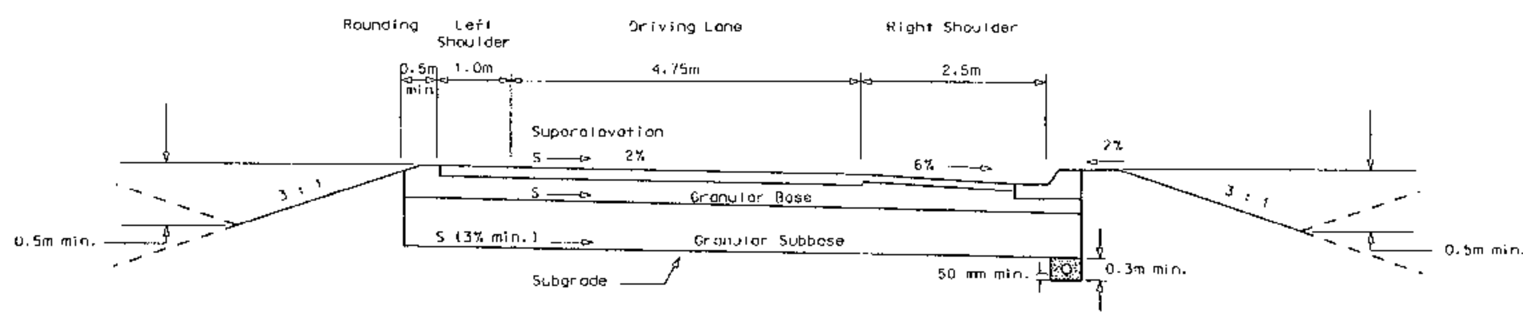
Exhibit 7.2



EXISTING AND FUTURE TYPICAL SECTION
YONGE STREET

Scale 1:150

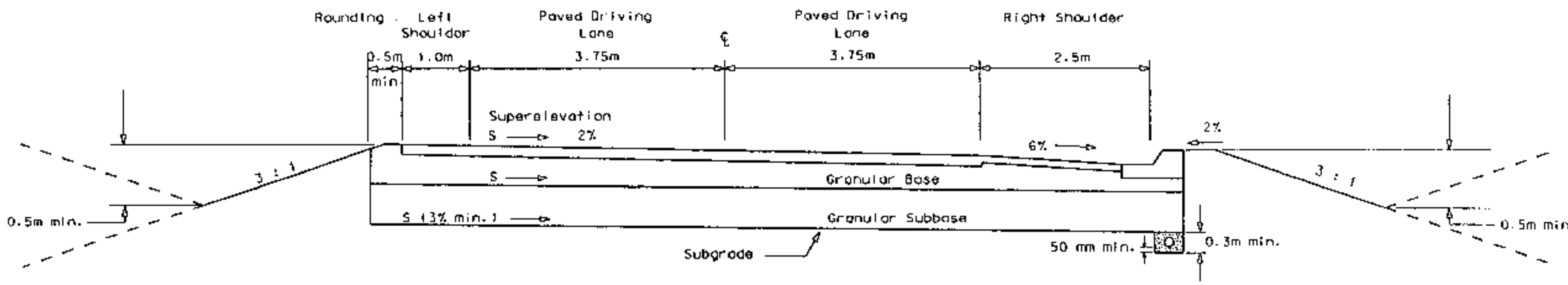
Exhibit 7.3



ONE LANE RAMP - TYPICAL CROSS-SECTION

(Applies to Ramps Link-W, W-N, S-W and N-W)

Scale 1:100

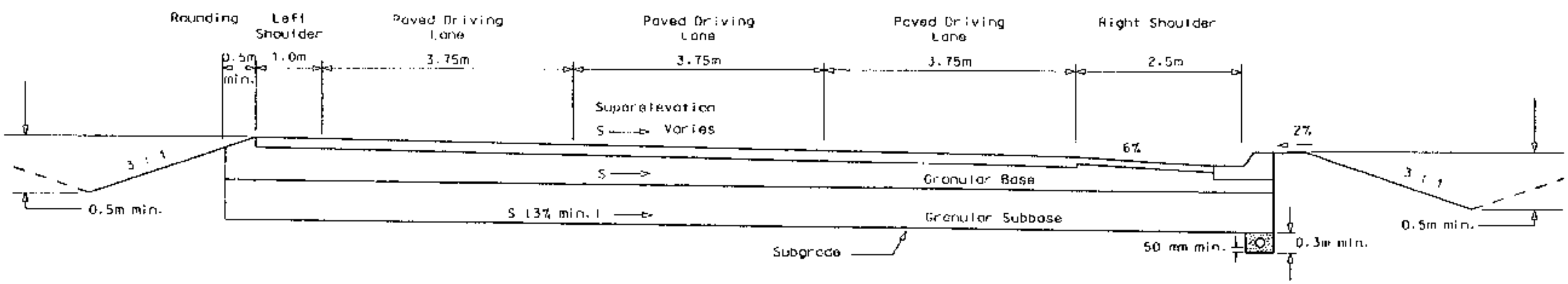


TWO LANE RAMP – TYPICAL CROSS-SECTION

(Applies to Ramps E–N/S, N–E and Portions of Other Ramps)

Scale 1:100

Exhibit 7.5



THREE LANE RAMP - TYPICAL CROSS-SECTION

(Applies to Ramps E-N/S and W-Link)

Scale 1:100

7.2 STAGING AND DETOURS

Construction staging has been considered on two major levels. The first is the overall long term staging for the entire roadway network and the second is the details of the staging and detours necessary to construct various portions of the network while maintaining safe and efficient traffic flow.

The former of the above two levels is shown on **Exhibit 7.6** and explained in detail below:

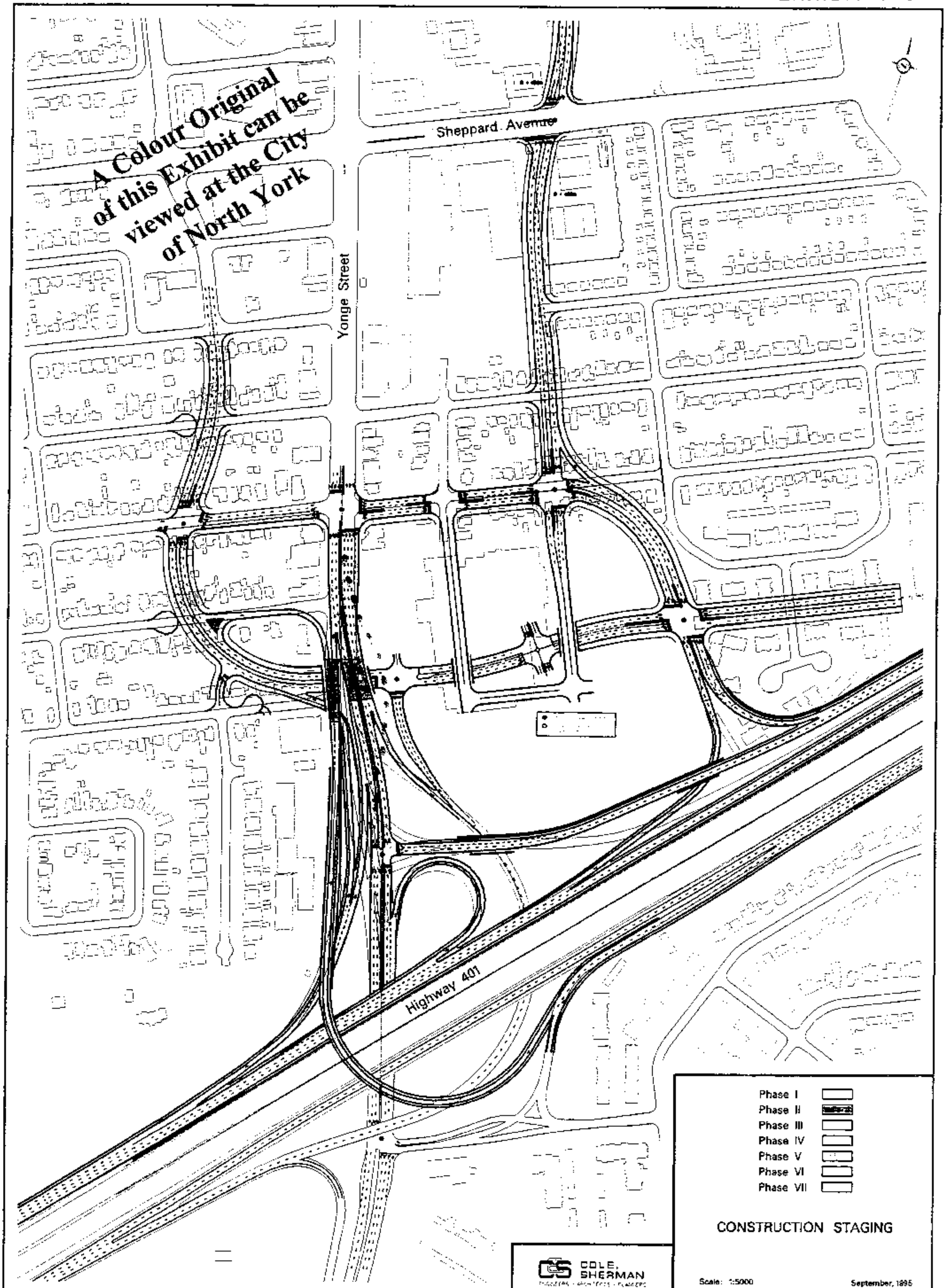
Phase I

- Construct ramp 401 east to Yonge Street, ramp 401 east to Service Road and entire East Service Road (and Avondale Avenue), including a new structure over future ramp Service Road to 401 west and widening of existing structure over ramp 401 west to Yonge Street north
- Existing traffic on existing roads and ramps, stage construct the widening of the existing structure over ramp 401 west to Yonge Street north with a temporary connection to the existing Yonge Street for the south movement
- At completion of construction, traffic from 401 east going to areas north of the 401 forced to use ramp 401 east to Service Road and Service Road system to Yonge Street and Sheppard Avenue. Traffic going to areas south of the 401 would use new ramp 401 east to Yonge Street south
- This would relieve some of the traffic at the intersection of Yonge Street and Franklin Avenue

Phase II

- Detour Yonge Street or stage construct Structures at Yonge Street and Franklin Avenue
- Traffic the same as Phase I except complete temporary connection to ramp Yonge Street north to 401 west
- Stage construction of theses structures is possible while keeping all existing lanes open. A detour would quicken construction of the structures, allow Yonge Street traffic to flow smoothly and clear existing Yonge Street through this area for the Yonge Street re-alignment

EXHIBIT 7·6


A Colour Original of this Exhibit can be viewed at the City of North York
Sheppard Avenue
Yonge Street
Highway 401
Phase I
Phase II
Phase III
Phase IV
Phase V
Phase VI
Phase VII
CONSTRUCTION STAGING
COLE, SHERMAN
Scale: 1:5000
September, 1995

Phase III

- Construct flyover ramp Yonge Street north to 401 east complete with tie to existing ramp Yonge Street north/south to 401 east
- Traffic using Phase I infrastructure (ramps/East Service Road), detoured Yonge Street and existing ramps
- Open new flyover ramp to traffic, the section of Yonge Street between Florence Avenue and the 401 has been relieved of most of the traffic flow to or from Highway 401
- Short time closure at ramp connection Yonge Street south to 401 west would likely be required

Phase IV

- Stage construct the re-alignment of Yonge Street including the widening of the existing Highway 401 westbound collector structures over Yonge Street and ramp 401 west to Yonge Street north and connection to ramp 401 west to Yonge Street north
- Traffic on newly constructed ramps and stage constructed Yonge Street remaining open at peak traffic periods
- Temporary connections to existing ramps Yonge Street south to 401 west and Yonge Street north to 401 west
- Some work may be required on ramp 401 west to Yonge Street north for structure clearances

Phase V

- Construct the widening of the Hogg's Hollow structure (401 westbound collector) and ramp Yonge Street north to 401 west
- Ramp to remain open at all times

Phase VI

- Construct ramps Service Road to 401 west and Yonge Street south to 401 west
- Short time closure likely required for ramp Yonge Street south to 401 west construction

Phase VII

- Complete construction of West Service Road, east-west link (Lower Service Road) and ramp connections 401 west to Service Road and Service Road to 401 west
- Service Roads and connection from ramp 401 west to Yonge Street north could be constructed after Phase IV with the connection to ramp Yonge Street north to 401 west being constructed after Phase V

There were four major areas of concern regarding the staging and constructability of the proposed works: i) Yonge Street overpass at Franklin, ii) Yonge Street south of Franklin, iii) N-E flyover (impact to Highway 401 operations) and iv) N-E flyover (impact to Yonge Street at pier). Each one of these concerns was addressed in detail as can be seen in the recommended staging sections, **Exhibits 7.7 to 7.10** respectively.

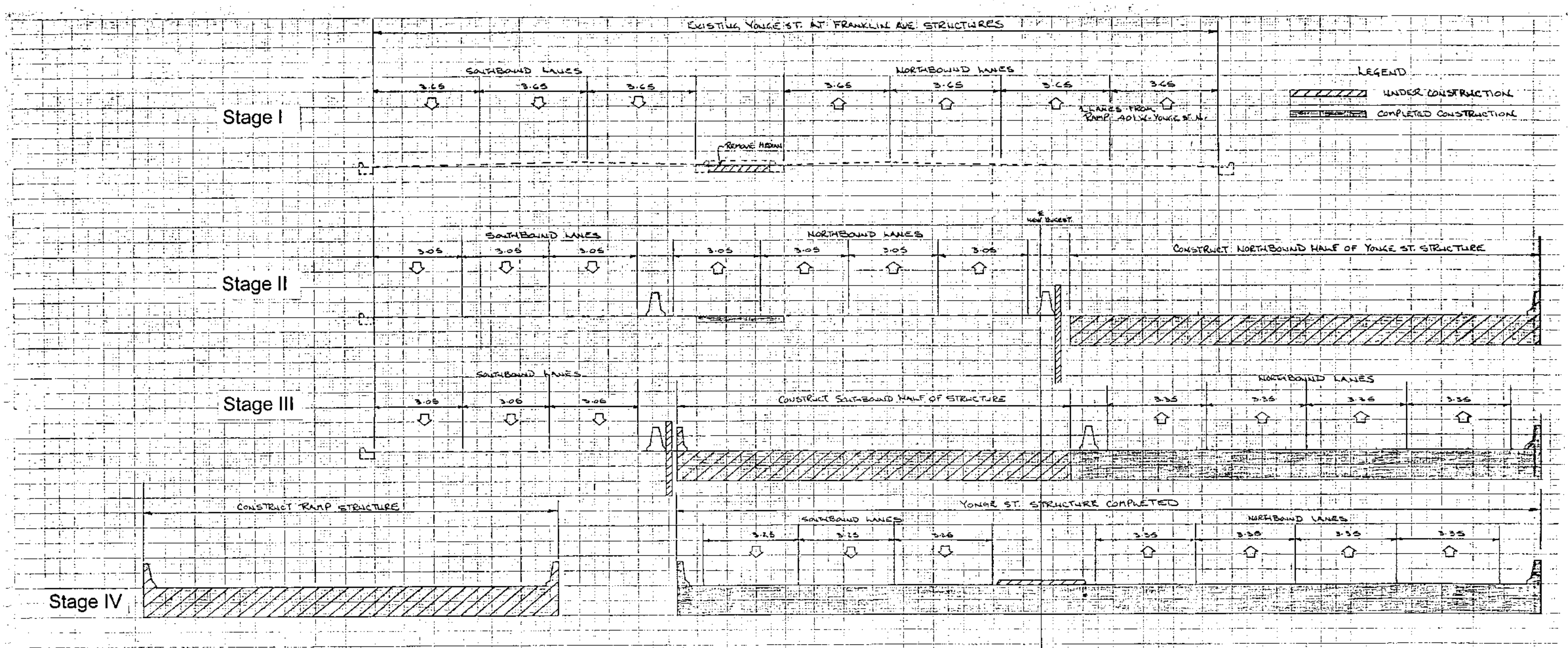
7.3 STRUCTURES

A preliminary assessment was made of all structural issues during course of this study. These included the following; i) Highway 401 bridge widenings, ii) new structure ramp E-N/S, iii) ramp N-E (flyover), iv) Yonge Street structure at Franklin Avenue and v) Hogg's Hollow bridge widening. All of these structural works are considered feasible at this time. Items iii) and v) were considered to be the most critical to the success of the network improvements and therefore received the greatest attention.

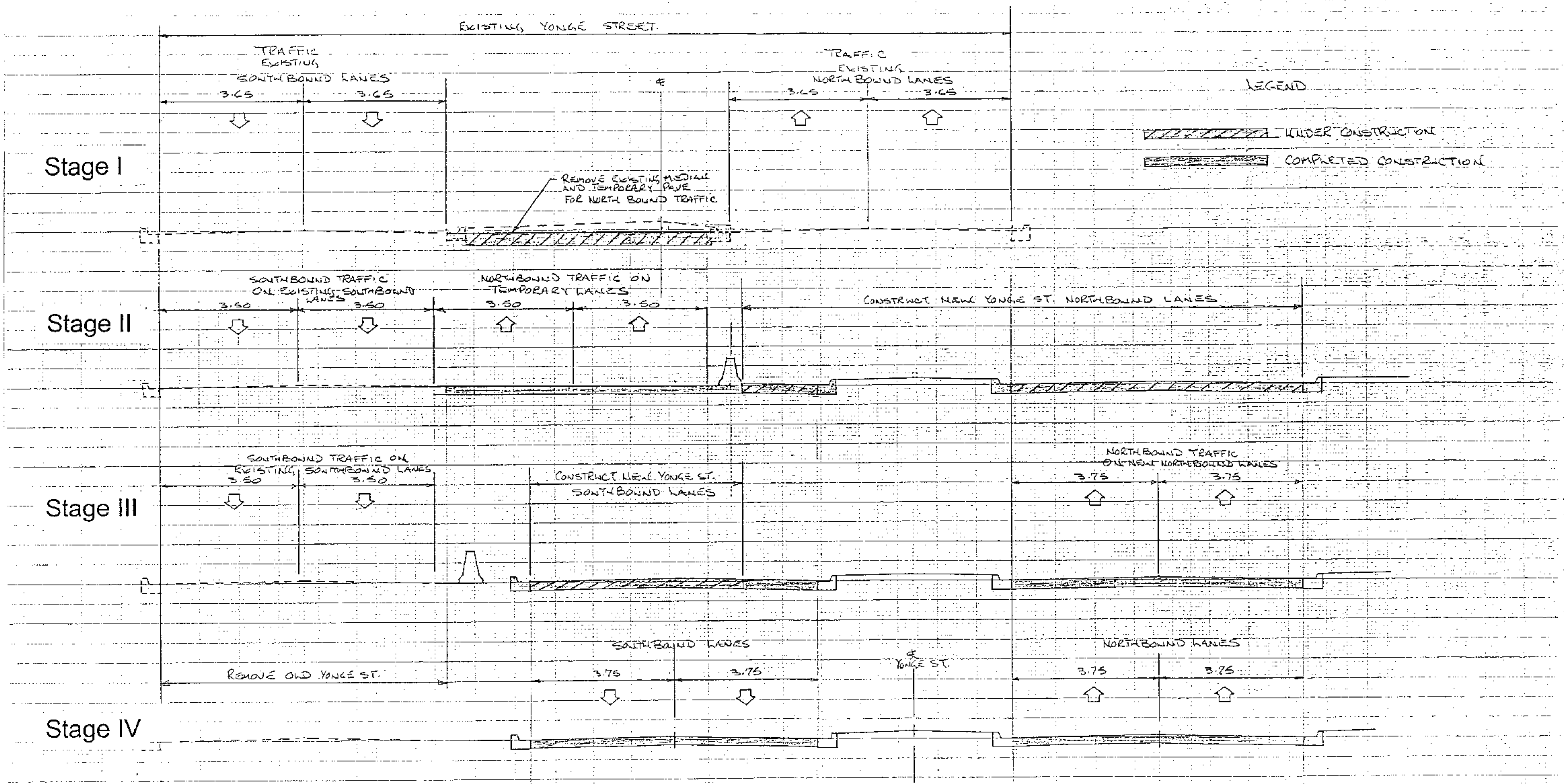
Although many alignments for the N-E flyover were considered, only one met the geometric constraints of the existing conditions. The location of this structure can be seen in **Exhibits 6.1, 6.2 and 6.3**. Three alternative structure types were considered for the flyover as seen in **Exhibits 7.11, 7.12 and 7.13**. At the time of writing, the precast segmental box girder (**Exhibit 7.11**) was favored due to its ease of construction.

Exhibit 7.14 shows the lane reconfiguration considered for the additional westbound collector lane over the Hogg's Hollow bridge. It was determined that the substandard lane and shoulder widths would not be acceptable and this alternative was dropped. **Exhibits 7.15 and 7.16** show the two widening alternatives considered for the widening of the bridge. As can be seen in **Exhibit 7.15**, the applied moment would be increased by the cantilever and it was determined that the bridge would fail. The only feasible alternative for the widening of the Hogg's Hollow bridge is shown in **Exhibit 7.16**. This construction would require additional piers down to the valley floor.

EXHIBIT 7·7

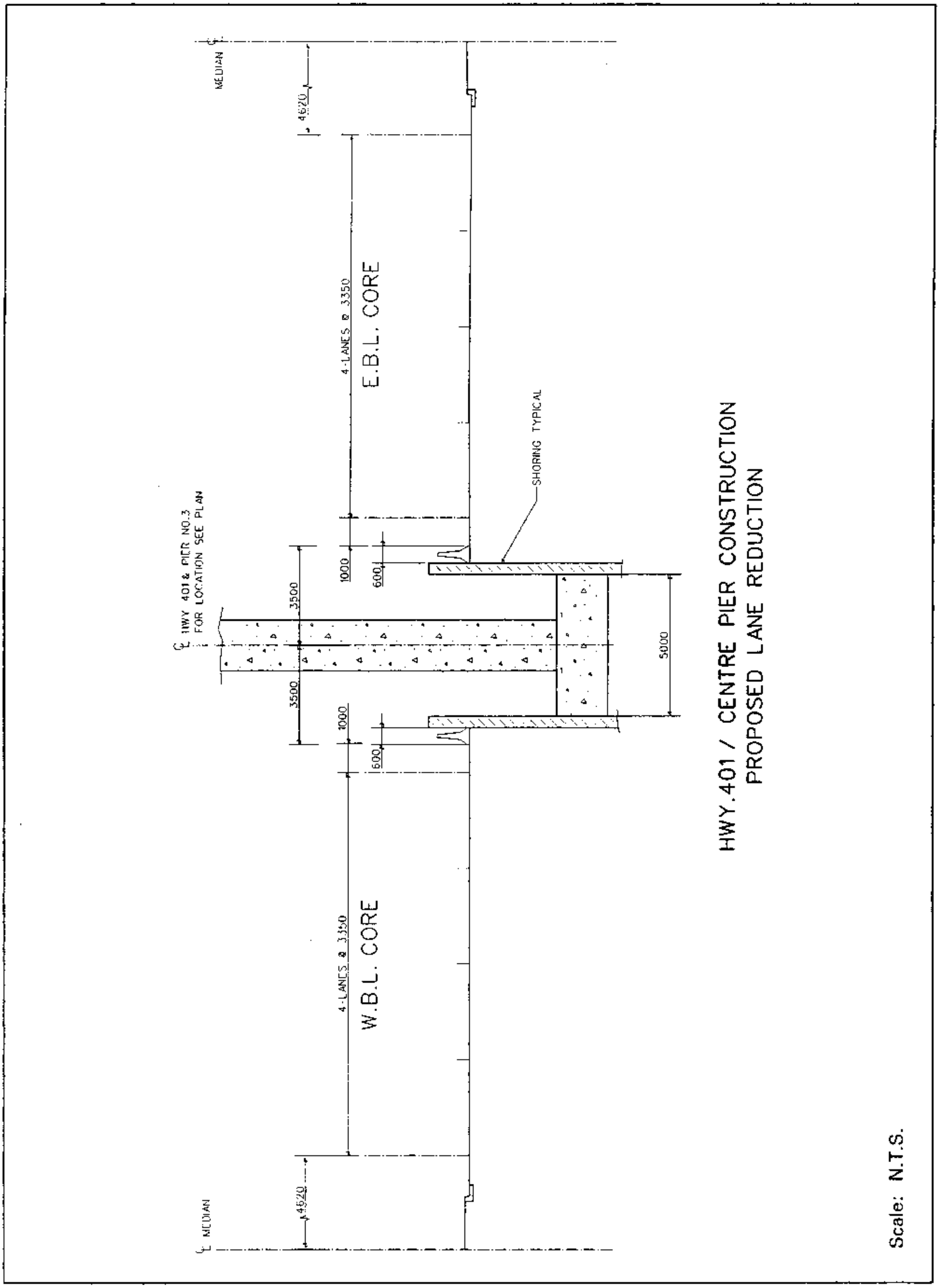


Stage Construction
Yonge Street Structures at
Franklin Avenue



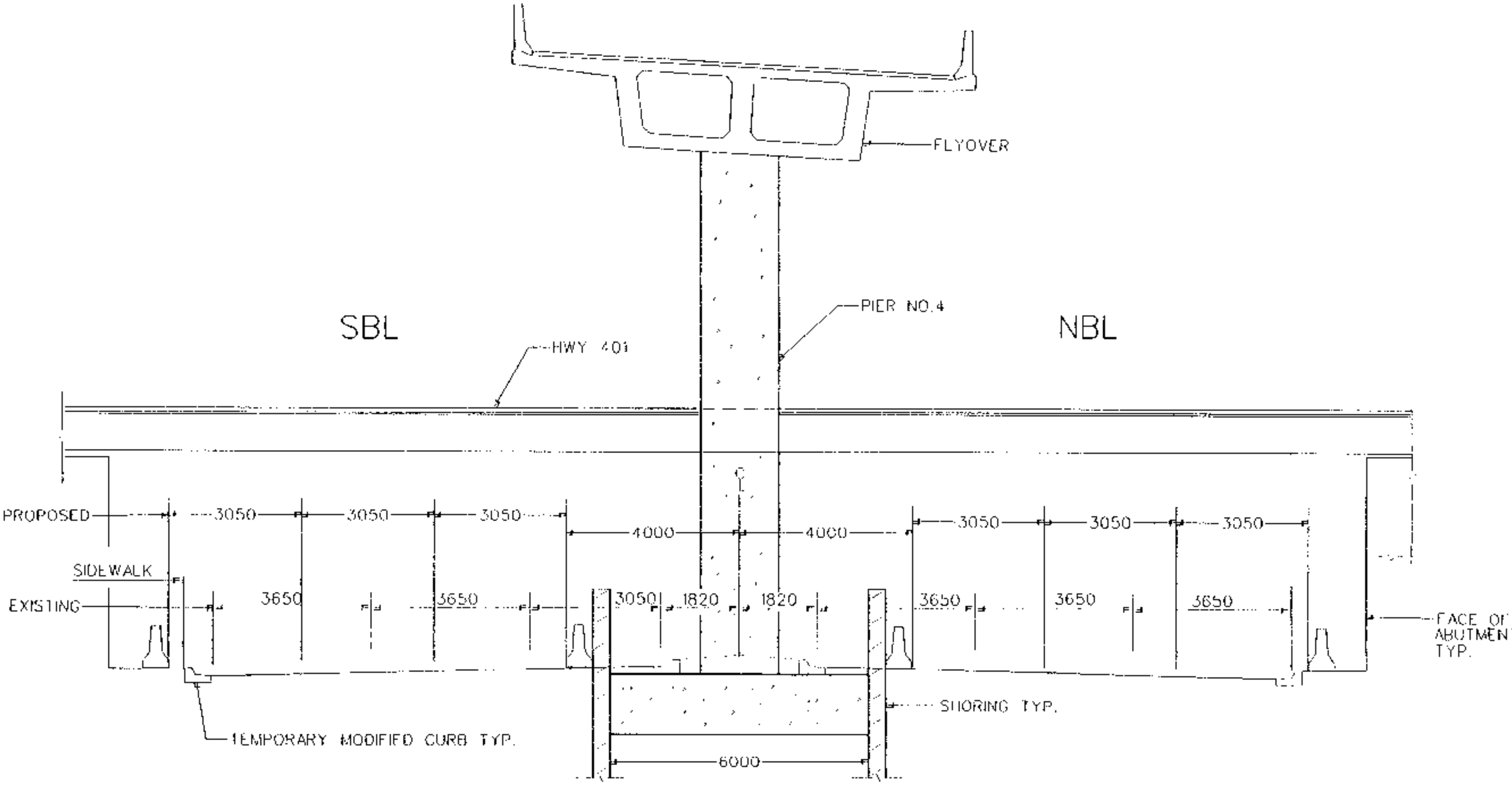
Stage Construction Yonge Street North of Highway 401

Exhibit 7.9



MEDIAN
4620
4-LANES @ 3350
E.B.L. CORE
SHORING TYPICAL
HWY 401 & PIER NO.3
FOR LOCATION SEE PLAN
3500
3500
1000
600
1000
600
5000
4-LANES @ 3350
W.B.L. CORE
4620
MEDIAN
HWY.401 / CENTRE PIER CONSTRUCTION
PROPOSED LANE REDUCTION
Scale: N.T.S.

Exhibit 7.10

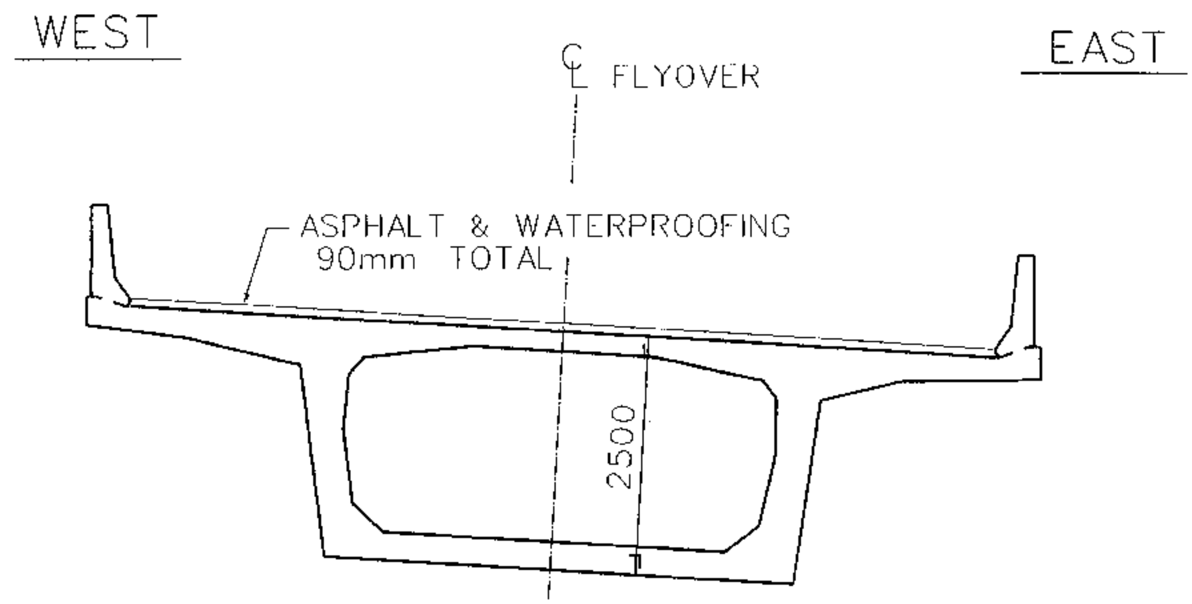


YONGE ST. / PIER NO.4 CONSTRUCTION

LANE REDUCTION PROPOSED

Scale: N.T.S.

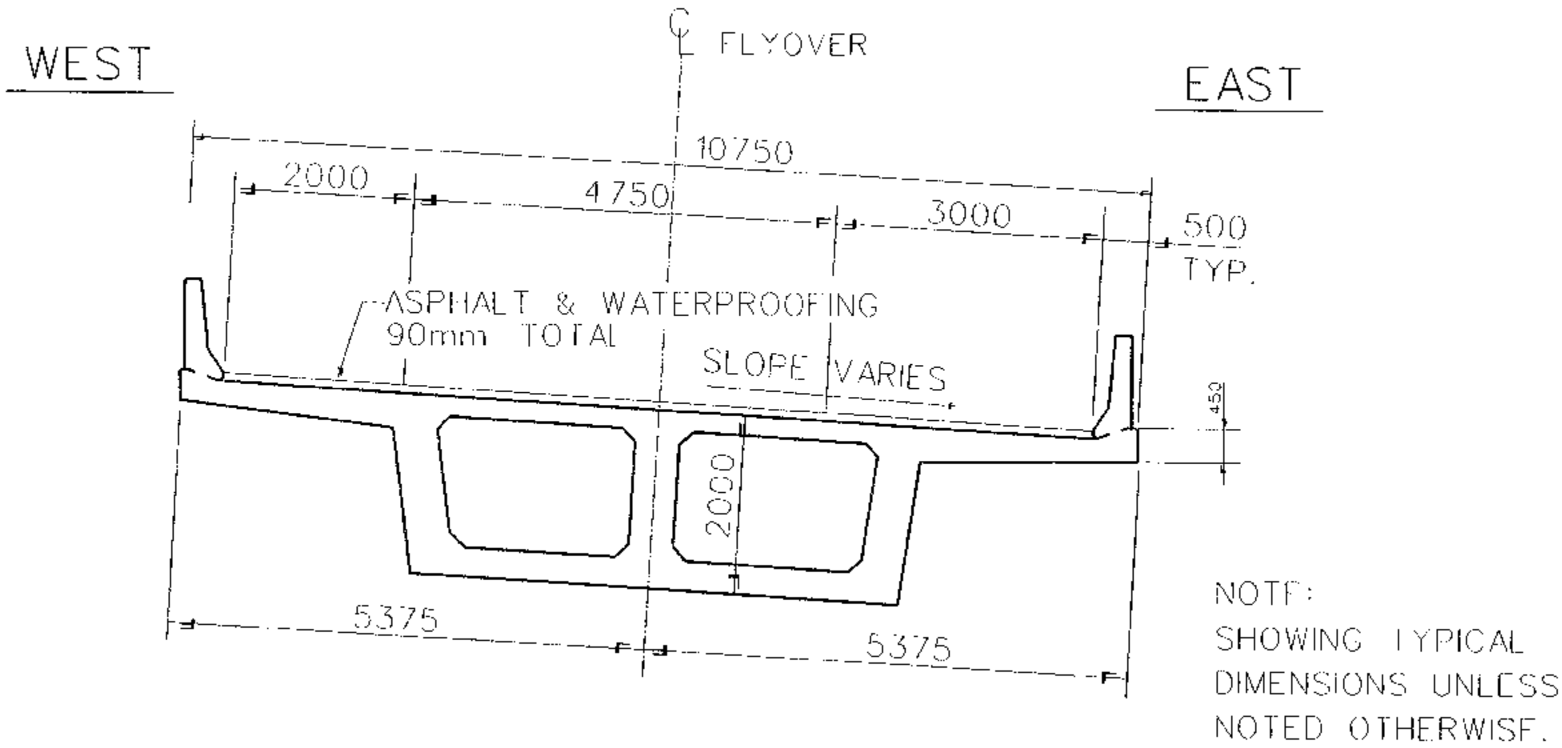
Exhibit 7.11



PREFERRED ALTERNATIVE

PRECAST SEGMENTAL BOX GIRDER STRUCTURE.

Scale: N.T.S.

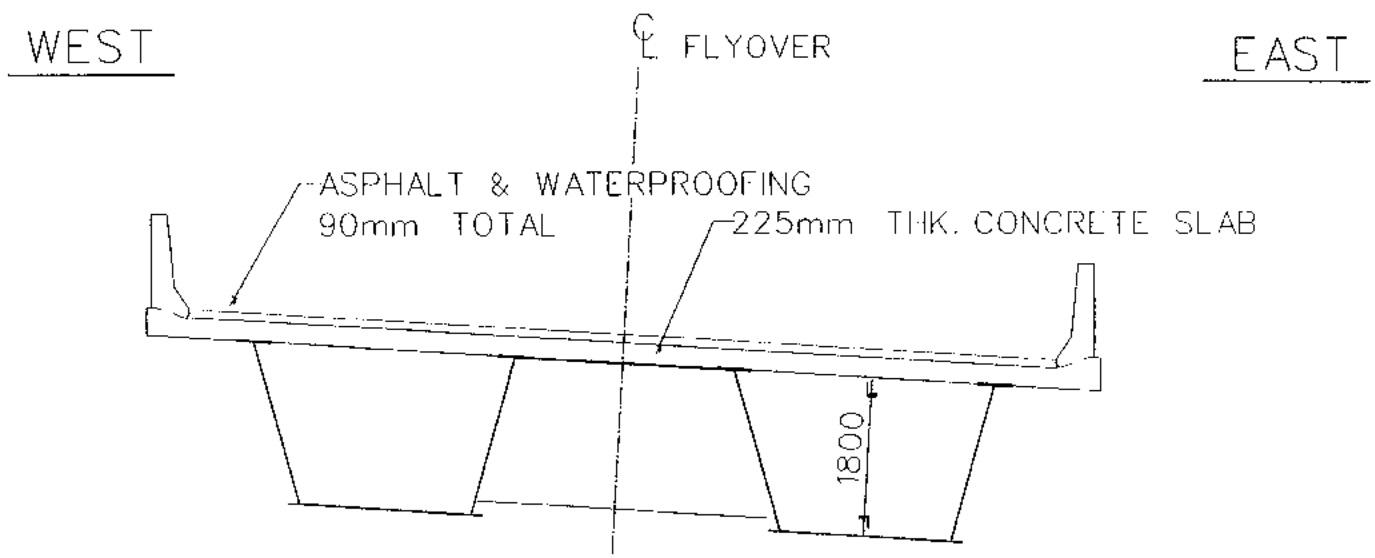


ALTERNATIVE 1

POST-TENSIONED CONCRETE BOX GIRDER STRUCTURE.

Scale: N.T.S.

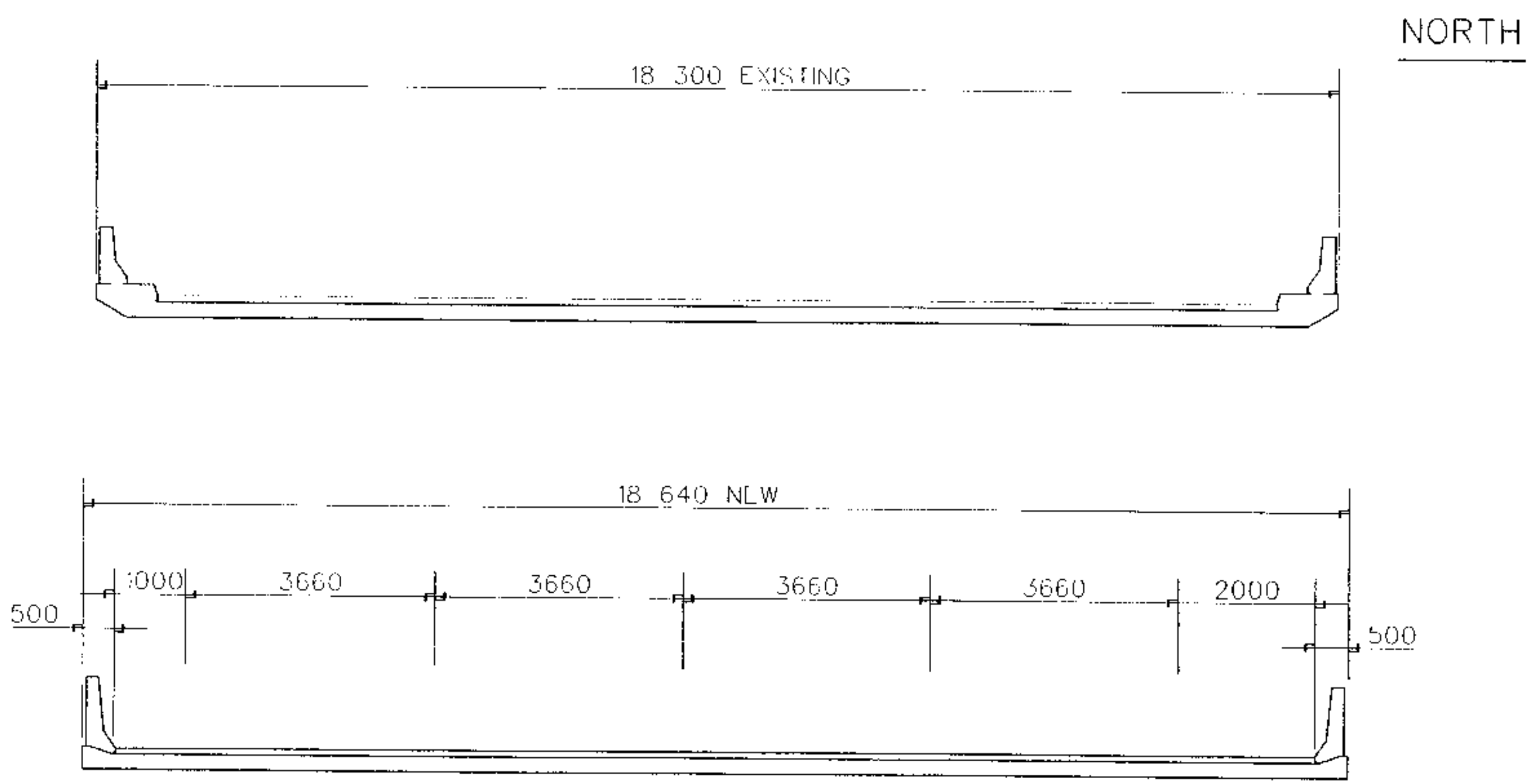
Exhibit 7.13



ALTERNATIVE 2

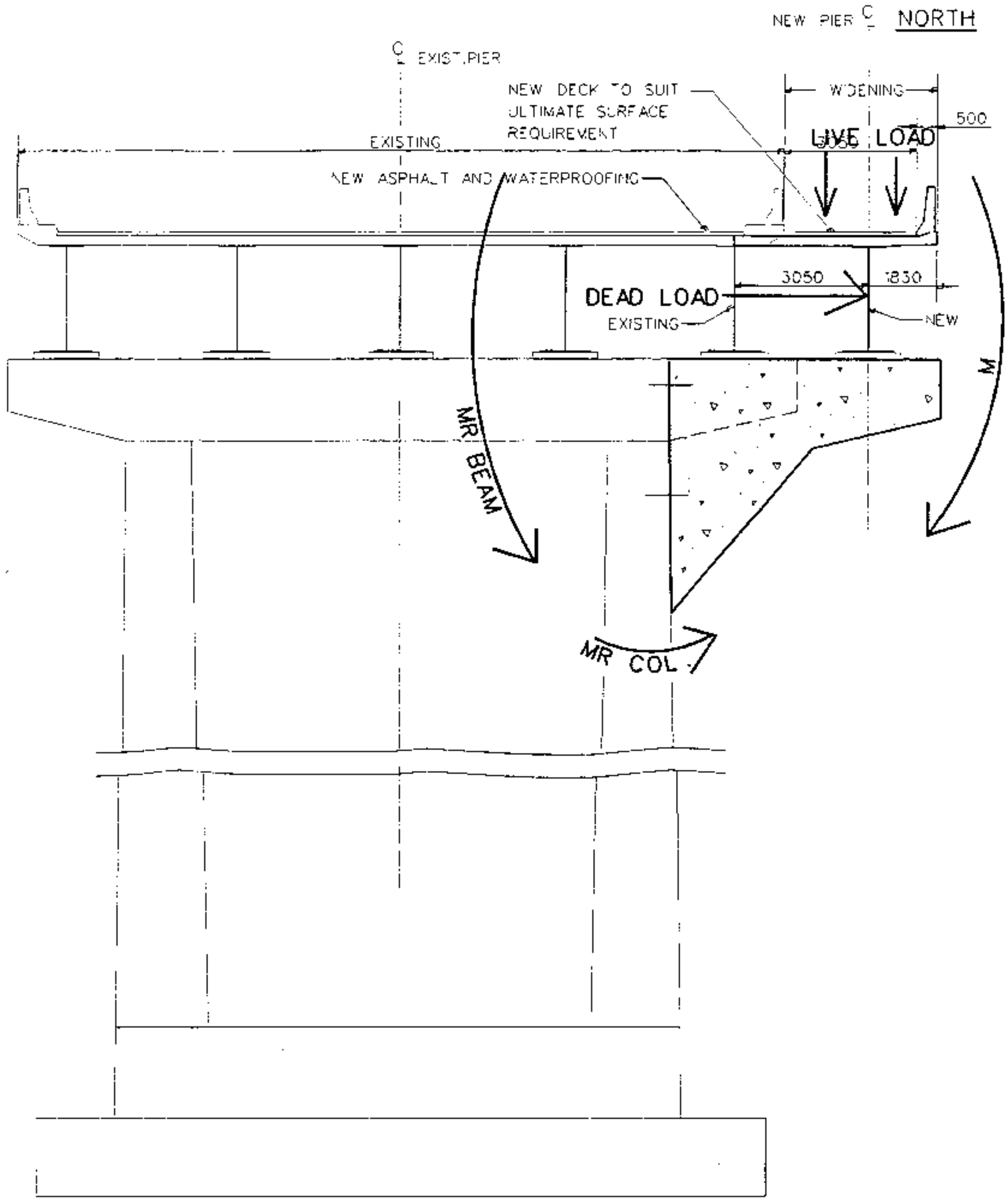
CONTINUOUS STEEL BOX GIRDER STRUCTURE

Scale: N.T.S.



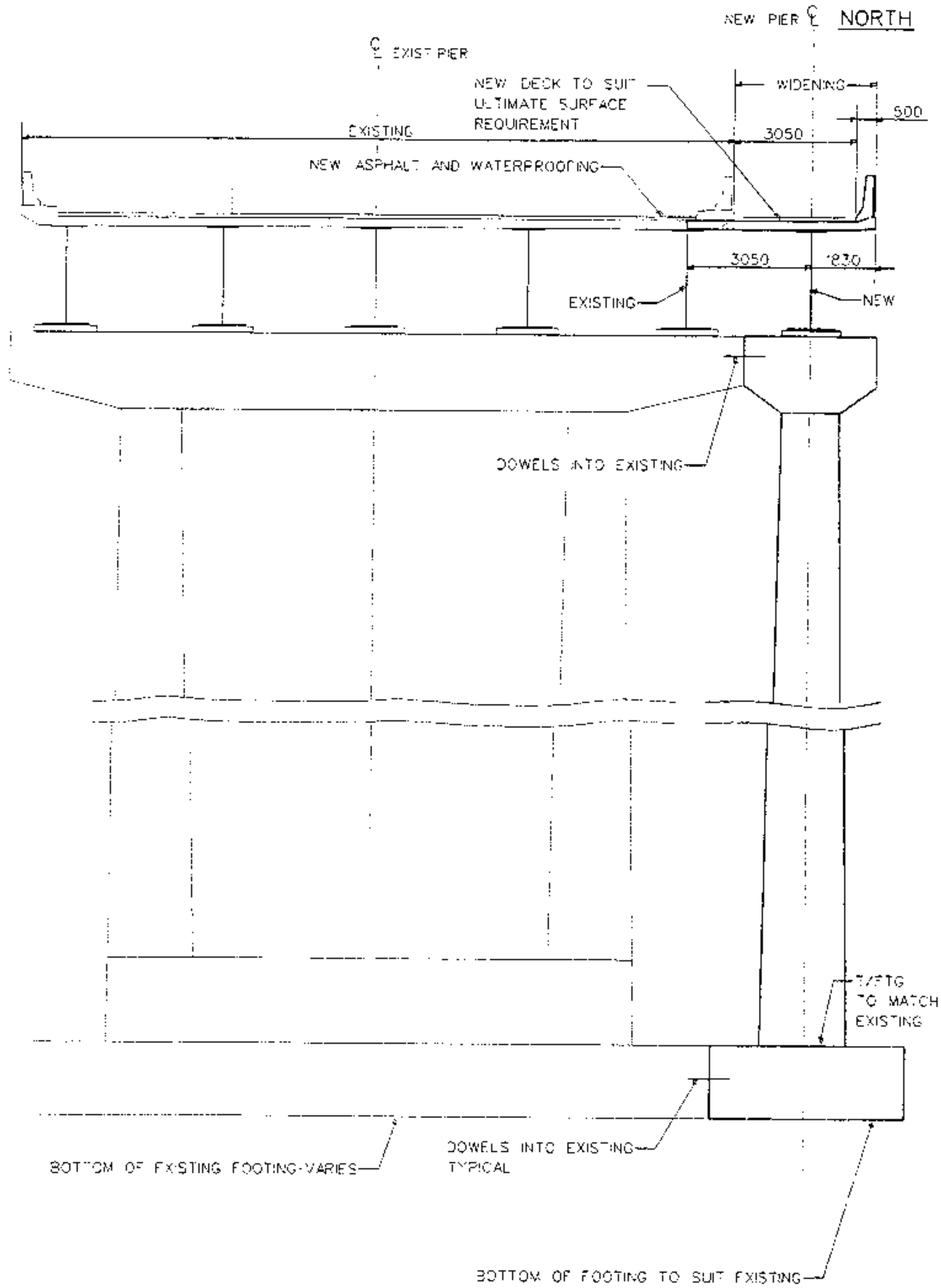
HWY 401 / W.B.L. COLLECTORS
WIDENING OF BRIDGE OVER HOGG'S HOLLOW
CROSS SECTIONS

Scale: N.T.S.



HWY 401 / W.B.L. COLLECTORS
WIDENING OF BRIDGE OVER HOGG'S HOLLOW
PIER CAPPING BEAM EXTENSION

Scale: N.T.S.



HWY 401 / W.B.L. COLLECTORS
WIDENING OF BRIDGE OVER HOGG'S HOLLOW
CROSS SECTION

Scale: N.T.S.

7.4 CONSTRUCTION COST ESTIMATES

Preliminary quantities and construction costs were developed at the alternative evaluation stage of this project. These included costs (in 1995 dollars) for every component of the infrastructure improvements as summarized below:

East Service Road	
• Alternative #1 (Tradewind)	$3,920,000
• Alternative #2 (Combination)	$4,514,000
• Alternative #3 (Midblock)	$4,121,000
West Service Road	
• Alternative #1	$1,473,000
• Alternative #2	$1,492,000
East-West Link (Lower Service Road)	
• Preferred Alignment	$ 853,000
Yonge Street Reconstruction	
• Preferred Alignment with detour	$5,788,000
Interchange	
• Ramp 401 East to Service Road	$2,162,000
• Ramp 401 East to Yonge North & South	$1,641,000
• Ramp 401 West to Yonge North & Service Road	$ 591,000
• Ramp Service Road to 401 West	$1,503,000
• Ramp Yonge South to 401 West	$ 691,000
• Ramp Yonge North to 401 East	$9,528,000
• Ramp Yonge North to 401 West	$10,215,000
Total Construction Cost	
• Based on Average Cost of Alternatives	$38,640,000
• 10% Contingency	$ 3,860,000
• 10% Engineering	$ 3,860,000
TOTAL COST	**$46,400,000**

Details of the quantities, unit costs and totals for each item and each component of the above summary can be seen in Appendix B.

8.0 TASKS TO COMPLETE THE STUDY

8.1 INTRODUCTION

As discussed earlier, this is a "Background Report". This chapter will suggest the outstanding work required to complete a Class 'C' "Environmental Assessment for Municipal Roads" for the transportation infrastructure required for development levels associated with "Vision" development. The tasks are broken down into three main sections i) engineering, ii) public consultation and iii) the final report. Section 8.5 of this chapter outlines the additional information available through Cole, Sherman that is not included in this report.

8.2 ENGINEERING

The evaluation of the east and west service road alternatives is now complete. The next step will be to complete the decision making process and identify the preferred alternatives.

When the preferred alternatives are selected, Cole, Sherman will continue with the preliminary design of the recommended infrastructure improvements. This process is partially complete for the interchange portion of the project and will continue as outlined in section "5.0 Preliminary Design" of our original study design. Preliminary design of the service roads has not begun.

It should be noted that the Hogg's Hollow bridge widening will require an additional study. The structural investigation into various widening techniques identified additional piers to the valley floor as the only feasible solution. These piers introduce a new set of environmental and geotechnical concerns that must be identified and engineered. MTRCA is fully responsible for the terrestrial and aquatic impacts caused by the bridge widening and have not yet been contacted. The following is a preliminary list of concerns at the West Don River Tributary:

- Fish Habitat - warmwater tributary of Type II significance (i.e., warrants mitigation or compensation if impacted). Pier and footing construction will force the relocation of the West Don River tributary.
- Flood and Fill - pier and footing placement will fall within MTRCA's flood and fill regulation lines.
- Vegetation - plant life potentially impacted falls within the following categories: manicured, meadow, and successional forest.

- Wetlands/ANSIs/ESAs - none.
- Surficial Geology - the area immediately below the Hogg's Hollow bridge closest to the river bed consists of sand, silt, clay and muck including Pleistocene Alluvium. Surrounding the flood zone, the earth consists of Undifferentiated Glacial and Interglacial Deposits.
- Recreation - the area under Hogg's Hollow bridge links the north and south portions of the Don Valley Golf Course (a public course owned by the municipality).

The final step in the original study design was "6.0 Construction Staging and Scheduling". During the course of this study construction staging sections, detours and schemes have been completed to ensure constructability. The level of detail in these areas is sufficient for a Class EA. It has been determined through the traffic study that the entire infrastructure improvement scheme must be in place to support further development in the North York South Downtown. For this reason, it is not recommended that reduced schemes be considered to support reduced development levels. Therefore, the construction schedule (timing) is a product of development levels and funding and is beyond the scope of this study.

8.3 PUBLIC CONSULTATION

The public consultation process for this undertaking has been extensive and open. A second Public Information Centre was scheduled for March of 1995, however, was suspended pending direction from Council. This PIC must be held to present the preferred alternative once it is identified during the above-mentioned decision making process. Public input from this PIC will be gathered, summarized and weighed against the decision that is presented. All of this input will be detailed further in the completed (final) ESR.

8.4 FINAL ENVIRONMENTAL STUDY REPORT (ESR)

Given that this is simply an interim status report, the final ESR will be required to satisfy the Class EA process. The ESR will be in a similar format as this report however, will detail the preferred alternative and complete the public consultation component. Additional background information will be provided along with further exhibits and support material. The ESR document will be placed on public record for examination purposes and will ultimately become the governing work to guide the undertaking.

APPENDIX

A

TRAFFIC STUDY

SOUTH DOWNTOWN
SECONDARY PLAN REVIEW

ENVIRONMENTAL
ASSESSMENT STUDY

STATUS
REPORT

NORTH YORK SOUTH DOWNTOWN E.A.

TRAFFIC DOCUMENTATION

The following report documents the information and the results of the traffic analysis undertaken in support of the Environmental Assessment for the transportation infrastructure for the North York South Downtown Secondary Plan. The report consists of the following parts:

- Need and Justification Background Information
- Arterial Road Traffic Operations
- Highway 401 Traffic Operations

A NEED AND JUSTIFICATION BACKGROUND INFORMATION

The City of North York Transportation Department provided the following background information for the need and justification for the transportation improvements proposed for the south downtown under the VISION-2 scenario:

1. initial estimates of overall network capacity versus development potential
2. assessment of road link capacities (v/c) for initial land use scenarios (report #3)
3. comparison of uptown, downtown and south downtown development intensities
4. detailed link assignment (at 60% modal split)for four land use scenarios which lead to "the vision"
5. detailed link assignment (at 60% modal split) for "the vision"
6. some of the background data used in link assignments
7. comparative assessment of two alignments of Service Road (Doris) south of Avondale Avenue
8. Phase 1 Analysis - BA Group
9. Phase 1 Analysis - City of North York Transportation

The above information is contained in a binder available from the City of North York Transportation Department. Appendix A of this report includes exhibits of link volumes and links operating over capacity in the south downtown in the future PM peak hour under various land use alternatives.

Link volumes for the proposed development and transportation infrastructure improvements under the VISION-2 scenario are shown in Figure 1.

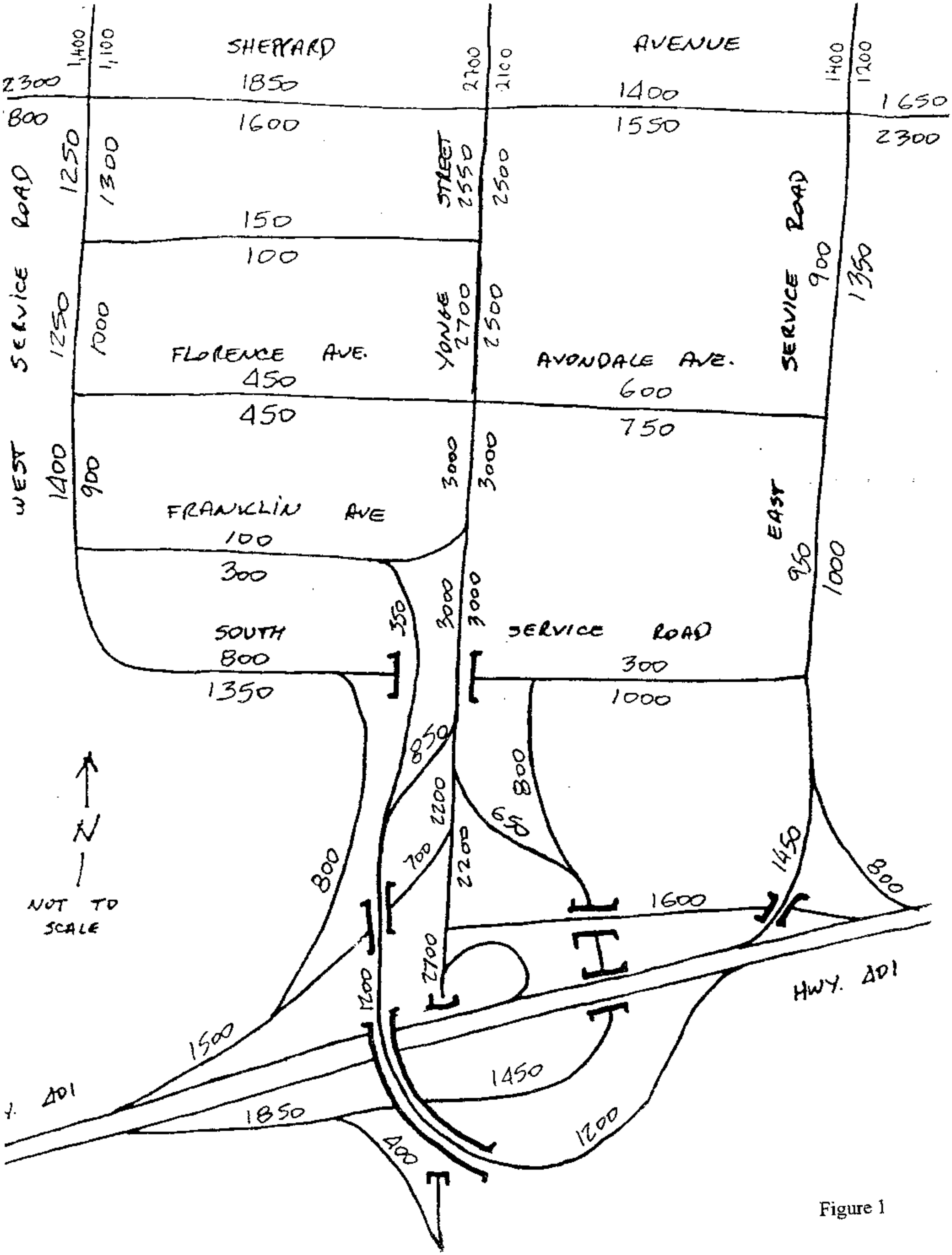

SHEPPARD
AVENUE
WEST SERVICE ROAD
YONGE STREET
EAST SERVICE ROAD
FLORENCE AVE.
AVONDALE AVE.
FRANKLIN AVE
SOUTH SERVICE ROAD
HWY. 401
N
NOT TO SCALE

Figure 1

The land use and trip generation assumptions for this scenario are as follows:

1. Development

Westnor Site

	Floor Area sq.m.	**%**	**residents**	**res. units***	**employees****
residential	249,205	65%	4,019	2,233	--
non-res.	134,187	35%	--	--	4,473
TOTAL	383,392	100%	4,019	2,233	4,473

South Downtown (incl. Westnor)

	Floor Area sq.m.	**%**	**residents**	**res. units***	**employees****
residential	787,190	62%	12,697	7,054	--
non-res.	487,856	38%	--	--	16,262
TOTAL	1,275,046	100%	12,697	7,054	16,262

* 1.8 residents/unit
** 30 sq.m./employee

2. Trip Generation Rates (O.P.A. 343)

peak hour factor	45%
Car occupancy	1.2 persons/vehicle
absenteeism rate (emp.)	10%
walk/other	10%
transit modal split	60%

PM peak hour trip rates:

employment:	0.34 autos/100 sq. m outbound off-peak direction (inbound) is 20% of peak
residential:	0.16 autos/res. unit inbound off-peak direction (outbound) is 50% of peak

3. Parking Requirement

usual parking requirement rates
1 - 1.5 spaces /res. unit
1 - 2 spaces/ 1,000 sq. ft. of office/non-res. development

assuming 1.3 spaces/unit (per north York By-law for R.M. density	
2,233 res. units will require approximately 2,900 parking spaces	
available for non-residential development	
(134, 187 sq.m. or 1,491,000 sq. ft.)	1,100 (or 0.74 spaces/1,000 sq. ft.)
for a total of	4,000 parking spaces
assuming 1.0 space/res, unit	
2,233 units will require approximately	2,200 spaces
avail. for non-res. development	1,800 spaces (1.2 spaces/1,000 sq. ft.)
for a total of	4,000 parking spaces

More details about the land use assumptions for the various sites in south downtown are provided in Appendix B.

Trip Generation Rates

The following is a discussion of the sensitivity of trip generation factors and how rates used by the City of North York compare to trip generation rates calculated using data from the 1991 and 1986 Transportation Tomorrow Survey (TTS). This discussion deals primarily with the sensitivity of trip generation rates to factors such as modal split and attendance factor.

As shown in the attached table, the City of North York Transportation Department has calculated a future trip generation rate of 0.34 inbound vehicle trips per 100 sq.m. of development for the AM peak hour. This value was obtained using the following factors:

30 sq.m. per employee (i.e. 3.33 employees/100 sq.m.);
0.9 attendance factor (i.e. 90% of employees will go to work in the AM peak period);
0.3 auto modal split (i.e. 60% transit and 10% walk/cycle);
1.2 persons per vehicle;
0.45 peak hour factor (i.e. 45% of the peak period trips arrive within the peak hour).

Using information from the TTS, the trip generation rate can be calculated as the product of:

the number of employees per 100 m^2,
percent of daily trips per employee,
percent of work trips in the peak period,
modal split,
no. of passengers per vehicle and
the peak hour factor.

It should be noted that the product of 'percent of daily trips per employee' and 'percent of work trips in the peak period' is approximately equivalent to the attendance factor used in the trip generation rate calculations by North York.

Trip generation rates were calculated for Planning District 11 and Planning District 1 of Metropolitan Toronto using data obtained in the 1986 and 1991 TTS. Planning District 11 is the area of North York bounded by Dufferin Street, the Don River, Highway 401 and Steeles Avenue. This area includes the North York City Centre, as well as, established residential neighbourhoods. Planning District 1 in the City of Toronto, is bounded by Bathurst Street, the Don Valley Parkway, the lakeshore and Bloor Street. The detailed calculations for these trip generations are outlined in Tables 1 and 2.

A trip generation rate of 0.50 was calculated for Planning District 11 using the following 1986 TTS values:

0.77 daily work trips/worker;

0.75 work trips in peak period;

0.69 auto modal split.

A trip generation rate of 0.51 was calculated using the following 1991 TTS values:

0.78 daily work trips/worker;

0.71 work trips in peak period;

0.74 auto modal split.

The trip generation rate for 1991 is slightly higher than the rate for 1986 because the auto modal split increased. This is primarily a result of the decrease in the transit modal split which is consistent with the decreases experienced throughout Metropolitan Toronto.

A trip generation rate of 0.28 was obtained for Planning District 1 using the following 1986 TTS values:

0.76 daily work trips /worker;

0.79 work trips in peak period;

0.36 auto modal split.

A trip generation rate of 0.28 was obtained for Planning District 1 using the following 1991 TTS values:

0.8 daily work trips /worker;

0.77 work trips in peak period;

0.36 auto modal split.

The North York City Centre is expected to become a high density fully developed urban area, therefore, it is reasonable to assume that this area will produce a future trip generation rate similar to that which currently exists in downtown Toronto (Planning District 1). With the high density development, surface transit and rapid transit improvements that are expected for this area, it is reasonable to assume a transit modal split of 60% in the future. The high density and mix of development that is expected for the area will also be able to support a 10% walk/cycle mode. Surveys show that in various areas in Metropolitan Toronto the walk/cycle mode represents 6% to 28% of the work based trips.

As noted above, the attendance factor was calculated as the product of the daily work trips/worker and the work trips made in the peak period. The attendance factor calculated from the 1991 TTS Data is 0.55 and the attendance factor calculated based on the 1986 TTS data is 0.58. North York has assumed a peak period attendance factor of 0.90 which is consistent with the absenteeism rate of 10% reported by the City of North York Human Resources Department, the building vacancy rate in the North York City Centre and the absenteeism rates used by Metropolitan Toronto and the City of Toronto. The assumed attendance factor of 0.90 implies a much higher participation of the work force in the morning peak hour trip making than the trip making participation indicated by the TTS data.

The assumed peak hour factor of 0.45 is representative of current patterns of work trip made by auto in the morning peak period. Assuming higher levels of congestion in the future and, possibly, peak period spreading, this factor could in theory go much lower than 0.40.

Tables 3 and 4 show combinations of modal split and attendance factor that may result in a trip generation rate of 0.34. Figure 2 is a sensitivity analysis to demonstrate the impact that changes in the absenteeism factor, the modal split and the peak hour factor have on the trip generation rate. Copies of TTS data summaries for Planning Districts 1 and 11 are also attached.

Trip Generation Rate

Trip Generation Rate calculated by the City of North York

# empl. per 100 sq.m.	AM peak period attendance	auto modal split	# empl. per veh.	Peak Hour Factor	Trip Generation Rate
3.33	0.9	0.3	1.2	0.45	**0.34**

Table 1 - 1991 TTS Values

# empl. per 100 sq.m.	AM peak period attendance		auto modal split	# empl. per veh.	Peak Hour Factor	Trip Generation Rate	Comments
	daily trips per employee	work trips in peak period					
3.33	0.8	0.77	0.36	1.2	0.45	**0.28**	PD1
3.33	0.78	0.71	0.74	1.2	0.45	**0.51**	PD11

Table 2 - 1986 TTS Values

# empl. per 100 sq.m.	AM peak period attendance		auto modal split	# empl. per veh.	Peak Hour Factor	Trip Generation Rate	Comments
	daily trips per employee	work trips in peak period					
3.33	0.78	0.79	0.36	1.2	0.45	**0.28**	PD1
3.33	0.77	0.75	0.69	1.2	0.45	**0.50**	PD11

Table 3 - Adjusting Modal Split Value

# empl. per 100 sq.m.	daily trips per employee	work trips in peak period	auto modal split	# empl. per veh.	Peak Hour Factor	Trip Generation Rate	Comments
3.33	0.78	0.71	**0.3**	1.2	0.45	**0.21**	1991 PD11 TTS values - 30% modal split
3.33	0.78	0.71	**0.5**	1.2	0.45	**0.34**	1991 PD11 TTS values - 50% modal split

Table 4 - Adjusting Attendance

# empl. per 100 sq.m.	AM peak period attendance	auto modal split	# empl. per veh.	Peak Hour Factor	Trip Generation Rate	Comments
3.33	**0.8**	0.3	1.2	0.45	**0.30**	NY values with attendance=80%
3.33	**0.7**	0.3	1.2	0.45	**0.26**	NY values with attendance=70%

Figure 2

Sensitivity Analysis of Trip Generation Rates

Attendance = 0.9

	auto modal split								
PHF	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7
0.35	0.26	0.31	0.35	0.39	0.44	0.48	0.52	0.57	0.61
0.4	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
0.45	0.34	0.39	0.45	0.51	0.56	0.62	0.67	0.73	0.79

Attendance = 0.8

	auto modal split								
PHF	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7
0.35	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.54
0.4	0.27	0.31	0.36	0.40	0.44	0.49	0.53	0.58	0.62
0.45	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70

Attendance = 0.7

	auto modal split								
PHF	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7
0.35	0.20	0.24	0.27	0.31	0.34	0.37	0.41	0.44	0.48
0.4	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.54
0.45	0.26	0.31	0.35	0.39	0.44	0.48	0.52	0.57	0.61

Attendance = 0.6

	auto modal split								
PHF	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7
0.35	0.17	0.20	0.23	0.26	0.29	0.32	0.35	0.38	0.41
0.4	0.20	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47
0.45	0.22	0.26	0.30	0.34	0.37	0.41	0.45	0.49	0.52

PLANNING DISTRICT 1

MUNICIPALITY OF METROPOLITAN TORONTO

DEMOGRAPHIC CHARACTERISTICS

TOTAL NUMBER OF HOUSEHOLDS: 70,500
64,300

Dwelling Type	House:	16% 24%	Other:	84% 76%

Household Size (persons)	1	2	3	4	5+
	46% 40%	35% 33%	11% 11%	5% 8%	3% 4%

No. of Available Vehicles	0	1	2	3	4+
	51% 47%	40% 43%	8% 9%	1% 1%	0% 0%

Household Averages	Persons	Workers	Drivers	Vehicles	Trips/Day
	1.8 [illegible]	1.1 [illegible]	1.2 [illegible]	0.6 0.7	4.0 3.7

TOTAL POPULATION: 130,500
122,000

	Population	Licenced Drivers	Employment Status: Full-Time	Part-Time	Work at Home	Student
Male	68,000 62,200	69% 69%	64% 63%	3% 3%	3% 2%	17% [illegible]
Female	62,500 59,800	55% 51%	44% 48%	9% 6%	3% 3%	18% 17%

Age	Median	0-10	11-15	16-25	26-45	46-64	65+
	33.3 30.7	8% 8%	2% 3%	16% 20%	47% 45%	17% [illegible]	9% [illegible]

Daily trips/Person (age 11+): 2.3
2.1

Daily work trips/Worker: 0.80
[illegible]

TRAVEL PATTERNS

TRIP PURPOSE

Trips Made by Residents of Planning District 1

Time Period	Trips	% of 24 hr.	Trip Purpose Category: HB-W	HB-S	HB-O	N-HB
6 - 9 a.m.	57,000 54,300	20.4 23.0	75% 74%	14% 15%	8% 8%	3% 3%
24 hours	278,500 236,100		42% 47%	12% 11%	32% 28%	14% 14%

Percentage of trips made within district: 6-9 a.m. = 58%
50% 24 hours = 56%
55%

Trips Made to Planning District 1

Time Period	Trips	% of 24 hr.	Destination Purpose: Work	School	Home	Other
6 - 9 a.m.	337,000 316,400	41.5 44.4	83% 85%	10% 9%	0% 0%	7% 6%
24 hours	811,500 712,000		45% 48%	8% 7%	15% 14%	32% 30%

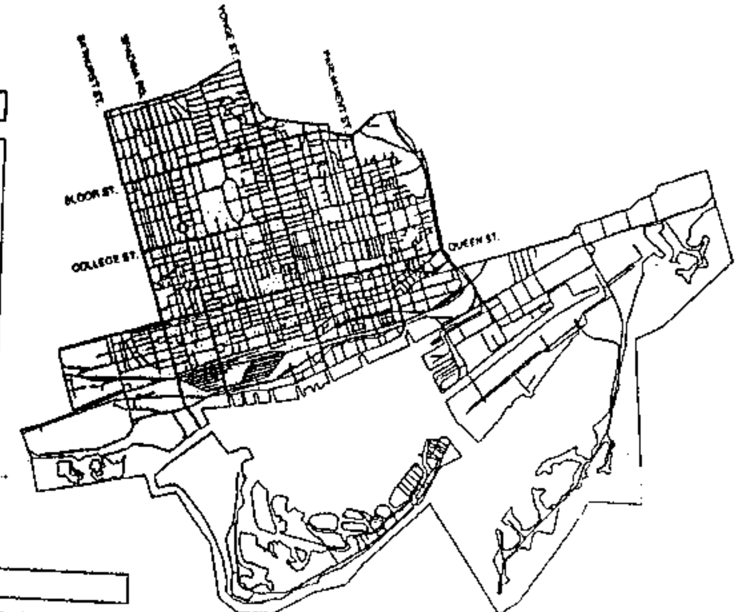
MODE OF TRAVEL

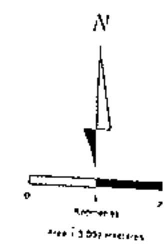
Trips Made by Residents of Planning District 1

Time Period	Trips	Auto Driver	Auto Passng.	Local Transit	GO Train	Walk & Cycle	Other
6 - 9 a.m.	57,000 54,300	27% 29%	4% 4%	38% 41%	1% 0%	28% 24%	2% [illegible]
24 hours	278,500 236,100	31% 34%	7% 0%	32% 36%	1% 0%	26% 19%	3% 3%
Mean Trip Length: (kilometres)		8.9 8.3	6.7 6.1	4.7 4.6	28.0 32.2		

Trips Made to Planning District 1

Time Period	Trips	Auto Driver	Auto Passng.	Local Transit	GO Train	Walk & Cycle	Other
6 - 9 a.m.	337,000 316,400	29% 29%	7% 7%	45% 51%	13% 8%	6% 5%	0% 1%
24 hours	811,500 712,000	33% 35%	8% 9%	39% 44%	6% 4%	11% 7%	2% 2%





LEGEND

1991 TTS

1986 TTS

TRANSPORTATION TOMORROW SURVEY

University of Toronto
Joint Program in Transportation
Data Management Group

PLANNING DISTRICT 11

MUNICIPALITY OF METROPOLITAN TORONTO

DEMOGRAPHIC CHARACTERISTICS

TOTAL NUMBER OF HOUSEHOLDS: 54,400
48,000

Dwelling Type — House: 54% (59%) — Other: 46% (41%)

Household Size (persons)	1	2	3	4	5+
	25%	39%	14%	14%	8%

No. of Available Vehicles	0	1	2	3	4+
	16%	49%	30%	4%	1%

Household Averages	Persons	Workers	Drivers	Vehicles	Trips/Day
	2.4	1.2	1.6	1.3	5.2

TOTAL POPULATION: 132,000
123,000

	Population	Licenced Drivers	Employment Status: Full-Time	Part-Time	Work at Home	Student
Male	62,000	77%	45%	1%	6%	19%
Female	70,000	58%	29%	7%	4%	16%

	Median	0-10	11-15	16-25	26-45	46-64	65+
Age	38.4	11%	4%	14%	33%	19%	20%

Daily trips/Person (age 11+): 2.4 — Daily work trips/Worker: 0.78

TRAVEL PATTERNS

TRIP PURPOSE

Trips Made by Residents of Planning District 11

Time Period	Trips	% of 24 hr.	Trip Purpose Category: HB-W	HB-S	HB-D	N-HB
6 - 9 a.m.	60,000	21.2	55%	18%	19%	8%
24 hours	284,000		31%	10%	44%	16%

Percentage of trips made within district: 6-9 a.m. = 31% 24 hours = 35%

Trips Made to Planning District 11

Time Period	Trips	% of 24 hr.	Destination Purpose: Work	School	Home	Other
6 - 9 a.m.	68,500	22.1	55%	19%	2%	24%
24 hours	310,500		17%	5%	38%	40%

MODE OF TRAVEL

Trips Made by Residents of Planning District 11

Time Period	Trips	Auto Driver	Auto Passng.	Local Transit	GO Train	Walk & Cycle	Other
6 - 9 a.m.	60,000	57%	12%	24%	*	5%	2%
24 hours	284,000	63%	17%	16%	*	4%	1%
Mean Trip Length: (kilometres)		7.2	5.7	9.8	*		

Trips Made to Planning District 11

Time Period	Trips	Auto Driver	Auto Passng.	Local Transit	GO Train	Walk & Cycle	Other
6 - 9 a.m.	68,500	59%	15%	19%	0%	5%	2%
24 hours	310,500	65%	16%	15%	0%	3%	1%

LEGEND
1991 TTS
1986 TTS

TRANSPORTATION TOMORROW SURVEY

University of Toronto
Joint Program in Transportation
Data Management Group

B ARTERIAL ROAD TRAFFIC OPERATIONS

Existing Turning Movements

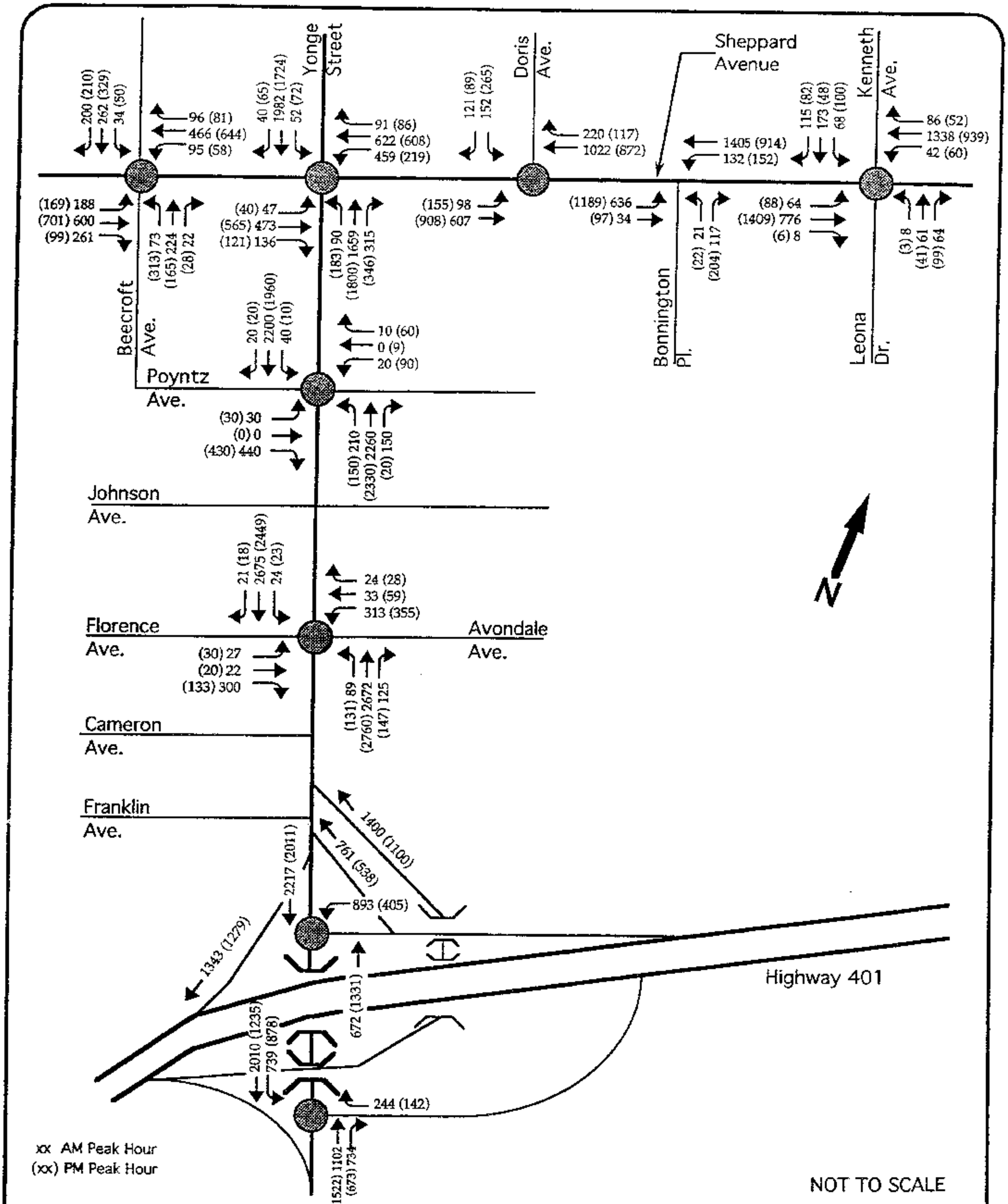
All existing turning movements, except the westbound Highway 401 to northbound Yonge Street ramp, were obtained from Metro counts. The west-north off ramp volume was obtained from the existing volumes used by the BA Group in their traffic impact study of the Westnor Development Project. The existing turning volumes are provided in Figure 3. The traffic volumes provided by the BA Group are contained in Appendix C. Included with these traffic volumes is a figure which outlines the Current/Committed Lane Configurations and Area Road System.

Future Turning Movements

Four designs were considered to account for various alignments of the service roads under future conditions. Traffic analyses were conducted for two of the four designs, these are design 1 "Tradewind Allignment" and design 3 "Midblock Allignment". Design 2 "Combination" produces the same traffic volumes as design 1 and design 4 "Modified Mid-block" produces the same traffic volumes as design 3.

The following table summarizes the sources from which the future turning movements were taken:

Intersection	AM Peak	PM Peak
Existing Intersections	Balanced future AM background traffic volumes provided by BA Group with the future link volumes provided by City of North York.	Balanced future PM background traffic volumes provided by BA Group with the future link volumes provided by City of North York.
Proposed Intersections	Reversed PM volumes and made minor adjustments to ensure volumes coming out of one intersection and going into the following intersection are equal.	BA Group
Existing Ramps	Reversed the PM volumes.	BA Group PM background volumes
Proposed Ramps	City of North York future ramp volumes	City of North York future ramp volumes



North York Environmental Assessment

EXISTING TRAFFIC VOLUMES
AM/PM PEAK HOUR

FIGURE 3

The future turning movements for design 1 are outlined in Figure 4 and the future turning movements for design 3 are outlined in Figure 5.

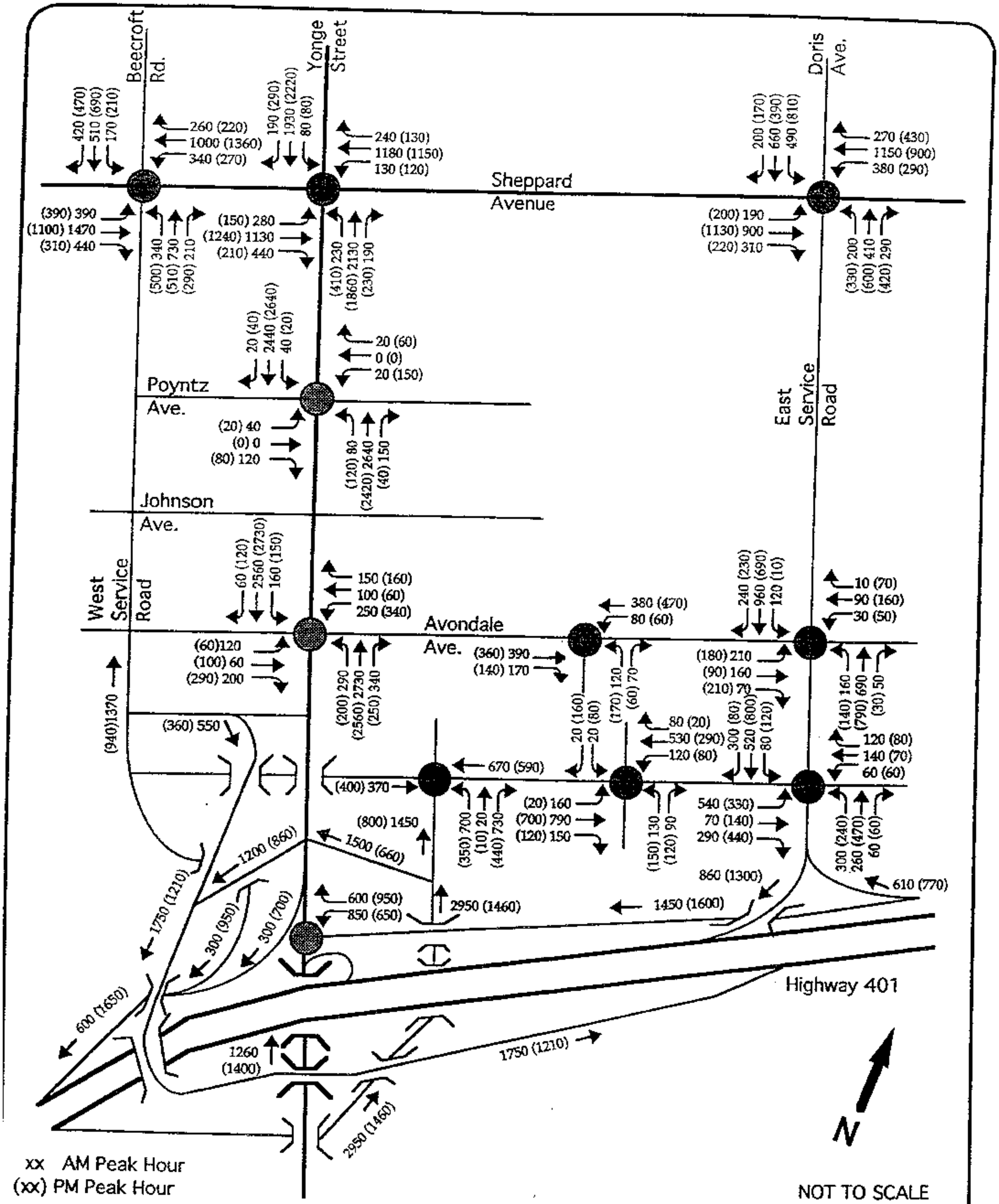
Capacity Analysis

The Highway Capacity Software was used to conduct the capacity analyses.

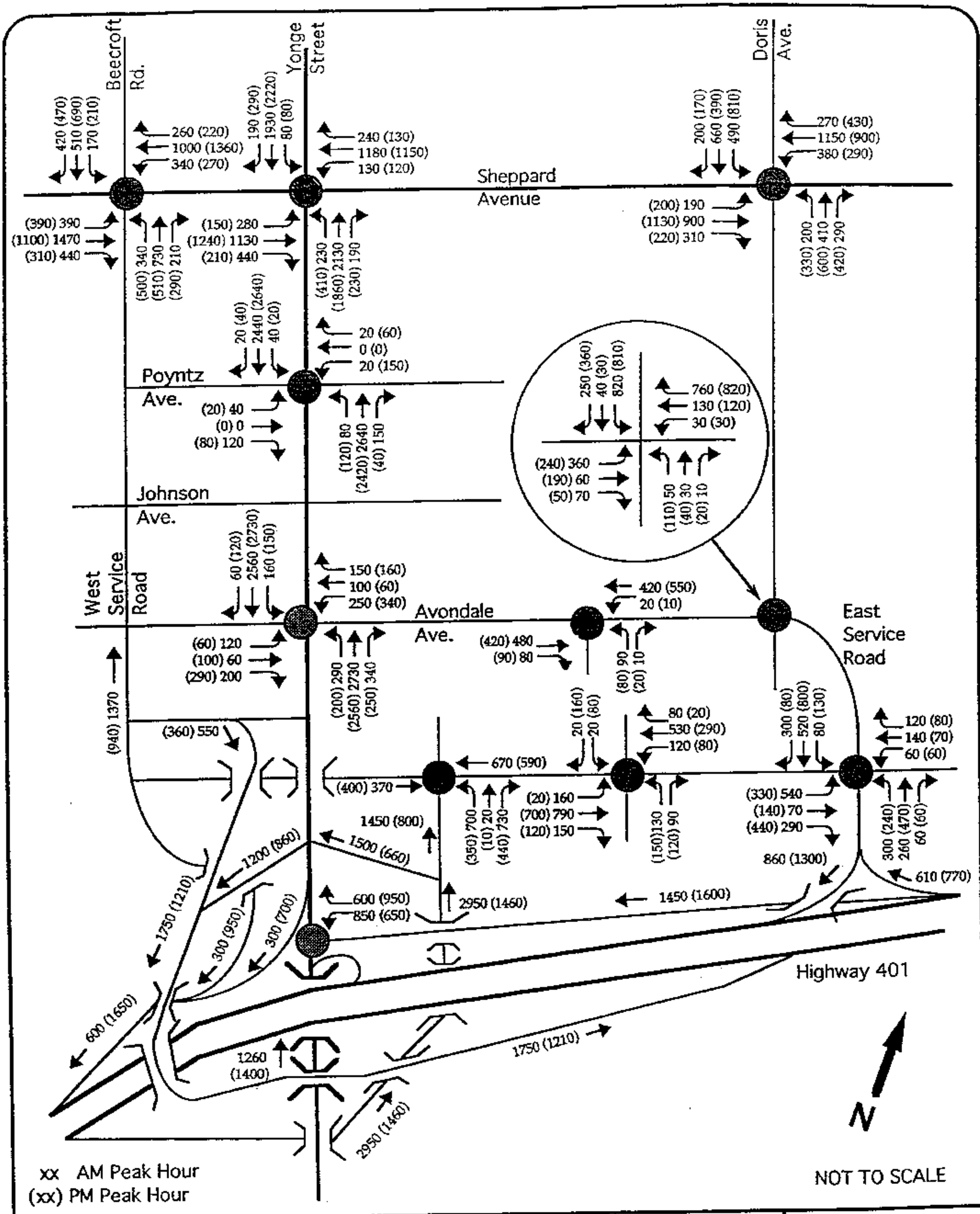
Under existing conditions capacity analysis was conducted for the AM and PM peak hours at all signalized intersections along Yonge Street between Sheppard Avenue and Highway 401, as well as the intersections of Sheppard Avenue with Beecroft Road and Doris Avenue. The existing volumes and existing traffic signal timing were used in the analysis, however some signal timing adjustments were required to keep the v/c ratio below 1.2. Since the traffic signals on Yonge Street are under SCOOT Control it is acceptable to adjust the signal timing for the existing conditions. At all intersections, except Yonge Street and Avondale Avenue, adjustments were made to the phase times but the cycle length remained the same. A saturation flow of 1800 vph and a peak hour factor of 0.95 were used in the analyses. For the analysis of the Avondale Avenue and Yonge Street intersection a saturation flow of 1900 vph and a peak hour factor of 0.98 were assumed due to the saturated conditions experienced at that intersection. The critical movements at these intersections are outlined in Table 5.

Capacity analyses were conducted for the future AM and PM peak hours at all existing and proposed signalized intersections in the study area. A saturation flow of 1800 vph and a peak hour factor of 0.95 were used in the analyses. The critical movements at the existing intersections along Yonge Street and Sheppard Avenue are outlined in Table 6 and the critical movements at the proposed intersections are outlined in Table 7. The level of service at these intersections are shown in Figures 6, 7 and 8 for designs 1 and 3.

The South Service Road and Westnor access intersection and the Avondale and Bales Avenue intersection were analyzed as both signalized and unsignalized intersections. The analysis of the South Service Road/Westnor access intersection indicates that traffic signals are not required for the movements on the main road, however traffic signals are required to serve the traffic exiting the access roads. Storage length requirements for the South Service Road intersections have been checked and it appears that the signalization of this intersection will not have adverse effects on the intersections of South Service Road/East Service Road and South Service Road/401 off ramp. The intersection of Avondale Avenue and Bales Avenue does not require traffic signals.



North York Environmental Assessment	FUTURE TRAFFIC VOLUMES SCENARIO 1	FIGURE 4



North York Environmental Assessment	FUTURE TRAFFIC VOLUMES SCENARIO 3	FIGURE 5

Table 5

Intersection Analysis - Existing Conditions

Intersection	Period	Intersection			Critical Movement			
		v/c	delay	LOS	Movement	v/c	delay	LOS
Beecroft/Sheppard	AM Peak	0.711	13.3	B				
Beecroft/Sheppard	PM Peak	1.013	36	D	EBLTR	1.05	55.9	E
					WBTR	0.92	28.4	D
					NBL	0.98	50.2	E
Yonge/Sheppard	AM Peak	0.961	27.9	D	WB L	1.02	61.5	F
					NB L	1.19	202.4	F
					NBTR	0.9	23.2	C
					SBTR	0.9	23.2	C
Yonge/Sheppard	PM Peak	0.829	31.4	D	NBTR	0.97	25.7	D
					SB L	0.94	78	F
					SB TR	1.04	46.5	E
Doris/Sheppard	AM Peak	0.555	9.6	B				
Doris/Sheppard	PM Peak	0.756	10	B				
Kenneth/Sheppard	AM Peak	0.731	12	B				
Kenneth/Sheppard	PM Peak	0.607	10.8	B				
Yonge/Poyntz	AM Peak	0.876	23.3	C	SB TR	0.96	27.6	D
					NBTR	0.87	16.1	C
Yonge/Poyntz	PM Peak	0.859	16.9	C				
Yonge/Avodale	AM Peak	1.1	85.9	F	WB LTR	1.12	113.3	F
					NBTR	1.08	64.3	F
					SB TR	1.17	115	F
Yonge/Avondale	PM Peak	1.165	98.4	F	WBLTR	1.15	118.9	F
					NBTR	1.18	111.6	F
					SB TR	1.14	89.7	F
Yonge/401 N	AM Peak	1.028	39.7	D	WB L	1.13	105.4	F
					SB T	0.99	24.9	C
Yonge/401 N	PM Peak	0.848	10.5	B	SBT	0.88	10.3	B
Yonge/401 S	AM Peak	0.838	10.3	B	NB TR	0.88	20.1	C
Yonge/401 S	PM Peak	0.951	23.5	C	NB TR	1	33.2	D
					SB L	1.02	33	D

critical if LOS = E or F
or if v/c >= 0.85 for through, v/c >= 1.00 for left or right

Table 6

Intersection Analysis - Future Conditions

Intersection	Period	Intersection			Critical Movement			
		v/c	delay	LOS	Movement	v/c	delay	LOS
Beecroft/Sheppard	AM Peak	1.017	75.5	F	EBTR	1.15	108.8	F
					WBL	1.13	125.7	F
					WBTR	0.94	41	E
					NBL	1.13	124.7	F
					NBTR	1.03	65.8	F
					SBR	1.04	79.6	F
Beecroft/Sheppard	PM Peak	1.023	76.2	F	EBL	1.03	71.9	F
					EBTR	1.12	98.1	F
					WBT	1.05	65.6	F
					NBL	1.16	130	F
					NBTR	1.16	124.7	F
					SBT	0.94	49.8	E
Yonge/Sheppard	AM Peak	0.998	63.4	F	EBL	1.13	126.1	F
					EBTR	1.12	93.3	F
					WBTR	1	49.4	E
					NBL	1.11	123.3	F
					NBTR	1.03	46.1	E
					SBL	0.99	113	F
					SBT	1.06	60.7	F
Yonge/Sheppard	PM Peak	1.059	101	F	EBL	1.04	119.6	F
					EBTR	1.18	130	F
					WBTR	1.03	62	F
					NBL	1.14	120.3	F
					NBTR	1.13	93.4	F
					SBT	1.18	122.6	F
Doris/Sheppard	AM Peak	1.055	71	F	EBTR	0.88	35.8	D
					WBL	1.16	135.4	F
					WBTR	1.03	57.1	E
					NBTR	1.16	129.7	F
					SBLTR	1.12	99.9	F
Doris/Sheppard	PM Peak	1.092	95.9	F	EBTR	1.1	87.9	F
					WBL	1.13	131.2	F
					WBTR	1.11	93.6	F
					NBTR	1.16	122.8	F
					SBL	0.91	48.7	E
					SBLTR	1.16	124.5	F
Yonge/Poyntz	AM Peak	0.729	15.1	C				
Yonge/Poyntz	PM Peak	0.782	17.9	C				
Yonge/401 North	AM Peak	0.83	16.5	C				
Yonge/401 North	PM Peak	0.863	15.4	C	SBT	0.91	16.4	C
Yonge/Lord Seaton	AM Peak	0.732	13.7	B	NBTR	0.98	29.9	D
Yonge/Lord Seaton	PM Peak	0.76	9.8	B	NBTR	0.93	18.4	C

critical if LOS = E or F

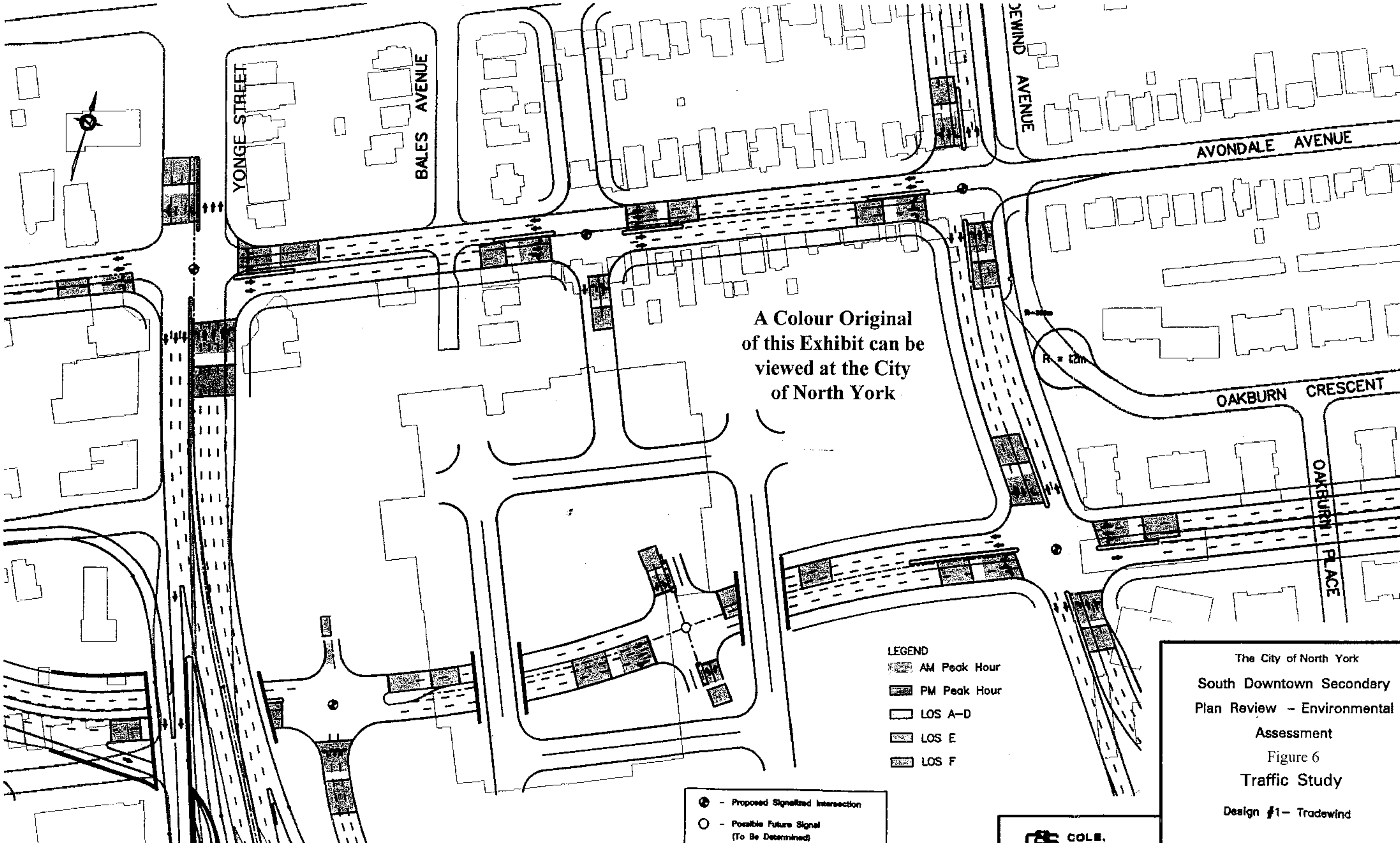
or if v/c >= 0.85 for through, v/c >= 1.00 for left or right

Table 7

Intersection Analysis - Future Conditions

Intersection	Period	Intersection			Critical Movement			
		v/c	delay	LOS	Movement	v/c	delay	LOS
South Service Road/ 401 off ramp	AM Peak	0.726	14.9	B				
South Service Road/ 401 off ramp	PM Peak	0.497	8.6	B				
South Service Road/ Wesnor Access	AM Peak	0.466	9.9	B				
South Service Road/ Wesnor Access	PM Peak	0.465	8.8	B				
East Service Road/ South Service Road	AM Peak	0.891	23.5	C	EBTR NBTR SBTR	0.85 0.87 0.94	25.7 35.1 28.4	D D D
East Service Road/ South Service Road	PM Peak	0.856	24	C	SBTR	0.85	23.6	C
Avondale Avenue/ East Service Road Design #1	AM Peak	0.614	12	B				
Avondale Avenue/ East Service Road Design #1	PM Peak	0.634	11.9	B				
Avondale Avenue/ East Service Road Design #2	AM Peak	0.598	11.4	B				
Avondale Avenue/ East Service Road Design #2	PM Peak	0.577	10.7	B				
Avondale Avenue/ East Service Road Design #3	AM Peak	0.853	37.6	D	WBR	1.03	53.4	E
Avondale Avenue/ East Service Road Design #3	PM Peak	0.899	34.9	D	EBL WBR NBL	0.89 1.05 0.82	44.6 55.2 40.8	E E E
Avondale Avenue/ East Service Road Design #4	AM Peak	0.615	22.2	C				
Avondale Avenue/ East Service Road Design #4	PM Peak	0.697	22.9	C				
Avondale Avenue/ Proposed Road Design #1,2	AM Peak	0.321	8.1	B				
Avondale Avenue/ Proposed Road Design #1,2	PM Peak	0.336	8	B				
Avondale Avenue/ Proposed Road Design #3,4	AM Peak	0.294	8.1	B				
Avondale Avenue/ Proposed Road Design #3,4	PM Peak	0.278	8.2	B				
Avondale Avenue/ Yonge Street	AM Peak	0.9	49.9	E	NBL NBT SBTR	1.11 1.08 1.04	107.4 61.3 44.8	F F E
Avondale Avenue/ Yonge Street	PM Peak	1.042	48.2	E	EBR NBT SBTR	1.17 1.07 1.2	157.4 58.9 129.6	F E F

critical if LOS = E or F
or if v/c >= 0.85 for through, v/c >= 1.00 for left or right



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South Downtown Secondary Plan Review – Environmental Assessment

Figure 6

Traffic Study

Design #1– Tradewind

Scale: N.T.S. September 5, 1996

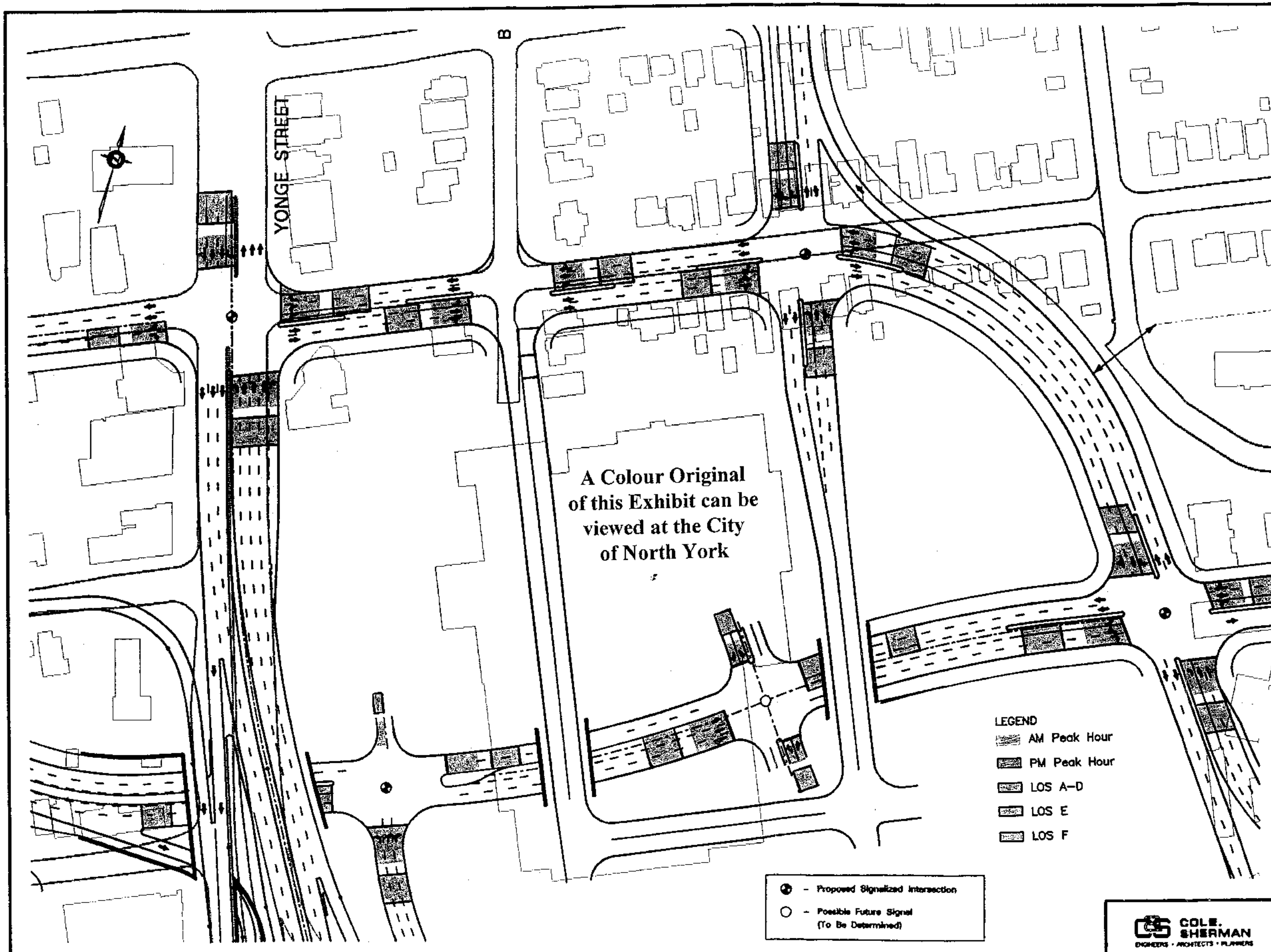

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Figure 7

Traffic Study

Design #3–Midblock

Scale: N.T.S.

September 5, 1995

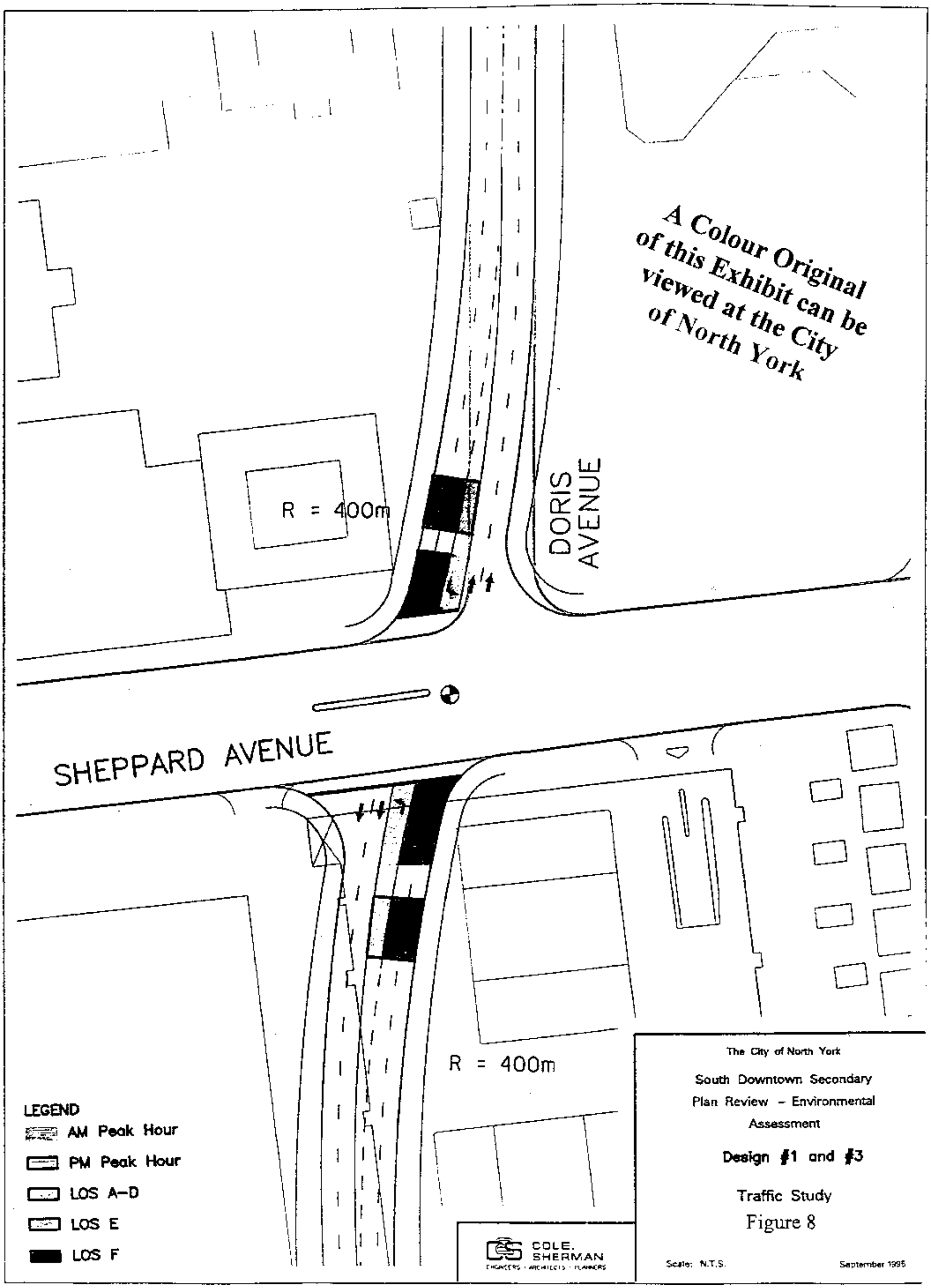

A Colour Original of this Exhibit can be viewed at the City of North York
R = 400m
DORIS AVENUE
SHEPPARD AVENUE
R = 400m
LEGEND
AM Peak Hour
PM Peak Hour
LOS A–D
LOS E
LOS F
COLE, SHERMAN
The City of North York
South Downtown Secondary Plan Review – Environmental Assessment
Design #1 and #3
Traffic Study
Scale: N.T.S.
September 1995

Figure 8

Storage Length Analysis

The storage length requirements were calculated for all four designs. The vehicle arrival rates were calculated for each movement at the intersections. The arrival rates for the left turn movements are based on a probability that 95% of the time vehicles will clear the intersection in one cycle. Using the Vehicle Arrival Rate Table provided in the Ministry of Transportation Geometric Design Standards the number of vehicles that will be stopped per cycle was determined. This number was multiplied by 7.5 metres, the average length of a vehicle, to determine the required storage. This adjustment for 95% probability of clearance results in an increase in storage length requirement of about 80% - 120% over the non-adjusted storage length requirement (depending on the arrival rate, this increase may range from about 45% to over 200%). The arrival rate for through and right turn movements was increased by 50% and rounded to determine the number of vehicles stopped per cycle, and was multiplied by 7.5 meters to determine the required storage.

At most intersections sufficient storage was provided, however there were a few critical intersections where storage length requirements could not be met, or where the lane configuration had to be adjusted to meet the storage length requirements. The storage length problems are primarily due to the close proximity of the proposed intersections.

The intersection of East Service Road and South Service Road could operate with only one eastbound left turn lane, however, there was a storage length problem in all the designs. A double left turn lane was provided at this intersection to meet the storage length requirement. Summarized below are storage length problems by design option.

Design #1 (Tradewind)

Intersection	Movement	Distance btwn Intersections (m)	Required Storage (m)	# of Lanes	Total Storage Provided (m)
Avondale/	SBTR	100	100	1	70
East Service	SBTR	100	130	1	70
		(Avondale - Glendora)			
South Service/	EBTR	150	130	1	120
East Service		(East Service - Westnor access)			
Avondale/	WBL	100	150	2	125
Yonge Street	WBTR	100	100	1	70
		(Yonge - Bales)			

Design #2 (Combination)

Intersection	Movement	Distance btwn Intersections (m)	Required Storage (m)	# of Lanes	Total Storage Provided (m)
Avondale/	SBTR	100	100	1	70
East Service	SBTR	100	130	1	70
		(Avondale - Glendora)			

South Service/ East Service	EBTR	150 (East Service - Westnor access)	130	1	120
Avondale/ Yonge Street	WBL	100	150	2	135
	WBTR	100 (Yonge - Bales)	100	1	75

Design #3 (Mid-block)

Intersection	Movement	Distance btwn Intersections (m)	Required Storage (m)	# of Lanes	Total Storage Provided (m)
Avondale/ East Service	SBTR	100	100	1	70
	SBTR	100 (Avondale - Glendora)	130	1	70
	EBL	110 (East Service - Proposed Rd)	115	1	65
	WBR	220 (East Service - South Service)	210	1	160
South Service/ East Service	EBTR	150 (East Service - Westnor access)	130	1	120
Avondale/ Yonge Street	WBL	100	150	2	135
	WBTR	100 (Yonge - Bales)	100	1	75

Design #4 (Modified Mid-block)

Intersection	Movement	Distance btwn Intersections (m)	Required Storage (m)	# of Lanes	Total Storage Provided (m)
Avondale/ East Service	SBTR	100	100	1	70
	SBTR	100 (Avondale - Glendora)	130	1	70
	EBL	110 (East Service - Proposed Rd)	115	1	65
South Service/ East Service	EBTR	150 (East Service - Westnor access)	130	1	120
Avondale/ Yonge Street	WBL	100	150	2	135
	WBTR	100 (Yonge - Bales)	100	1	75

The storage length problems for designs 1 and 2 could be eliminated by:

- closing Glendora Avenue at the East Service Road to eliminate the southbound storage length problems at the Avondale/East Service Road intersection;
- providing an exclusive right turn lane for the eastbound movement at the South Service/East Service intersection;
- eliminating through movements at the Avondale/Yonge intersection so that the WBTR lane could be designated an exclusive right lane;

Providing these adjustments would eliminate all storage length problems except for the westbound left turn movement at Yonge and Avondale. Two left turn lanes are provided for this movement with the left most lane being 60m long and the adjacent left turn lane being 75m long. The left most lane is shorter because a 15m eastbound left turn lane is provided at the Avondale/Bales intersection west of Yonge St. With this design, the westbound left turn movement at Yonge and Avondale would operate with a 90% probability that the left turn vehicles will not back up into the upstream intersection (Avondale/Bales). However, a capacity analysis for the intersection of Avondale and Bales has shown that an exclusive lane for eastbound left turns into Bales is not needed. Therefore, if the left turn lane into Bales is not provided, the westbound double left turn lane at Avondale/Yonge would provide sufficient storage length (150m) for left turning vehicles.

These same solutions could be provided for designs 3 and 4, however there would still be storage problems at the intersection of Avondale Avenue and East Service Road. Designs 3 and 4 have a storage problem for the eastbound left turn movement and design 3 also has a storage length deficiency for the westbound right movement.

Storage length requirements for the unsignalized intersections, at the South Service Road/Westnor access and Avondale Avenue/Bales Avenue, was conducted for AM and PM peak hours. The Ministry of Transportation Geometric Design Standards was used to determine the storage length requirements. A left turn storage lane is required in both the eastbound and westbound directions at the South Service Road and Westnor access intersection and a left turn storage lane is required for the westbound movement at the Avondale Avenue and Bales Avenue intersection.

Progression Along the Corridor

Progression analysis was conducted along the corridor using PASSER II-90 and TRANSYT-7F. The analysis indicates that it may not be attainable to provide progression long the East and South Service Roads because there is a lot of side friction which makes it very difficult to have progression, however this analysis was used to establish offsets between intersections.

An assessment of opportunities for coordination of traffic signals was undertaken using PASSER II-90 and TRANSYT-7F. The analysis indicates that it may be difficult to provide good progression along the East Service Road and especially along the South Service Road because there are high volumes of turning traffic which are not conducive to the coordination of signals. However, the analysis showed that offsets in the order of 4 - 10 seconds would allow the intersections to operate without queuing problems. More detailed analysis should be undertaken once the improvements have been implemented and actual traffic counts have been taken.

C HIGHWAY 401 TRAFFIC OPERATIONS

- Analysis of Hwy 401 operations was undertaken using MTO's INTEGRATION model. This model is set up separately by direction of travel and period of travel (am peak & p.m. peak) i.e. four sub-models

- Loading of the network is based on a 1986 simulated matrix of trip flows between pairs of on and off ramps. (this matrix has been adjusted to 1991/92 ramp volumes)

- Only the eastbound, a.m. peak period has been calibrated by the developers of the program.

- For purposes of the North York study, CSA has:

    - combined the two directions into one network
    - added ramp detail at the Yonge St. interchange
    - trimmed the network to include Hwy 401 between Hwy 404 and 400

  This was done in order to reduce simulation run time and capture the effects of ramp and arterial road operations onto freeway operations.

  In addition, CSA has enhanced the coding of the network by providing UTM coordinates for the nodes. This way, the graphical representation of the network on the screen is more realistic with respect to the network's actual geographic location.

- Calibration of CSA's enhanced network (including saturation flow and congested speed adjustments) is based on volume and speed information provided by MTO-FTMS for October 11-13, 1994 and November 23, 1994.

- Because of the discrepancies between observed traffic counts and the trip tables provided by MTO, some modifications were made to these trip tables. Volumes on Yonge Street ramps, were adjusted to reflect observed peak hour traffic counts, using the same origin-destination ratios as was found in the base table. Also trip tables provided by MTO reflected volumes that were only 20-30% of observed traffic counts for eastbound p.m. peak period traffic. The trip tables were factored up to match observed counts.

  An additional modification to the network was necessitated by the need to analyze weaving problems between the westbound core-collector diversion and the Avenue Road off-ramps. To handle this analysis, lanes were divided between weaving lanes and non-weaving lanes for this section, and saturation flows were reduced for the weaving lanes to reflect the friction caused by weaving vehicles.

- Some discrepancies in the coding of number of lanes were found in the networks provided by MTO. The number of lanes on all links were verified against the Highway 401 lane continuity diagram and the following changes were made.

    - One westbound collector lane added from Highway 404 to Yonge Street off-ramp

- One westbound collector lane added between Avenue Road on-ramps
- One westbound core lane removed between Leslie St and collector-core diversion
- One eastbound collector lane removed between core-collector diversion and Leslie Street off-ramp

- The future network was modified to include the assumed future changes at the Yonge Street ramps:

  - add one additional lane to westbound collector lanes from the first Yonge Street on-ramp to the first Avenue Road on-ramp
  - extend E-NS ramp and provide off-ramp connection to new Service Road
  - add a new off-ramp connection from W-N ramp to new Service Road
  - prohibit left turn from Southbound Yonge to Lord Seaton Drive (current N-E movement)
  - add new flyover for N-E ramp movement
  - add new lane to NS-E on-ramp merge lane
  - add new N-W ramp connection from new Service Road
  - a new centroid was added to represent trips in and out of the new Service Road and its freeway ramp connections.
- The following scenarios were considered for analysis of traffic operations on Highway 401:
  - Existing Conditions
  - Future Do Nothing
  - VISION

The analysis was undertaken for both AM and PM peak periods. For the Do Nothing scenario (exisiting interchange configuration), mainline volumes for Highway 401 were obtained from the Ministry of Transportation EMME/2 model. The ramp volumes were rationalized on the basis of the future development in the North York City Centre excluding the South Downtown. The rationalization and the ramp volumes are provided in Tables 8 and 9. For the VISION scenario, trip linkages were growth factored to total the future study area ramp volumes as obtained from the North York Transportation Department traffic assignments.

Table 10 summarizes the travel time outputs of the INTEGRATION model for the sections of Highway 401 between Avenue Road and Bayview Avenue, and betweeen Highway 400 and Highway 404 by direction of travel, time of operation and analysis scenario. Figures 9-14 display the simulated travel speeds on the section of Highway 401 between Avenue Road and Bayview Avenue for the scenarios considered in this analysis.

Table 8

NORTH YORK - VISION 2
Rationalization of "Do Nothing" Ramp Volumes

Development (sq.m.)			Traffic (vph)*		
	South Downtown	Total**		AM Peak Hour	PM Peak Hour
Existing					
retail/office	57,600	637,000	to Hwy. 401	2,080	2,160
residential	68,900	626,000	from Hwy. 401	2,160	1,640
		1,263,000			
Future Do Nothing					
retail/office	58,000	1,948,000	to Hwy. 401	2,640	3,160
residential	69,000	2,304,500	from Hwy. 401	3,160	2,410
		4,252,500			
Vision					
retail/office	488,000	2,378,000	to Hwy. 401	3,210	4,160
residential	787,000	3,022,500	from Hwy. 401	4,160	3,180
		5,400,500			

* traffic on all ramps from/to the north
** includes Uptown, Downtown and South Downtown

Table 9

HIGHWAY 401 RAMP VOLUMES @ YONGE STREET INTERCHANGE

	EXISTING	DO NOTHING	VISION
AM PEAK HOUR			
WESTBOUND OFF	1,400	1,800	2,100
ON	2,000	2,100	2,200
EASTBOUND OFF	2,100	2,550	2,950
ON	1,350	1,900	2,500
PM PEAK HOUR			
WESTBOUND OFF	850	1,250	1,600
ON	1,950	2,450	2,950
EASTBOUND OFF	1,650	1,850	2,000
ON	1,600	1,750	1,900

Table 10

TRAVEL TIME
(minutes)

			Free Flow	Existing	Do Nothing	Vision
					with Background Growth	
AM PEAK HOUR	**AVENUE RD. - BAYVIEW AVE.**					
	Westbound	collector	2	9	11	5
		core	2	7	7	8
	Eastbound	collector	2	3	8	7
		core	2	3	5	7
	HIGHWAY 400 - HIGHWAY 404					
	Westbound	collector	8	20	31	30
		core	8	15	17	16
	Eastbound	collector	8	14	23	21
		core	8	10	16	16
PM PEAK HOUR	**AVENUE RD. - BAYVIEW AVE.**					
	Westbound	collector	2	3	8	6
		core	2	3	7	8
	Eastbound	collector	2	7	10	7
		core	2	7	11	13
	HIGHWAY 400 - HIGHWAY 404					
	Westbound	collector	8	11	18	19
		core	8	9	14	15
	Eastbound	collector	8	27	31	35
		core	8	18	23	27

AM - EXISTING CONDITIONS

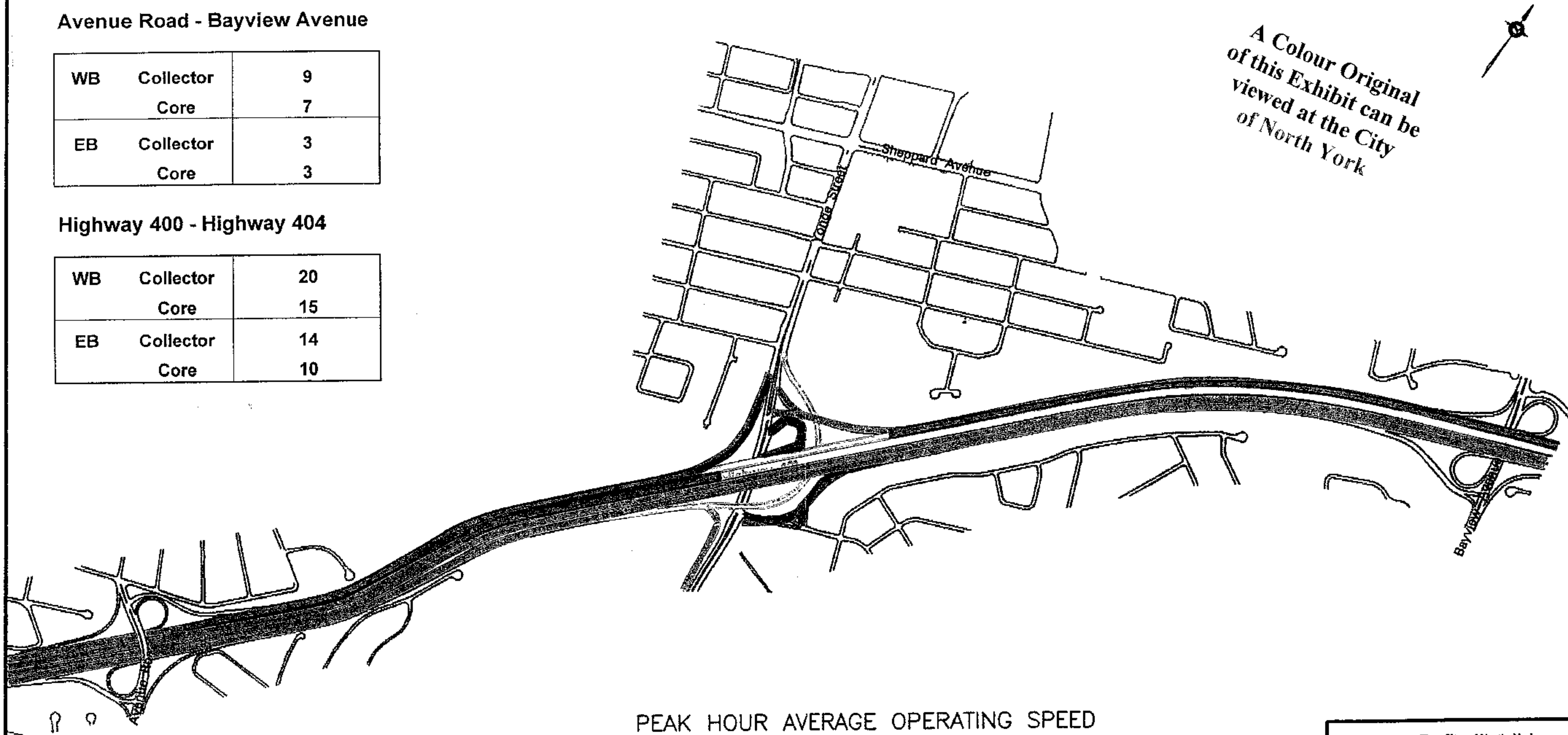
TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

WB	Collector	9
	Core	7
EB	Collector	3
	Core	3

Highway 400 - Highway 404

WB	Collector	20
	Core	15
EB	Collector	14
	Core	10



A Colour Original of this Exhibit can be viewed at the City of North York

PEAK HOUR AVERAGE OPERATING SPEED

- 80 kph and above
- 60–80 kph
- 40–60 kph
- below 40 kph

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South Downtown Secondary Plan Review – Environmental Assessment

Figure 9

Existing Conditions Highway 401 (Integration Software)

Scale: N.T.S.

September 1996

PM - EXISTING CONDITIONS

TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

WB	Collector	3
	Core	3
EB	Collector	7
	Core	7

Highway 400 - Highway 404

WB	Collector	11
	Core	9
EB	Collector	27
	Core	18

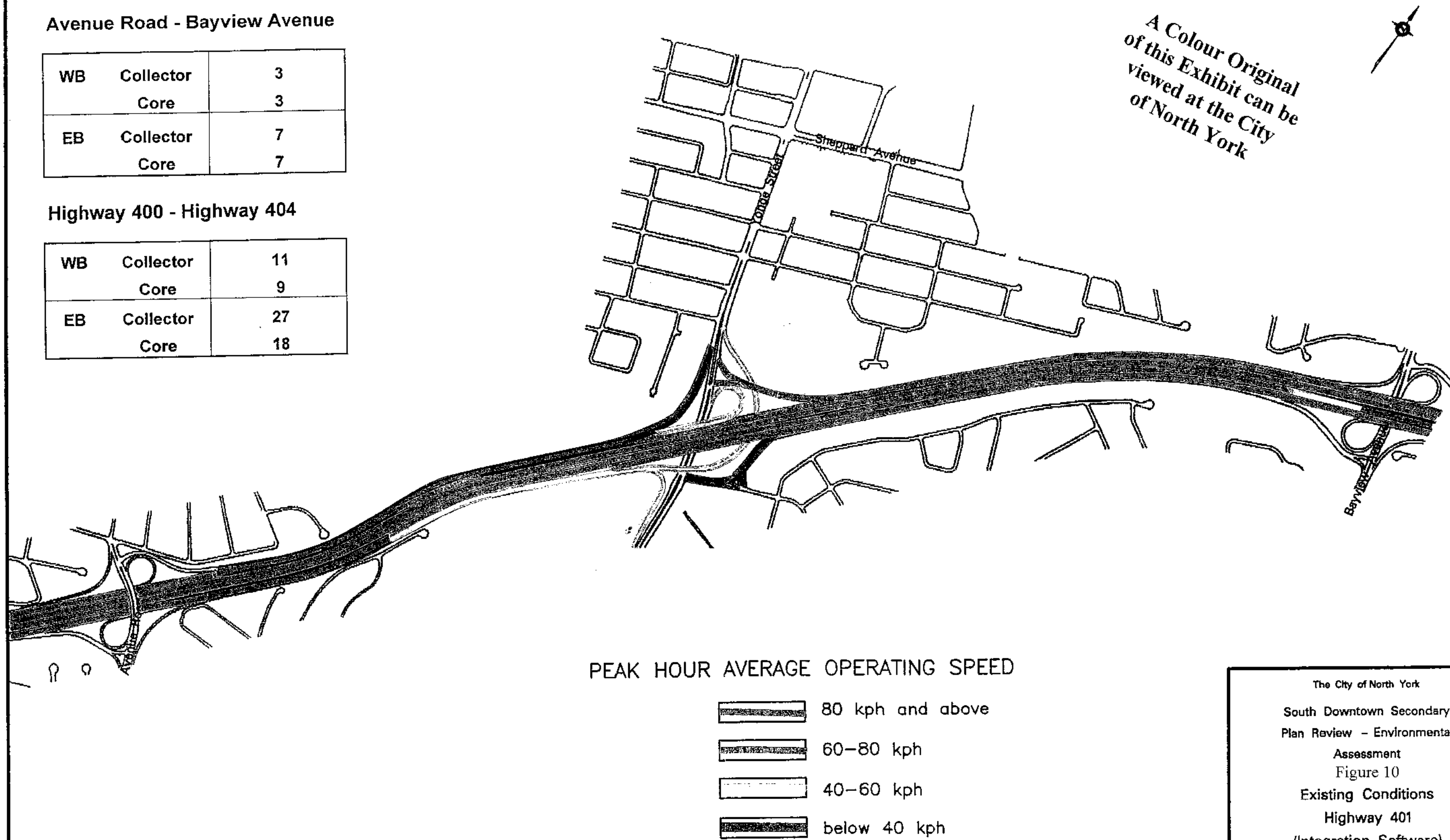

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Figure 10

Existing Conditions
Highway 401
(Integration Software)

Scale: N.T.S.

September 1996

TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

WB	Collector	11
	Core	7
EB	Collector	8
	Core	5

Highway 400 - Highway 404

WB	Collector	31
	Core	17
EB	Collector	23
	Core	16

AM - FUTURE DO NOTHING
(with background growth only)

A Colour Original of this Exhibit can be viewed at the City of North York

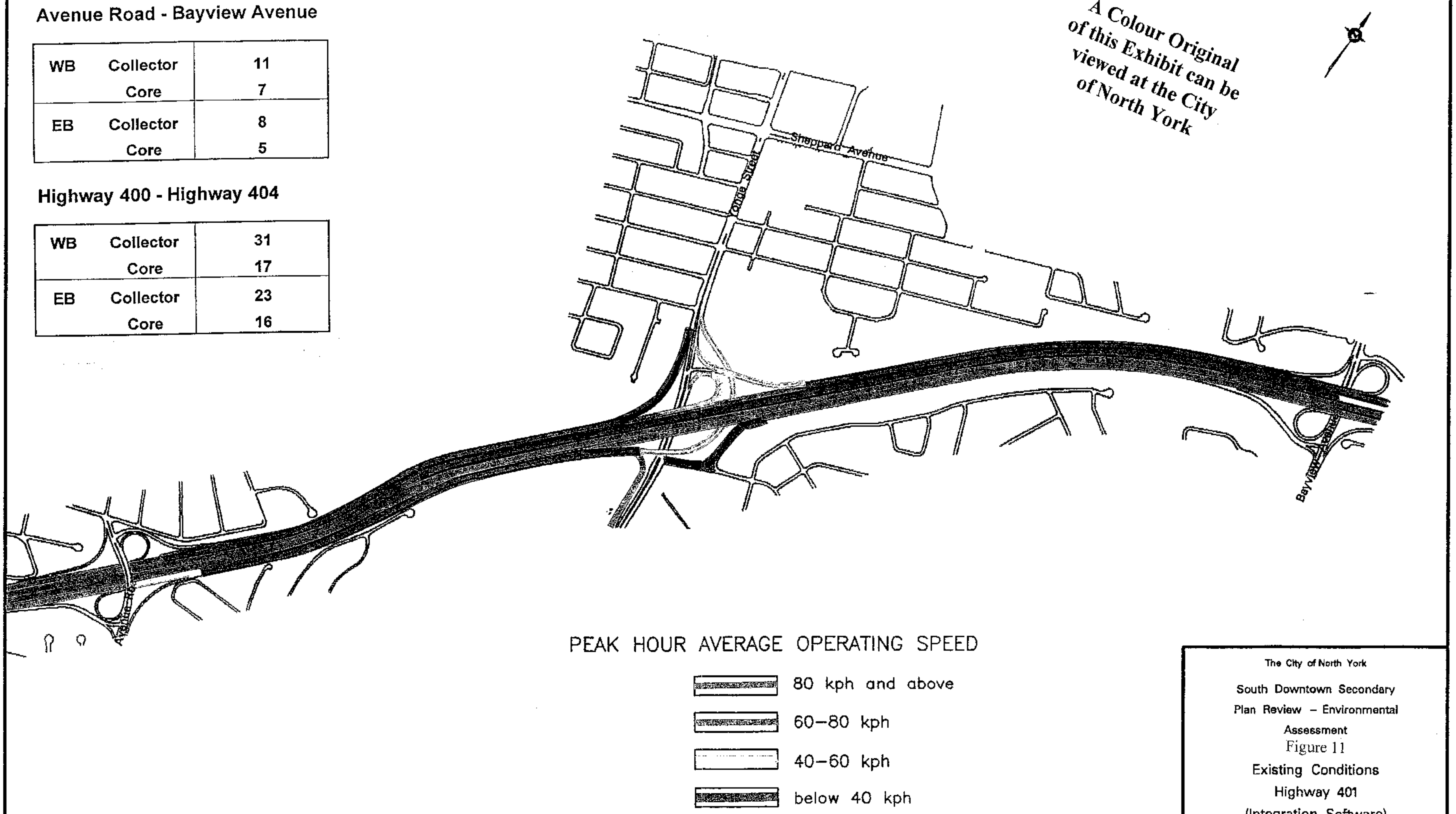

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Figure 11

Existing Conditions
Highway 401
(Integration Software)

Scale: N.T.S. September 1995

TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

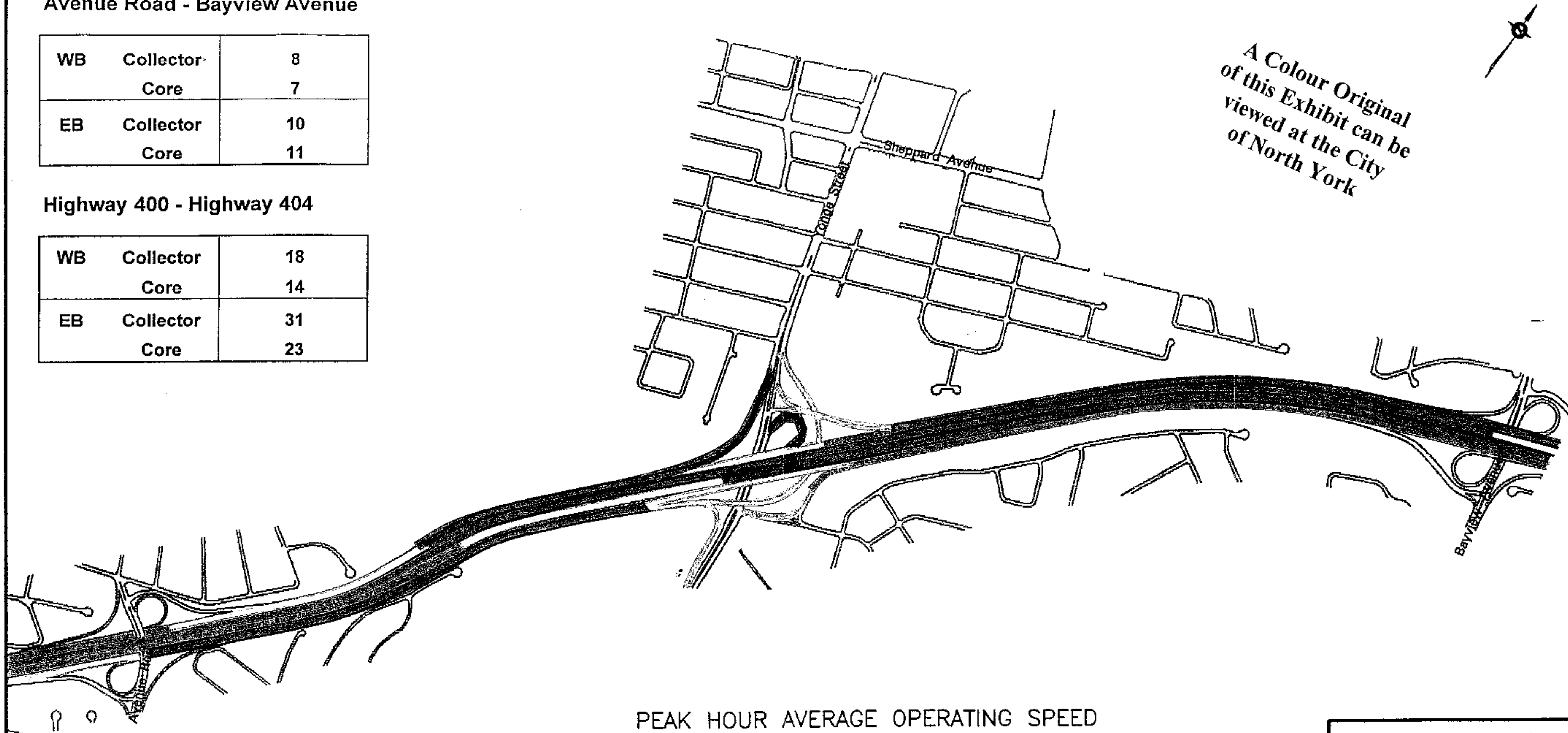
WB	Collector	8
	Core	7
EB	Collector	10
	Core	11

Highway 400 - Highway 404

WB	Collector	18
	Core	14
EB	Collector	31
	Core	23

PM - FUTURE DO NOTHING
(with background growth only)

A Colour Original of this Exhibit can be viewed at the City of North York



PEAK HOUR AVERAGE OPERATING SPEED

- 80 kph and above
- 60–80 kph
- 40–60 kph
- below 40 kph

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Figure 12
Existing Conditions
Highway 401
(Integration Software)

Scale: N.T.S. September 1996

TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

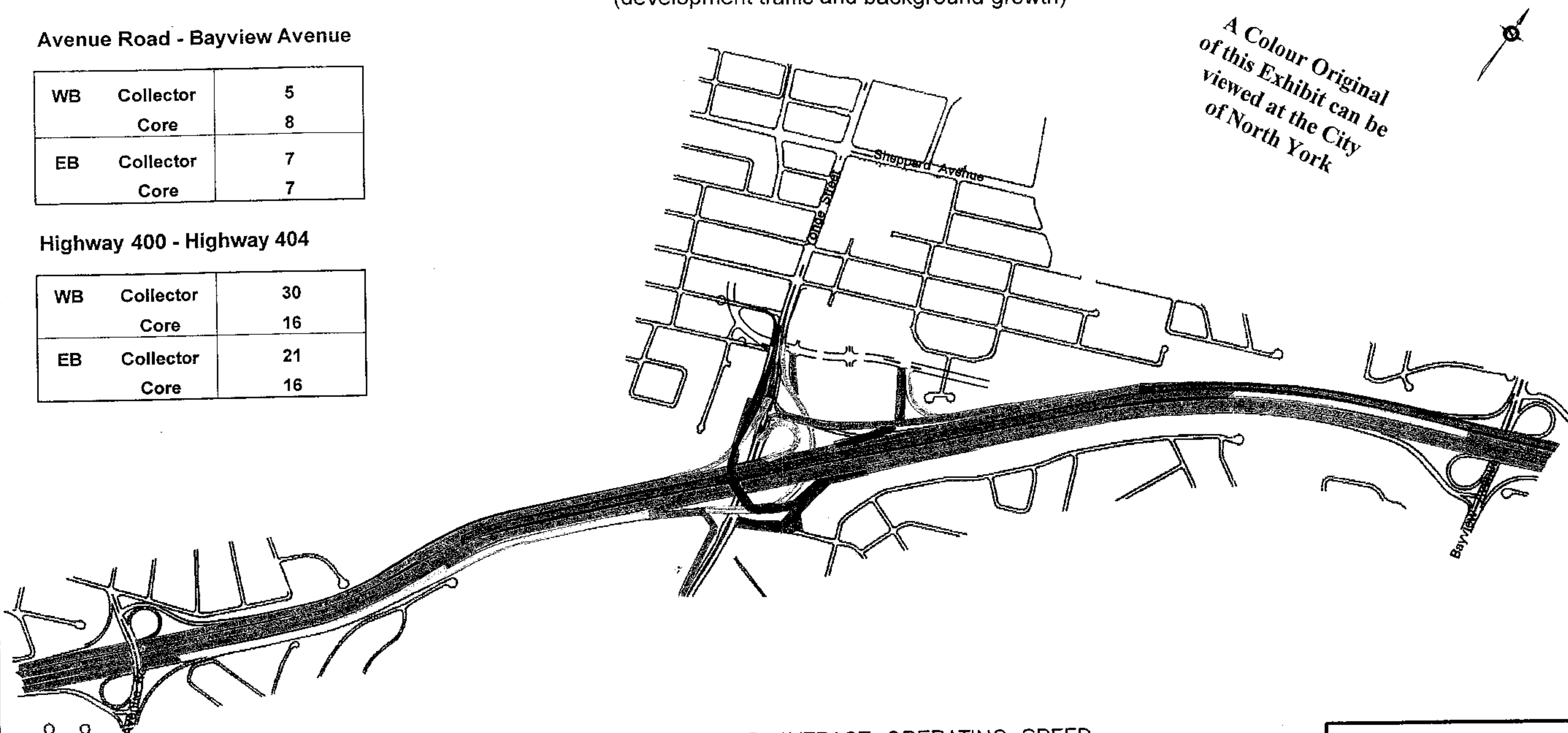
WB	Collector	5
	Core	8
EB	Collector	7
	Core	7

Highway 400 - Highway 404

WB	Collector	30
	Core	16
EB	Collector	21
	Core	16

AM - FUTURE WITH IMPROVEMENTS
(development traffic and background growth)

A Colour Original of this Exhibit can be viewed at the City of North York



PEAK HOUR AVERAGE OPERATING SPEED

- 80 kph and above
- 60–80 kph
- 40–60 kph
- below 40 kph

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South Downtown Secondary Plan Review – Environmental Assessment

Figure 13

Future Conditions
Highway 401
(Integration Software)

Scale: N.T.S. September 1995

PM - FUTURE WITH IMPROVEMENTS
(development traffic and background growth)

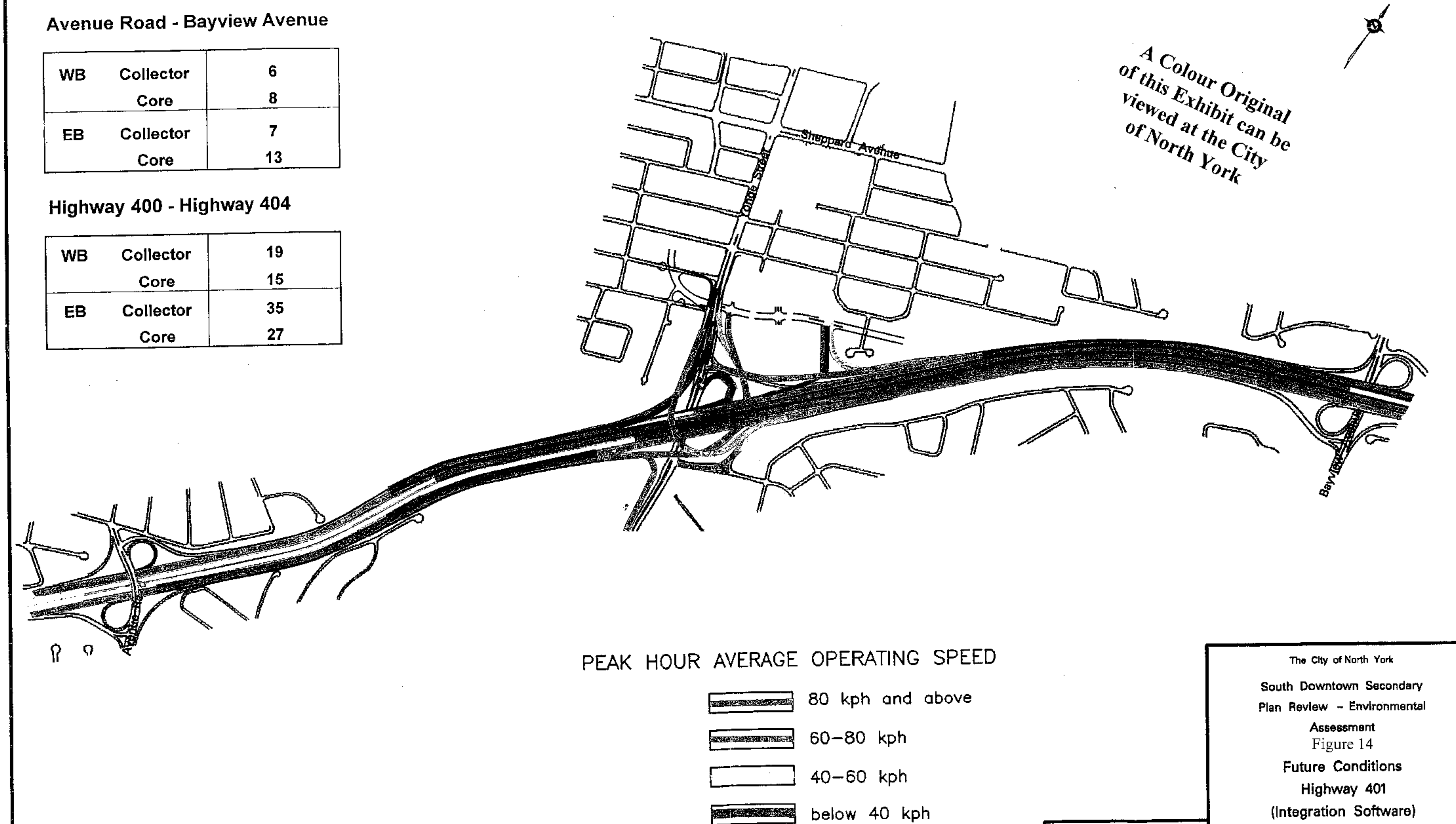
TRAVEL TIME (minutes)

Avenue Road - Bayview Avenue

WB	Collector	6
	Core	8
EB	Collector	7
	Core	13

Highway 400 - Highway 404

WB	Collector	19
	Core	15
EB	Collector	35
	Core	27



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South Downtown Secondary Plan Review – Environmental Assessment

Figure 14

Future Conditions Highway 401 (Integration Software)

Scale: N.T.S.

September 1995

D Conclusions

- Arterial roads and certain intersections in the study area (e.g. Yonge/Sheppard, Yonge/Avondale) are presently near or at capacity. Also, most sections of Highway 401 and its ramps within the study operate at or near capacity.

- Yonge Street and the existing ramps to/from Highway 401 do not provide sufficient access capacity for the proposed redevelopment of the South Downtown.

- The proposed system of service roads and new freeway ramps would provide the necessary capacity, as well as better balance of traffic flows, and enhanced and flexible circulation of traffic in the South Downtown area.

- All signalized and select unsignalized intersections of the proposed system of arterial roads, service roads and ramps were analyzed in terms of levels of service, storage length requirements and progression considerations for two alternative alignments. Intersection configuration adjustments and other design refinements were undertaken (as necessary) to ensure that the road system would operate without undue delays or queue spill overs.

- Analysis of future conditions on Highway 401 indicates that, with the proposed ramps and the additional westbound collector lane from Yonge Street to Avenue Road, the proposed redevelopment of the South Downtown would not have any adverse impacts on Highway 401 operations when compared with the conditions expected to prevail on Highway 401 under a future "Do Nothing " situation.

APPENDIX A

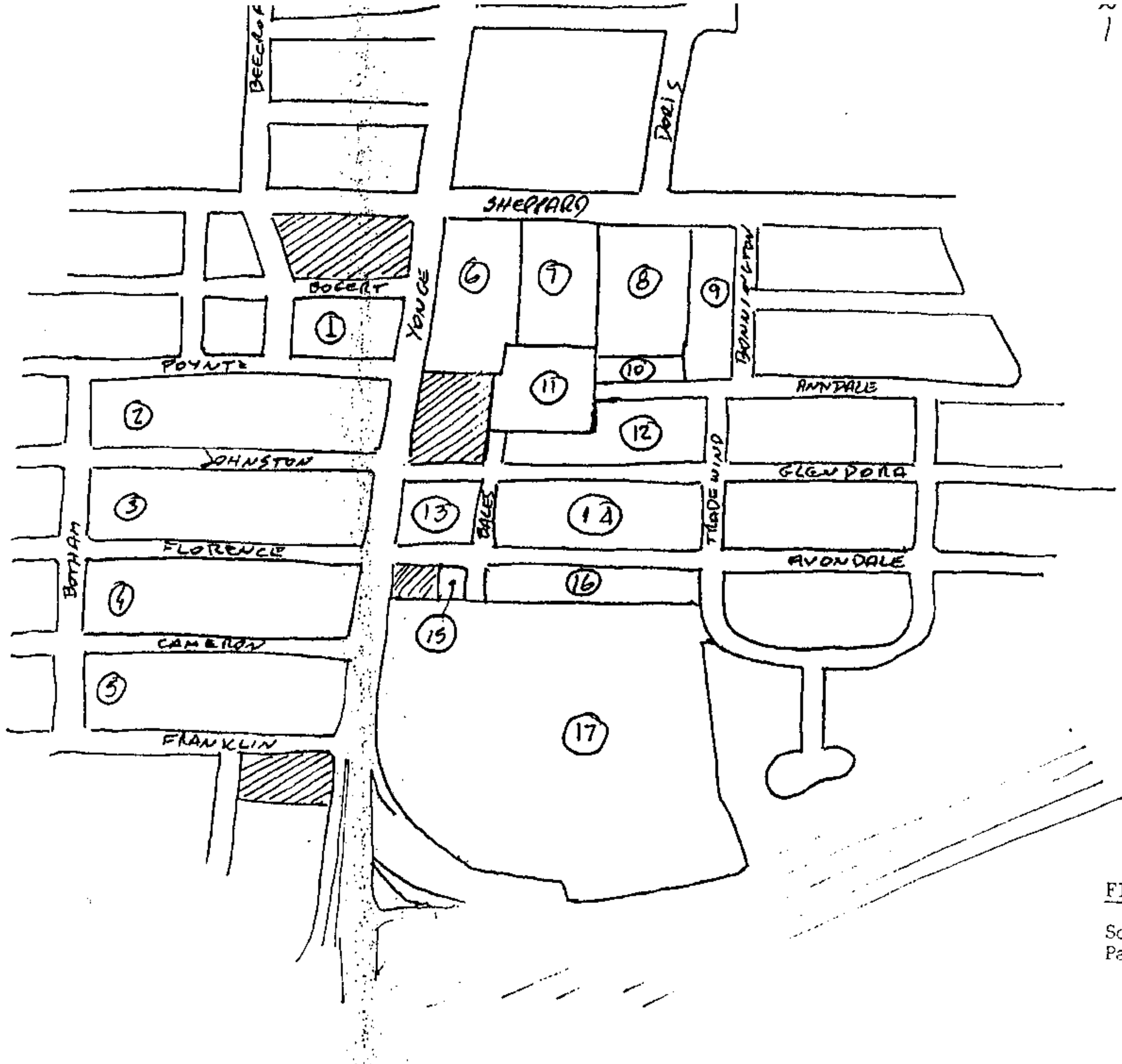


FIGURE 2

South Downtown
Parcel Locations

Land Use
Densities and Areas
(Sq. M.)

PAR. NO.	PARCEL (SQ. MT.)	"EXISTING" SCEN.		MINIMUM SCEN.		MEDIUM SCEN.		MAXIMUM SCEN.	
1	7261.35	4.50	32676.06	4.50	32676.06	4.50	32676.06	4.50	32676.06
2	21707.32	1.50	32560.98	1.50	32560.98	4.00	86829.28	4.50	97682.94
3	22406.54	1.50	33609.81	1.50	33609.81	3.50	78422.89	4.50	100829.43
4	21486.36	1.50	32229.54	1.50	32229.54	1.50	32229.54	4.50	96688.63
5	20564.15	1.50	30846.22	1.50	30846.22	1.50	30846.22	4.50	92538.66
6	24910.06	4.50	112095.26	4.50	112095.26	4.50	112095.26	4.50	112095.26
7	9771.35	4.50	43971.07	4.50	43971.07	4.50	43971.07	4.50	43971.07
8	12101.96	2.00	24203.92	2.00	24203.92	2.00	24203.92	4.50	54458.82
9	5635.54	2.00	0.00	2.00	11271.07	2.00	11271.07	4.50	25359.91
10	2769.40	2.00	0.00	2.00	5538.79	2.00	5538.79	4.50	12462.29
11	9290.00	2.00	0.00	2.00	18580.00	2.00	18580.00	4.50	41805.00
12	10355.57	1.50	0.00	1.50	15533.36	2.00	20711.15	4.50	46600.08
13	5513.82	1.50	8270.73	1.50	8270.73	3.50	19298.36	4.50	24812.18
14	14740.19	1.50	0.00	1.50	22110.29	2.00	29480.38	4.50	66330.87
15	880.70	1.50	1321.04	1.50	1321.04	1.50	1321.04	4.50	3963.13
16	7422.25	1.50	0.00	1.50	11133.38	1.50	11133.38	4.50	33400.14
17	96560.00	1.50	144840.00	1.50	144840.00	1.50	144840.00	4.50	434520.00
TOT.	293376.55		496624.63		580791.53		703448.43		1320194.46

FIGURE 8

Links Over Capacity
"Minimum" Scenario

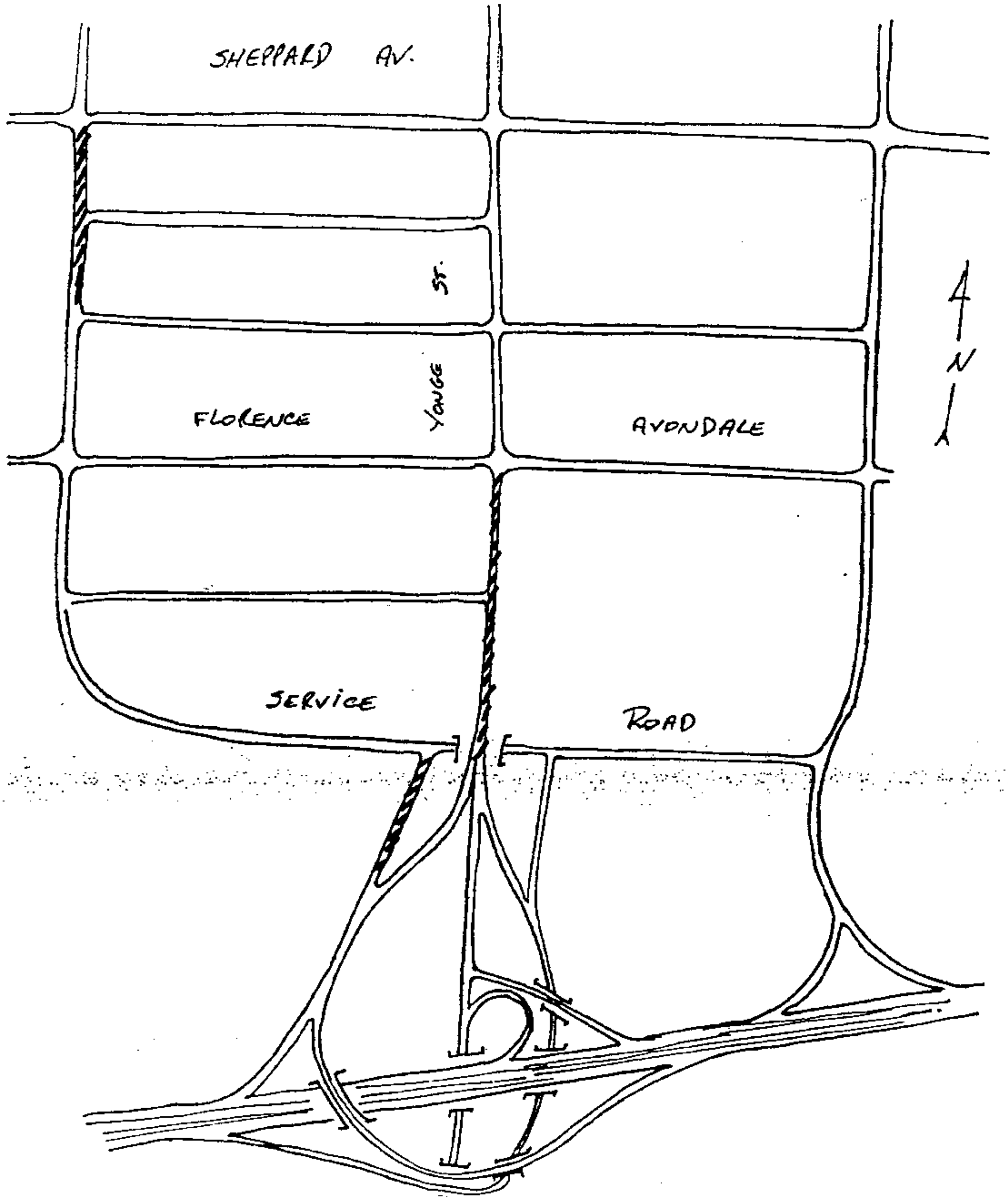


FIGURE 9

- " -
"Medium" Scenario

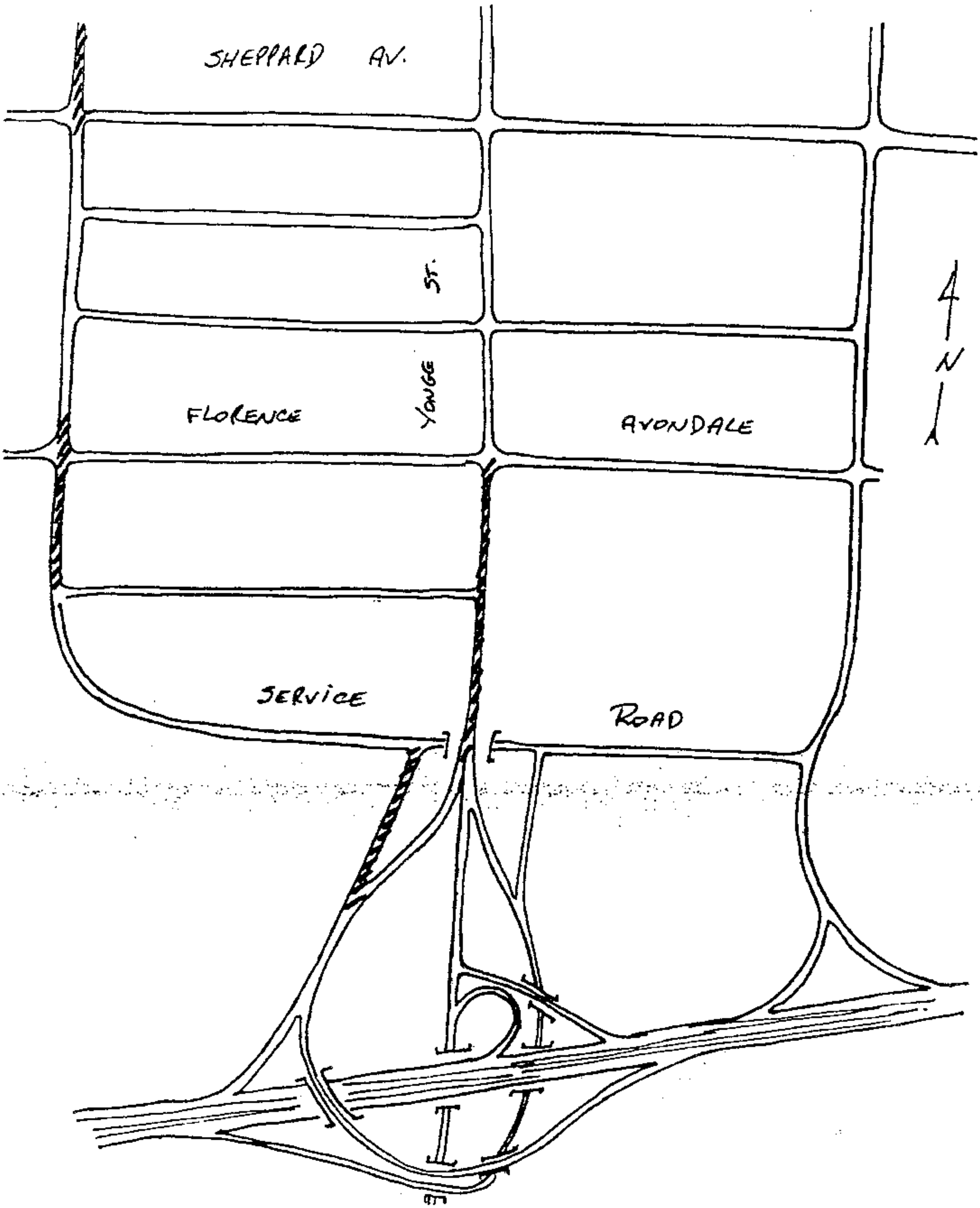


FIGURE 10

- " -

"Maximum" Scenario

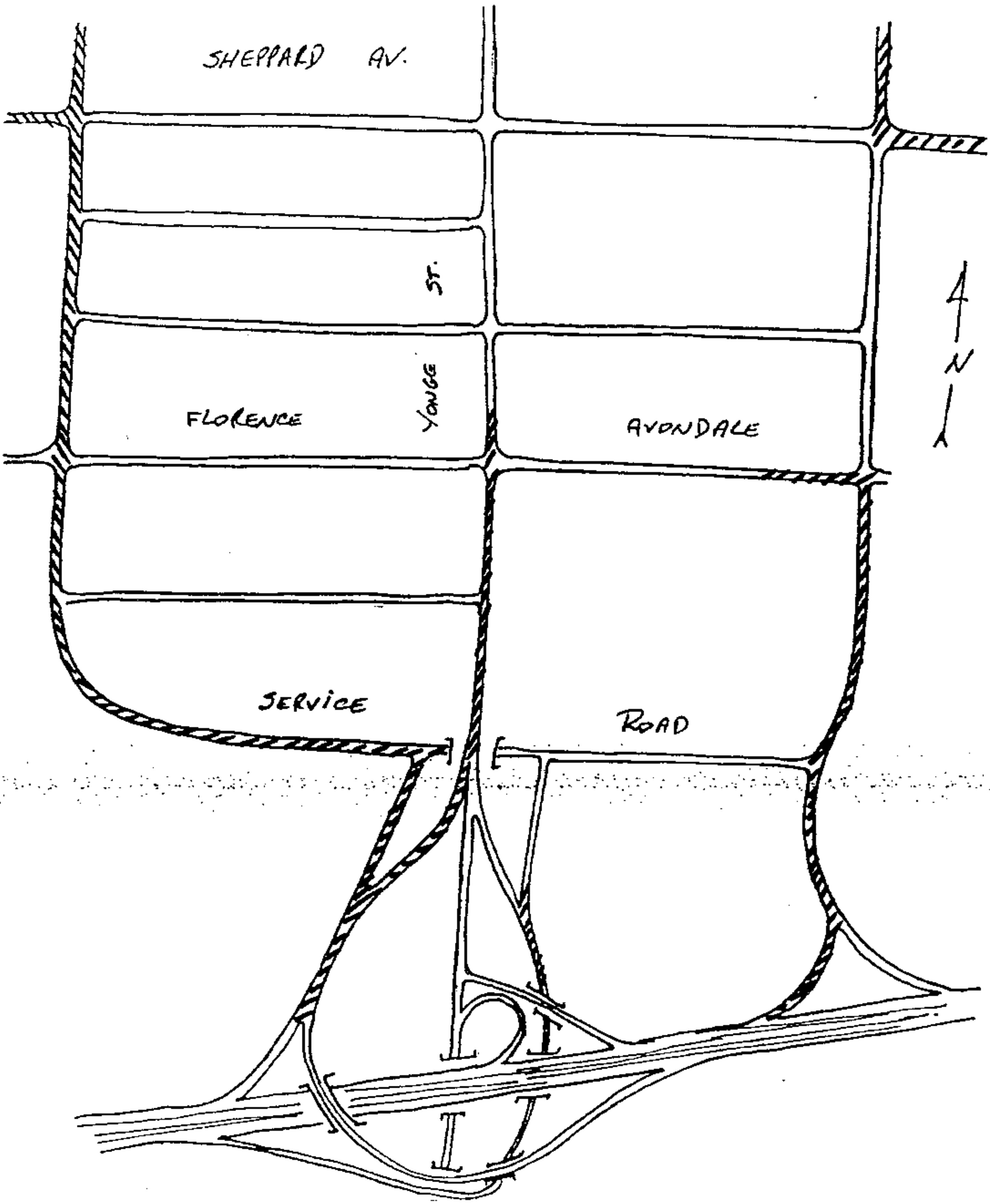
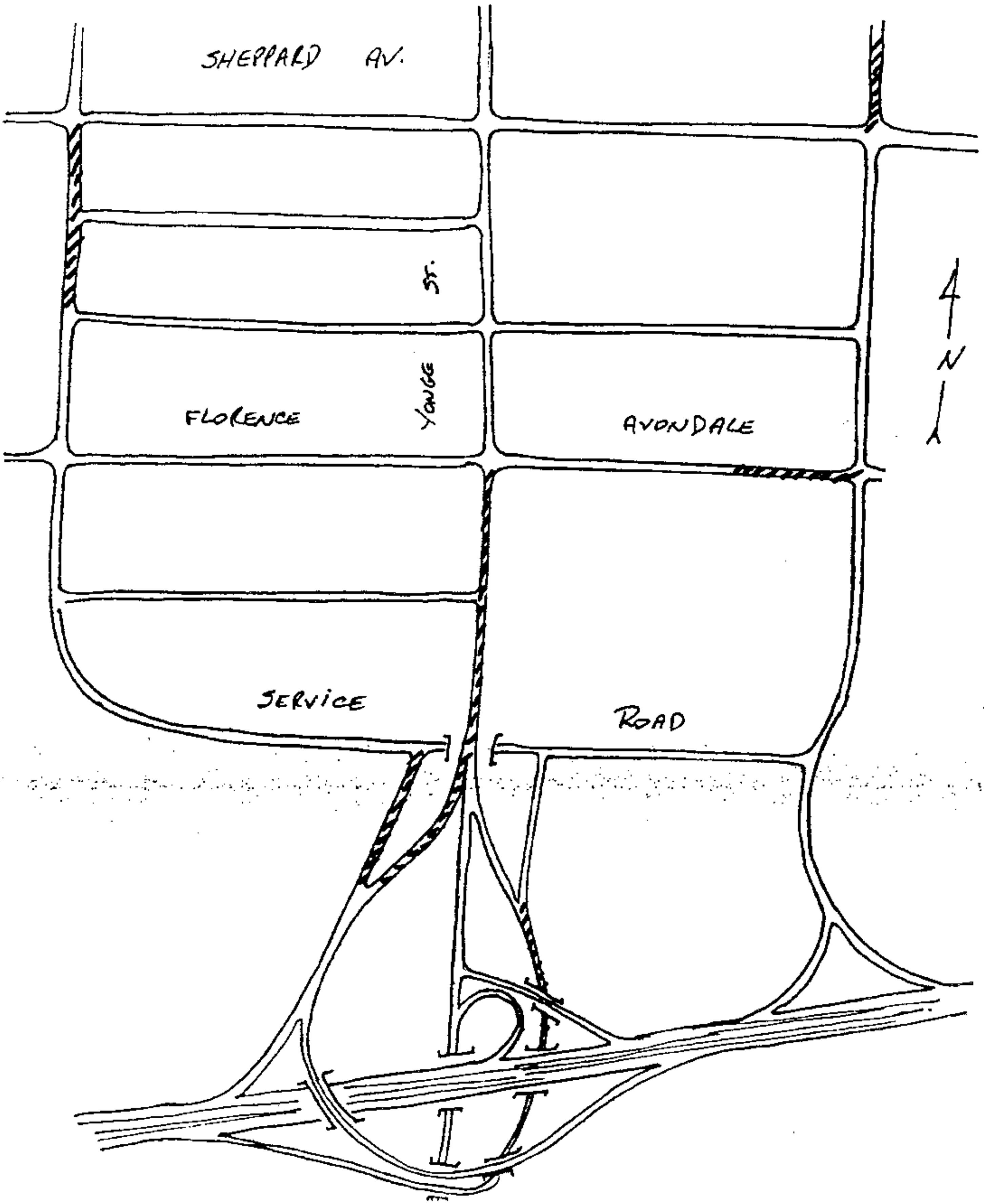


FIGURE 11

- " -

"Average" Scenario



DETAILED LINK ASSIGNMENT

(AT 60% MODAL SPLIT)

FOR FOUR LAND USE SCENARIOS

WHICH LEAD TO

"THE VISION"

SUMMARY TABLE APRIL 29, 1993

	GROSS FLOOR AREA			POPULATION			TOTAL TRIPS		
UPTOWN DRAFT PLAN	COMMERCIAL	RESIDENTIAL	TOTAL	EMPLOYEES	RESIDENTS	TOTAL	IN	OUT	
UPTOWN	542,259	1,597,566	2,139,825	18,075	25,767	43,842	2277	2452	
DOWN & SOUTH	1,838,647	802,964	2,641,611	57,992	13,945	71,937	1623	5040	
TOTAL	2,380,906	2,400,530	4,781,436	76,067	39,712	115,779	3900	7492	11392

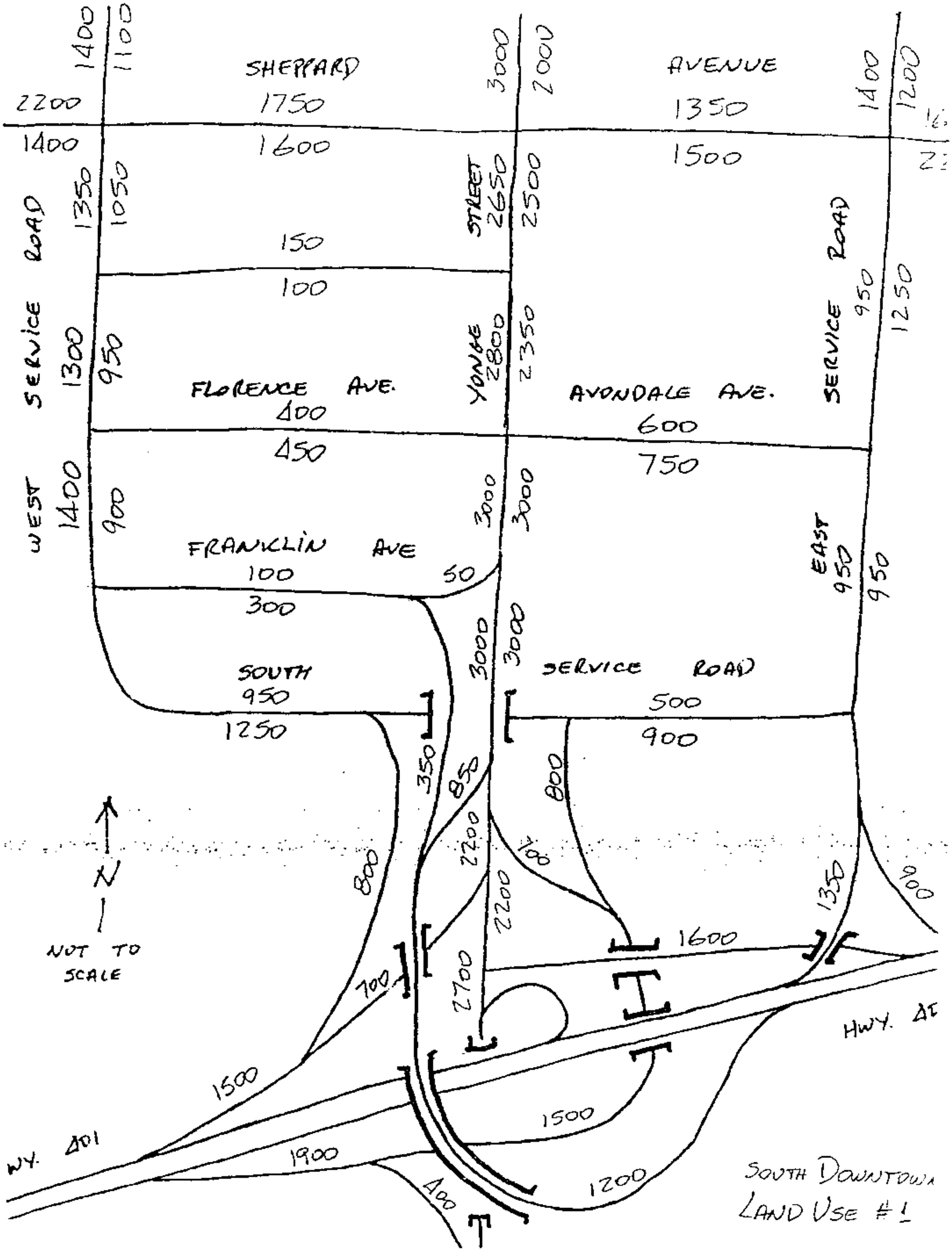
	GROSS FLOOR AREA			POPULATION			TOTAL TRIPS		
LANDUSE OPTION 1	COMMERCIAL	RESIDENTIAL	TOTAL	EMPLOYEES	RESIDENTS	TOTAL	IN	OUT	
UPTOWN	542,259	1,597,566	2,139,825	18,075	25,767	43,842	2277	2452	
DOWNTOWN	1,490,840	695,003	2,185,843	46,595	11,754	58,349	1265	3932	
SOUTH DOWNTOWN	395,470	942,473	1,337,943	13,182	15,201	28,383	1501	1848	
TOTAL	2,428,569	3,235,042	5,663,611	77,852	52,722	130,574	5043	8232	13275

	GROSS FLOOR AREA			POPULATION			TOTAL TRIPS		
LANDUSE OPTION 2	COMMERCIAL	RESIDENTIAL	TOTAL	EMPLOYEES	RESIDENTS	TOTAL	IN	OUT	
UPTOWN	542,259	1,597,566	2,139,825	18,075	25,767	43,842	2277	2452	
DOWNTOWN	1,490,840	695,003	2,185,843	46,595	11,754	58,349	1265	3932	
SOUTH DOWNTOWN	567,729	423,140	990,869	18,924	6,825	25,749	880	2105	
TOTAL	2,600,828	2,715,709	5,316,537	83,594	44,346	127,940	4422	8489	12911

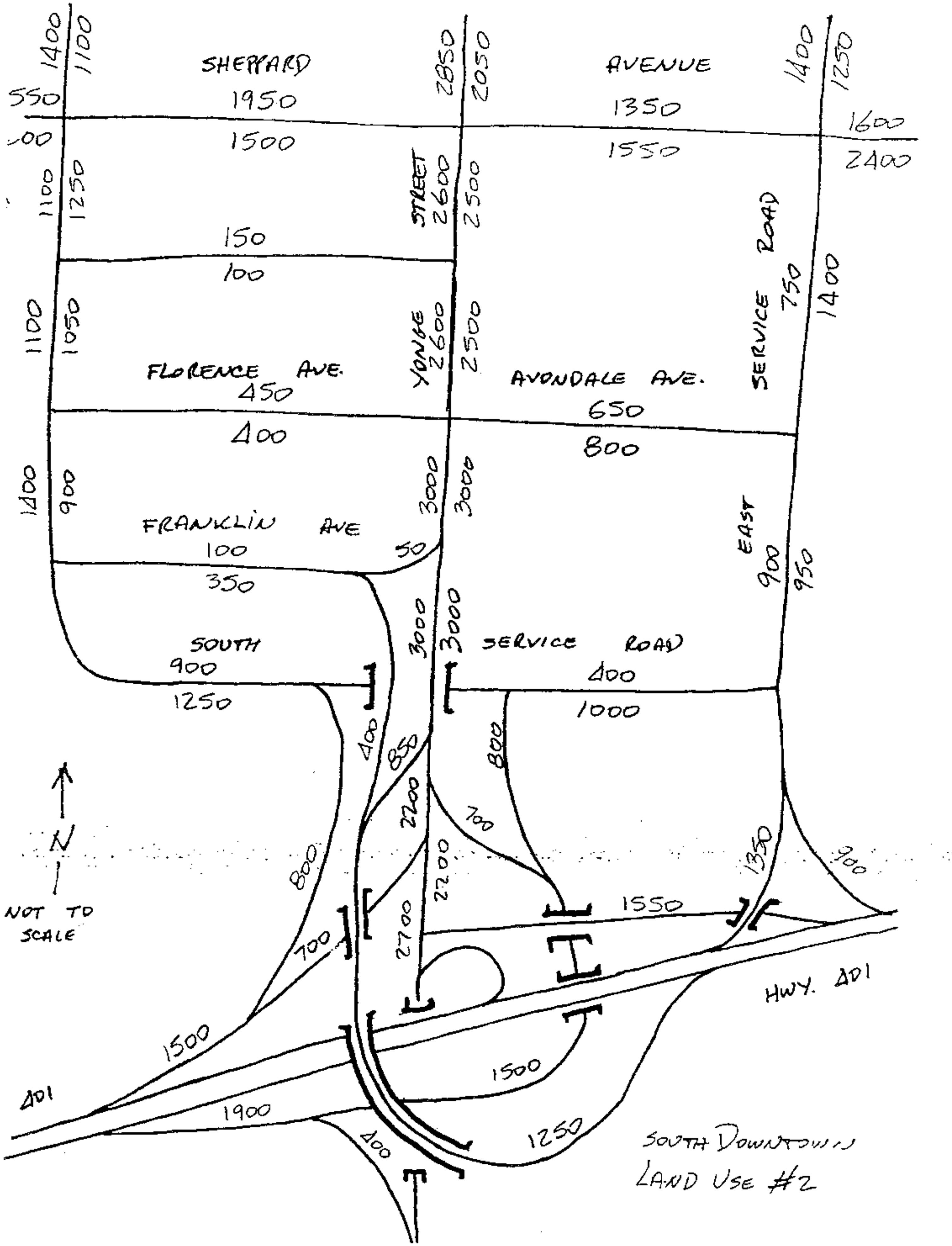
	GROSS FLOOR AREA			POPULATION			TOTAL TRIPS		
LANDUSE OPTION 3	COMMERCIAL	RESIDENTIAL	TOTAL	EMPLOYEES	RESIDENTS	TOTAL	IN	OUT	
UPTOWN	542,259	1,597,566	2,139,825	18,075	25,767	43,842	2277	2452	
DOWNTOWN	1,490,840	695,003	2,185,843	46,595	11,754	58,349	1265	3932	
SOUTH DOWNTOWN	427,573	1,045,991	1,473,564	14,252	16,871	31,123	1673	2038	
TOTAL	2,460,672	3,338,560	5,799,232	78,922	54,392	133,314	5215	8422	13637

	GROSS FLOOR AREA			POPULATION			TOTAL TRIPS		
LANDUSE OPTION 4	COMMERCIAL	RESIDENTIAL	TOTAL	EMPLOYEES	RESIDENTS	TOTAL	IN	OUT	
UPTOWN	542,259	1,597,566	2,139,825	18,075	25,767	43,842	2277	2452	
DOWNTOWN	1,490,840	695,003	2,185,843	46,595	11,754	58,349	1265	3932	
SOUTH DOWNTOWN	763,918	428,100	1,192,018	25,464	6,905	32,369	1030	2822	
TOTAL	2,797,017	2,720,669	5,517,686	90,134	44,426	134,560	4572	9206	13778

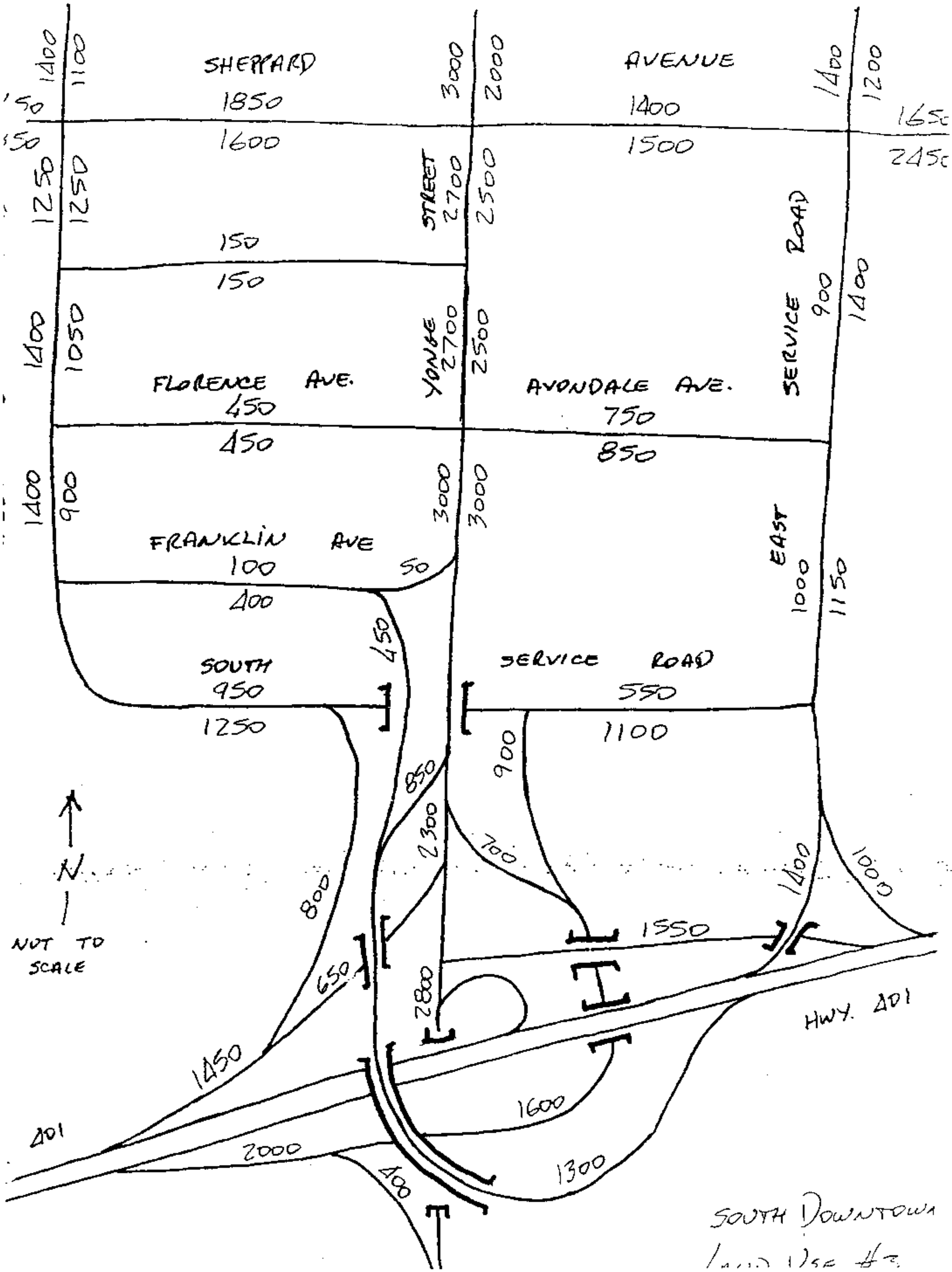
LANDUSE OPTIONS 1 THRU 4 TAKEN FROM PLANNING FILES "TRADE1.WK1" ,"TRADE2.WK1"... (PREPARED BY VS)
ABOVE OPTIONS WERE RUN IN CONJUNCTION WITH DOWNTOWN/UPTOWN
AS SET OUT IN PLANNING FILES "DOWNCAL0.WK1 (QUADRANTS N/O SHEPPARD ONLY) AND UPTOWN FILE "EXPLORE6.WK1"



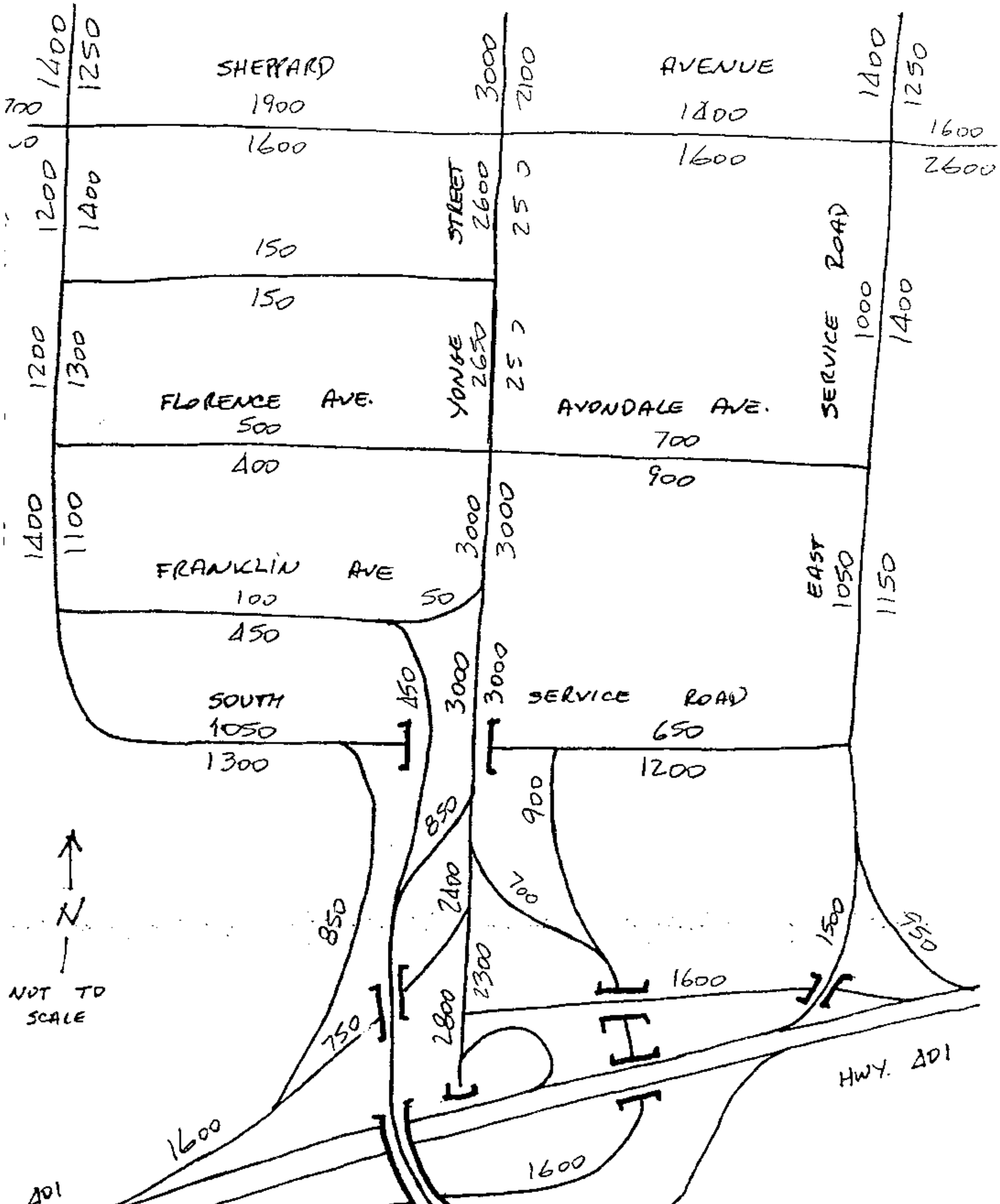
SOUTH DOWNTOWN
LAND USE #1



SOUTH DOWNTOWN
LAND USE #2



SOUTH DOWNTOWN
Land Use #3



SOUTH DOWNTOWN
LAND USE #4

APPENDIX B

SOUTH DOWNTOWN BLOCKS – POSSIBLE VISION DENSITIES

(Revised August 25, 1994)

AUGUST
1994

Alternatives for Remaining Undeveloped Land are based on no S.D.I.
Integrated with Existing and committed projects per YCD, Jan. 1993.*

Worker	30.00	
Resident	62.00	1.80
Office	30.00	

EAST SIDE OF YONGE, SOUTH OF SHEPPARD

Block	Area (Acres)	Area (Sq. m.)	Floor Area Non-Res	% (non)	Resident	% (res.)	Total	F.S.I.	Emps.	Res.	Units	1988 Pop. Emps.	1988 Pop. Res.	Net Change Emps.	Net Change Res.	Block
26.1 Plaza	3.84	15,563	70,034	100.00%	0	0.00%	70,034	4.50	2,334	0	0	173	0	2161	0	Plaza
26.2 Seneca	2.41	9,762	43,929	100.00%	0	0.00%	43,929	4.50	1,464	0	0	60	0	1404	0	Seneca
26.3 North York Square	2.99	12,100	25,410	60.00%	16,940	40.00%	42,350	3.50	647	273	152	588	0	259	273	North York Square
26.4 Bonnington (Res.)	1.09	4,409	0	0.00%	6,614	100.00%	6,614	1.50	0	107	59	0	19	0	88	Bonnington
26.4 Bonnington (Com)	0.30	1,227	0	0.00%	1,841	100.00%	1,841	1.50	0	30	16	0	6	0	24	Bonnington
26.5 Proctor & Gamble	1.80	7,300	30,822	100.00%	0	0.00%	30,822	4.22	1,027	0	0	0	0	1027	0	Proctor & Gamble
26.6 Gemeiner	2.31	9,347	3,271	10.00%	29,443	90.00%	32,715	3.50	109	475	264	3	193	106	282	Gemeiner
26.7 N. side Anndale	0.68	2,769	0	0.00%	4,154	100.00%	4,154	1.50	0	67	37	0	13	0	54	N. side Anndale
26.8 Anndale	0.49	1,975	0	0.00%	0	0.00%	0	0.00	0	0	0	0	0	0	0	Anndale
26.9 S. side Anndale	0.81	3,297	0	0.00%	4,946	100.00%	4,946	1.50	0	80	44	0	15	0	65	S. side Anndale
26.10 N side Glendora A	1.00	4,046	0	0.00%	12,138	100.00%	12,138	3.00	0	196	109	0	14	0	182	N side GlendoraA
26.10 N side Glendora B	0.74	3,007	0	0.00%	4,511	100.00%	4,511	1.50	0	73	40	0	14	0	59	N side GlendoraB
26.11 Bales, N. end	0.16	666	0	0.00%	1,998	100.00%	1,998	3.00	0	32	18	0	0	0	32	Bales, N. end
26.12 Yonge/Glen./Avon.	1.36	5,505	4,404	20.00%	17,616	80.00%	22,020	4.00	147	284	158	42	6	105	278	Yonge/Glen./Avon.
26.13 Bales, middle	0.33	1,333	0	0.00%	3,999	100.00%	3,999	3.00	0	65	36	0	0	0	65	Bales, middle
26.14 Bales/Avon/Glen A	2.15	8,723	0	0.00%	26,169	100.00%	26,169	3.00	0	422	234	0	36	0	386	Bales/Avon/GlenA
26.14 Bales/Avon/Glen B	1.48	6,006	0	0.00%	9,009	100.00%	9,009	1.50	0	145	81	0	37	0	108	Bales/Avon/GlenB
26.15 Westnor	23.72	95,848	134,187	35.00%	249,205	65.00%	383,393	4.00	4,473	4,019	2,233	681	3	3792	4016	Westnor
26.16 Bales, end	0.16	643	772	30.00%	1,800	70.00%	2,572	4.00	26	29	16	0	0	26	29	Bales, end
26.17 S side Avondale A	1.11	4,505	5,406	30.00%	12,614	70.00%	18,020	4.00	180	203	113	0	15	180	188	S side AvondaleA
26.17 S side Avondale B	0.72	2,913	0	0.00%	4,370	100.00%	4,370	1.50	0	70	39	0	15	0	55	S side AvondaleB
26.18 Oakburn Apts.	12.10	48,985	8,572	5.00%	162,875	95.00%	171,446	3.50	286	2,627	1,459	0	505	286	2122	Oakburn Apts.
26.19 N.Y. Bd. of Ed.	10.47	42,374	0	0.00%	63,561	100.00%	63,561	1.50	0	1,025	570	95	0	0	1025	N.Y. Bd. of Ed.
SE-TOTAL	72.24	292,303	326,807	34.02%	633,601	65.98%	960,606	3.29	10,894	10,223	5,679	1,642	891	9,347	9,332	SE-TOTAL

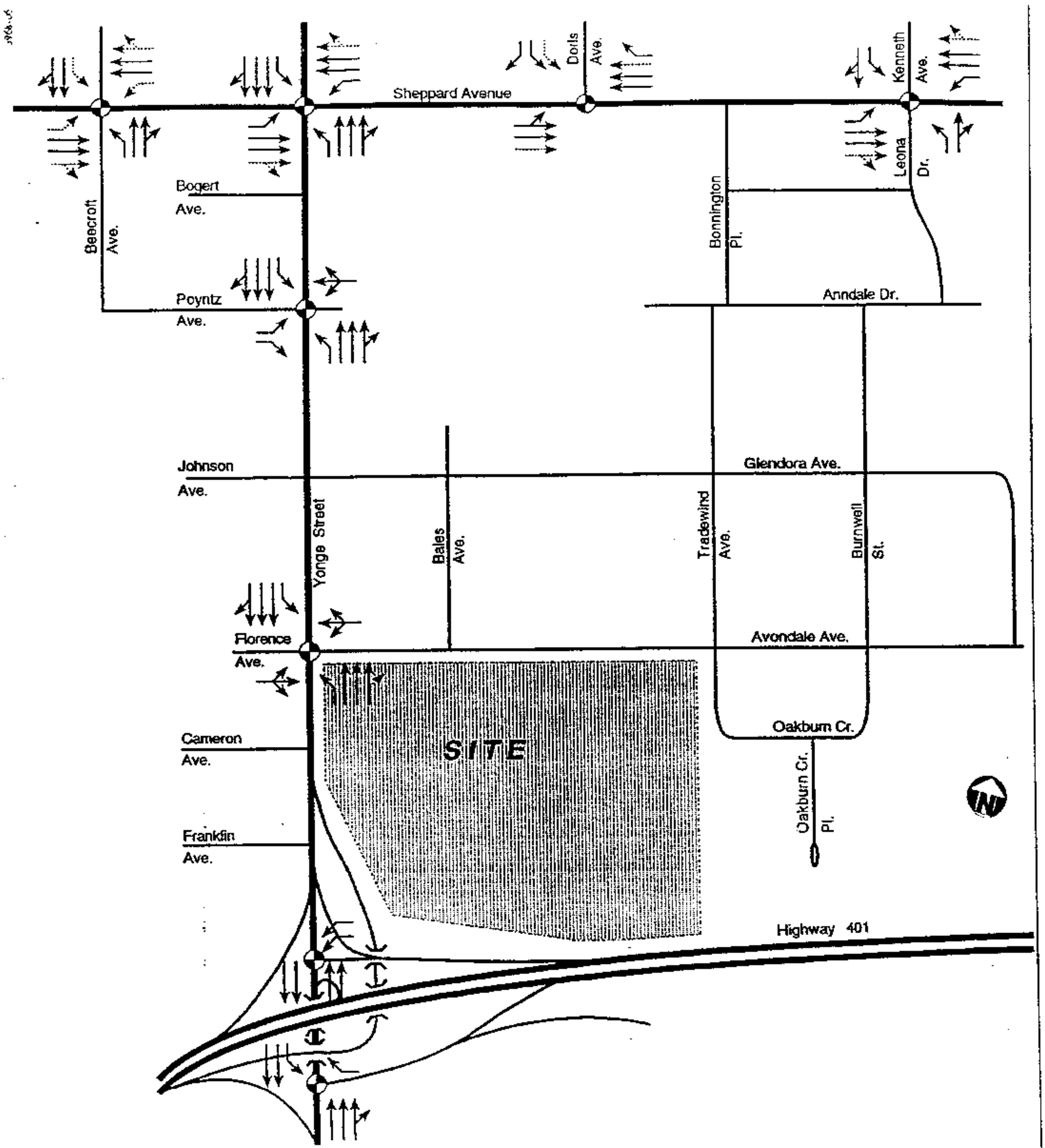
WEST SIDE OF YONGE, SOUTH OF SHEPPARD

Block	Area (Acres)	Area (Sq.m.)	Non-Res	% (Non)	Resident	% (res.)	Total	F.S.I.	Employees	Res.	Units	1988 Pop. Emps.	1988 Pop. Res.	Net Change Emps.	Net Change Res.	Block
25.1 Park	0.79	3,191	0	0.00%	0	0.00%	0	0.00	0	0	0	0	0	0	0	Park
25.2 Beecroft N.	0.46	1,870	0	0.00%	0	0.00%	0	0.00	0	0	0	0	0	0	0	Beecroft N.
25.3 H & R Realty*	1.09	4,400	33,407	100.00%	0	0.00%	33,407	7.59	1,114	0	0	4	0	1110	0	H & R Realty
25.4 Marathon*	1.01	4,100	34,993	100.00%	0	0.00%	34,993	8.53	1,166	0	0	18	1	1148	-1	Marathon
25.5 Bogert	1.00	4,047	0	0.00%	0	0.00%	0	0.00	0	0	0	0	0	0	0	Bogert
25.6 Church	1.01	4,093	12,279	100.00%	0	0.00%	12,279	3.00	409	0	0	0	0	409	0	Church
25.7 Beecroft S.	0.43	1,759	7,916	100.00%	0	0.00%	7,916	4.50	264	0	0	0	0	264	0	Beecroft S.
25.8 Yonge/Poyntz/Bogert	1.79	7,261	32,675	100.00%	0	0.00%	32,675	4.50	1,089	0	0	59	23	1030	-23	Yonge/Poyntz/Bog.
25.10 Poyntz/John. A	1.38	5,574	0	0.00%	8,361	100.00%	8,361	1.50	0	135	75	0	37	0	0	Poyntz/John. A
25.10 Poyntz/John. B	2.33	9,448	7,558	20.00%	30,234	80.00%	37,792	4.00	252	488	271	47	37	205	451	Poyntz/John. B
25.12 Flo./John. A	1.38	5,573	0	0.00%	8,360	100.00%	8,360	1.50	0	135	75	0	23	0	0	Flo./John. A
25.12 Flo./John. B	2.37	9,598	7,678	20.00%	30,714	80.00%	38,392	4.00	256	495	275	50	22	206	473	Flo./John. B
25.14 Cam./Flo. A	0.75	3,028	0	0.00%	4,542	100.00%	4,542	1.50	0	73	41	0	16	0	0	Cam./Flo. A
25.14 Cam./Flo. B	2.78	11,254	9,003	20.00%	36,013	80.00%	45,016	4.00	300	581	323	77	27	223	554	Cam./Flo. B
25.16 Frank./Cam. A	1.29	5,207	0	0.00%	7,811	100.00%	7,811	1.50	0	126	70	0	24	0	0	Frank./Cam. A
25.16 Frank./Cam. B	2.00	8,091	6,473	20.00%	25,891	80.00%	32,364	4.00	216	418	232	23	10	193	408	Frank./Cam. B
25.17 Frank./Lin.	0.24	977	0	0.00%	1,466	100.00%	1,466	1.50	0	24	13	0	0	0	24	Frank./Lin.
25.18 Warner Brothers*	0.70	2,800	9,067	100.00%	0	0.00%	9,067	3.24	302	0	0	0	0	302	0	Warner Brothers
SW-TOTAL	22.80	92,271	161,049	51.22%	153,390	48.78%	314,439	3.41	5,368	2,474	1,374	278	220	5,090	1,665	SW-TOTAL

TOTAL – EAST AND WEST SIDES OF YONGE

Block	Area (Acres)	Area (Sq.m.)	Floor Area Non-Res	% (Non)	Resident	% (res.)	Total	F.S.I.	Employees	Res.	Units	1988 Pop. Emps.	1988 Pop. Res.	Net Change Emps.	Net Change Res.	Block
TOTAL	95.04	384,574	487,856	38.26%	787,190	61.74%	1,275,047	3.32	16,262	12,697	7,054	1,920	1,111	14,437	11,217	TOTAL

APPENDIX C



Existing Traffic Signal

Widening of Sheppard Avenue

Schematic Only - Not to Scale

Figure 7

CURRENT/COMMITTED LANE CONFIGURATIONS AND AREA ROAD SYSTEM

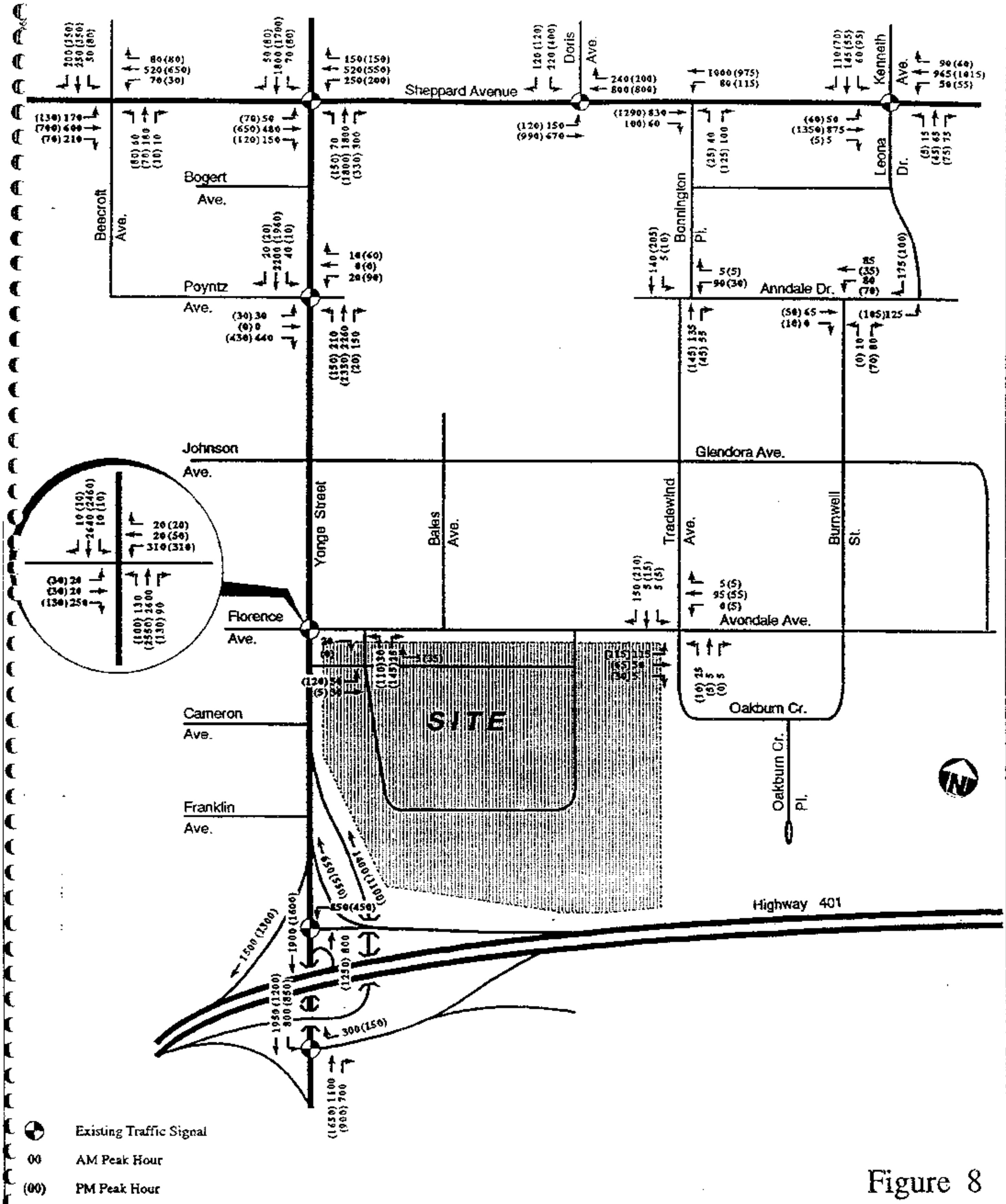


Figure 8
EXISTING TRAFFIC VOLUMES
AM/PM Peak Hour

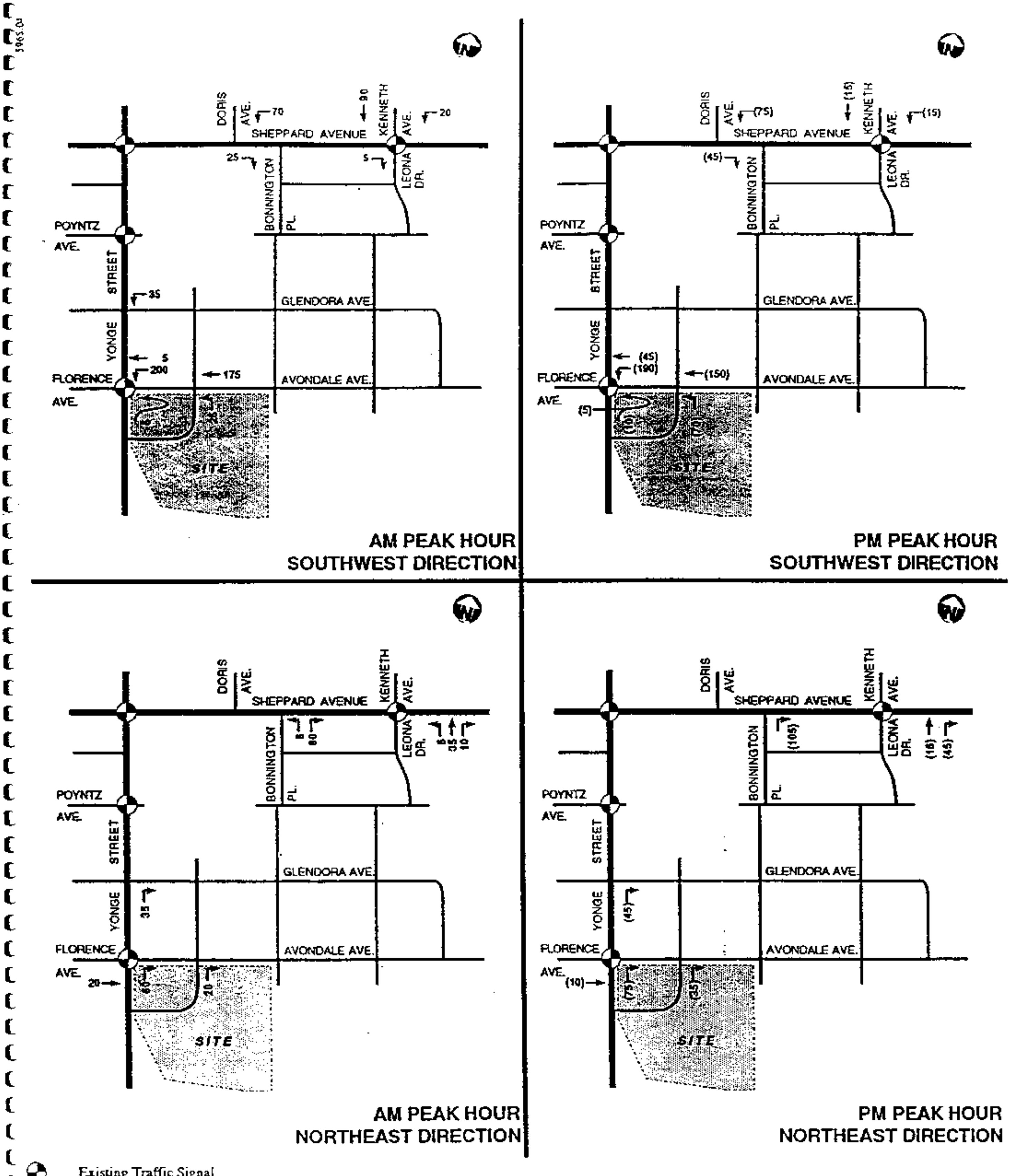
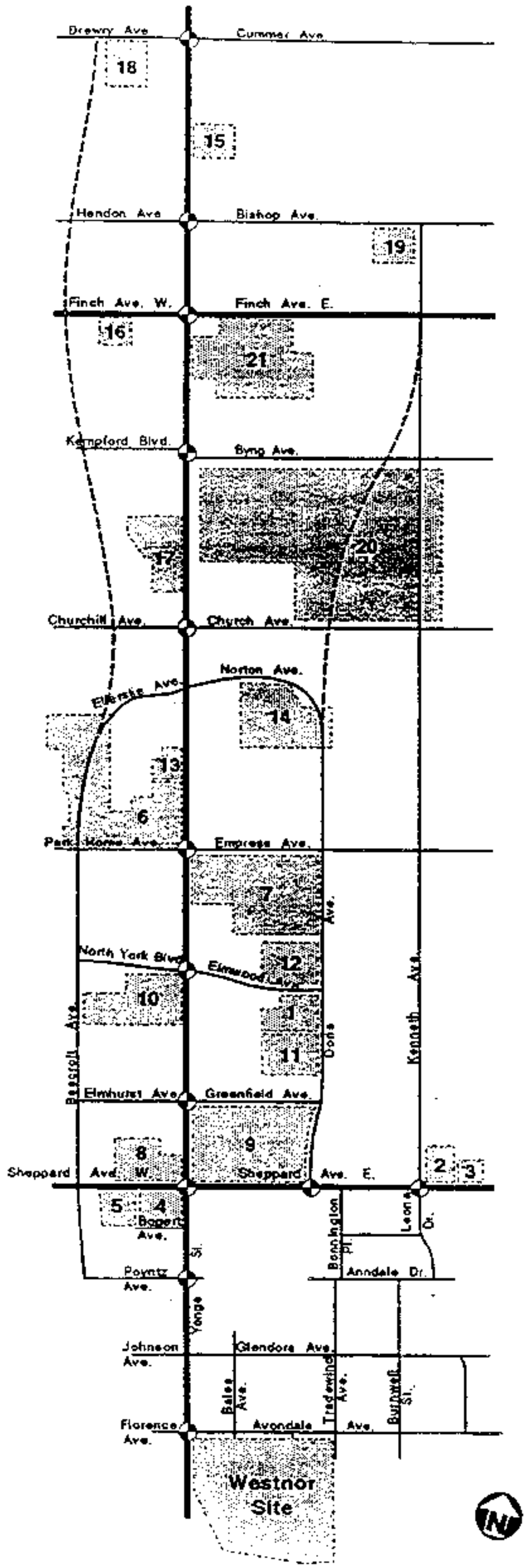


Figure 14
TRANSIENT TRAFFIC FLOWS THROUGH AVONDALE COMMUNITY STREETS



1. Cam-nest (Hollywood II Res.)
2. Creditel (110 Sheppard Ave. E.)
3. Kenneth/Sheppard
4. Marathon (4800 Yonge)
5. Southwest Sheppard (25 Sheppard)
6. Penta Stolp (Gibson Square)
7. Menkes (Empress Plaza)
8. Canderel (Yonge/Sheppard)
9. Counsel Prop. (Sheppard Ctr. II)
10. Ontario Hydro (5000 Yonge)
11. Bramalea (Spring Garden 1,2A)
12. Bramalea (Elmwood)
13. Sam-Sor (5182-5200 Yonge)
14. Centara/Inland (Yonge-Norton)
15. Zaraska (5791-3 Yonge)
16. Mizrahi (Finch/Lorraine)
17. Ullscrest (Yonge/Horsham)
18. Crestline (Drewry)
19. Arendsquare (Pemberton I)
20. Eminent (Northtown I)
21. Yonge/Finch (N. Amer. Life)

Existing Traffic Signal

Proposed Road

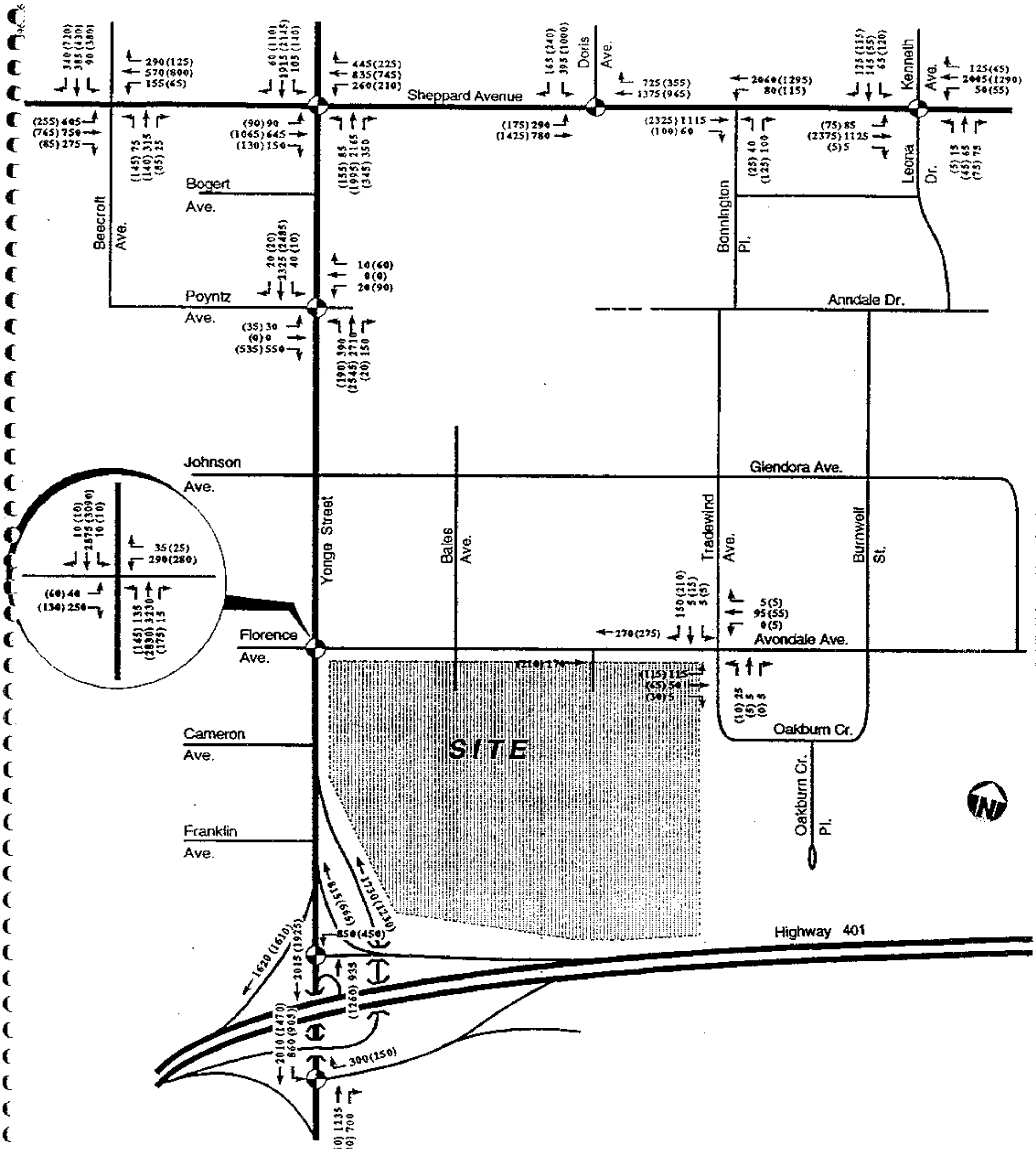
Schematic: Not to Scale

Figure 10

OTHER CITY CENTRE DEVELOPMENTS

TABLE 3
OTHER DEVELOPMENT - Traffic Generation

TRIP GENERATION RATES					AM PEAK HOUR IN	AM PEAK HOUR OUT	PM PEAK HOUR IN	PM PEAK HOUR OUT
				Residential (veh/unit)	0.08	0.16	0.16	0.08
				Commercial (veh/100m2)	0.45	0.09	0.09	0.45
				Other - Hotel (veh/room)	0.15	0.10	0.15	0.20
				Other - Assisted Housing (veh/unit)	0.05	0.14	0.11	0.08
PROJECT	**LAND USES**				**PEAK HOUR TRAFFIC GENERATION**			
DOWNTOWN	Residential (units)	Office (m^2 GFA)	Retail (m^2 GFA)	Other (htl rms)				
1. Cam-nest (Hollywood II Res)	150				12	24	24	12
2. Creditel (110 Sheppard Ave. E.)		14317			64	13	13	64
Under Construction:								
5. Southwest Sheppard (25 Sheppard)		33407	1002		153	31	35	153
Approved:								
3. Kenneth/Sheppard	50				4	8	8	4
4. Marathon (4800 Yonge)		34993	3937		173	35	31	173
6. Penta Stolp (Gibson Square)		103449	5400		509	145	145	509
7. Menkes (Empress PLaza)	303	95096	24108	300	596	176	191	611
8. Canderel (Yonge/Sheppard)	250	46317	4714		227	45	45	227
9. Counsel Prop. (Sheppard Ctr.II)		20991	10097		138	28	28	138
10. Ontario Hydro (5000 Yonge)		180750	17396		883	177	177	883
11. Bramalea (Spring Garden 1,2A)		54131	2361		252	50	50	252
12. Bramalea (Elmwood)	270				22	43	43	22
13. Sam-Sor (5182-5200 Yonge)		31345	2068		149	30	30	149
14. Centara/Inland (Yonge - Norton)	336	2990	1800	347	100	93	110	118
Subtotal	1359	617786	72883	647	3283	898	930	3315
UPTOWN	Residential (units)	Office (m^2 GFA)	Retail (m^2 GFA)	Other (asst. hsg)				
Approved:								
15. Zaraska (5791-3 Yonge)		30859	1145		143	29	29	143
16. Mizrahi (Finch/Lorraine)		4227	669		22	4	4	22
17. Ullscrest (Yonge/Horsham)	235			135	26	57	52	30
18. Crestline (Drewry)				81	4	11	9	6
19. Arendsquare (Pemberton I)	400				32	64	64	32
20. Eminent (Northtown I)	1168				93	187	187	93
Proposed:								
21. Yonge/Finch (N. Amer. Life)	350	24289	1758	216	131	77	77	131
Subtotal	2153	59375	3572		450	429	422	457
TOTAL CITY CENTRE	3512	677161	76455	863	3733	1326	1352	3772



Existing Traffic Signal

00 AM Peak Hour

(00) PM Peak Hour

Schematic Only - Not to Scale

Figure 11a

FUTURE BACKGROUND TRAFFIC VOLUMES

AM/PM Peak Hour

-Without East Service Road

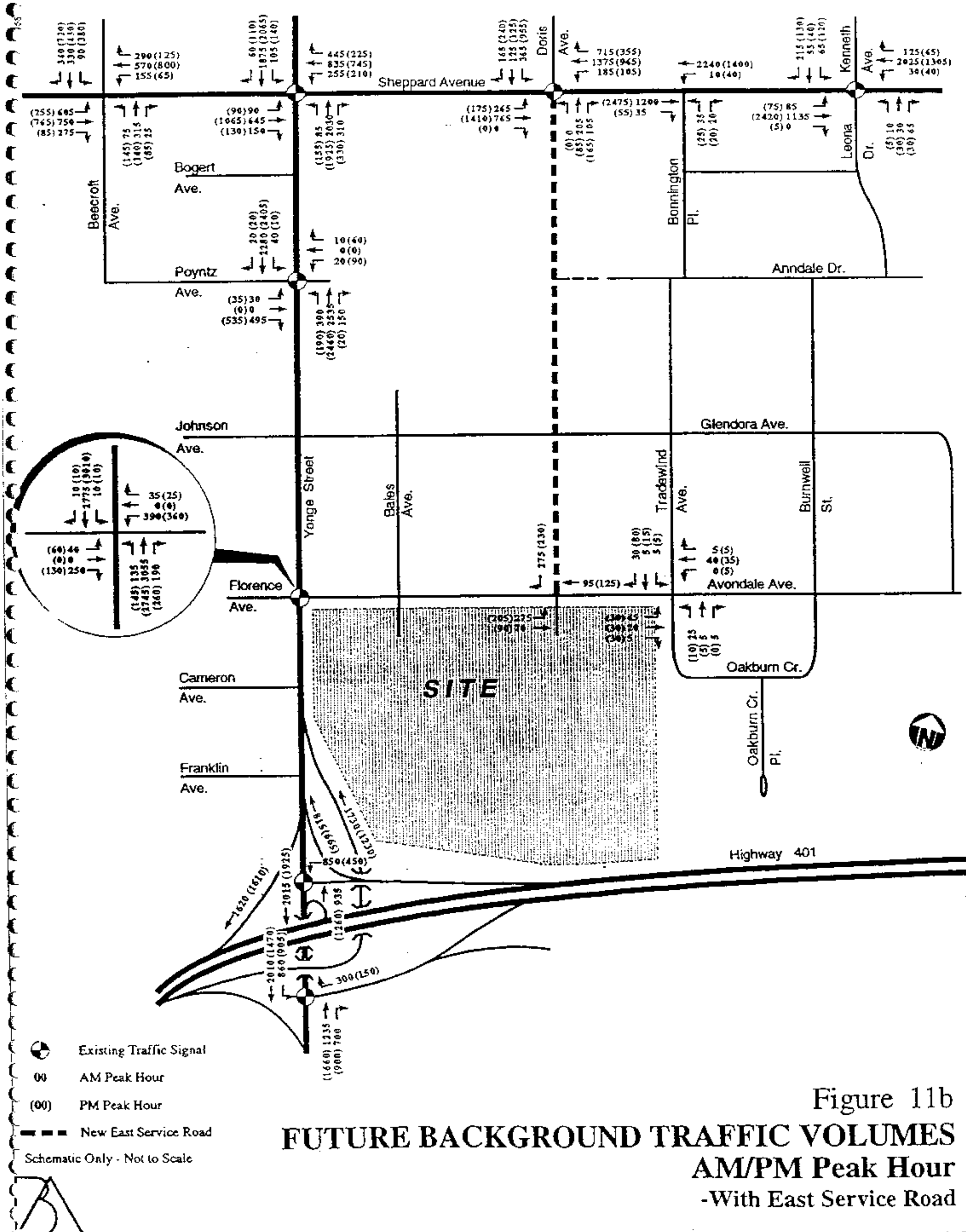


Figure 11b

FUTURE BACKGROUND TRAFFIC VOLUMES
AM/PM Peak Hour
-With East Service Road

APPENDIX

B

SUPPORTING MATERIAL

SOUTH DOWNTOWN SECONDARY PLAN REVIEW

ENVIRONMENTAL ASSESSMENT STUDY

STATUS REPORT

PROPERTY AND ECONOMIC DEVELOPMENT DEPARTMENT

MEMORANDUM

To:	Paula Dill Commissioner of Planning
From:	Jayne Domazet, Director of Economic Development
Date:	February 17, 1995
SUBJECT:	South Downtown Service Road - Acquisition Cost Estimate Revision

Further to our cost estimate prepared January 1995, the land requirements have been revised to include all of the lands located between Cameron Avenue, Franklin Avenue, Yonge Street and the proposed service road. The cost estimate has been revised accordingly. The cost, as of May 1994, of acquiring the land for South Downtown Service Road, west of Yonge Street is summarized on the following table.

COST ESTIMATE			
ALTERNATE ROUTES	*ACQUISITION COST*	*SALE OF SURPLUS*	*NET COST*
West of Yonge St.			
Route #1W	$23,900,000	$1,200,000	$22,700,000
Route #2W	$24,900,000	$1,200,000	$22,700,000

In addition it should be noted that this is an estimate only and is not based on appraised values.

Only the cost of the land is considered. Not included are any entitlements under the Expropriations Act for injurious affection, business loss, disturbance damage, relocation costs, good will, legal costs, survey costs or appraisal costs.

Jayne Domazet

Jayne Domazet,
Director of Economic Development

\PRO\MEMOS\SDSR95B.MEM

cc: Joe Farag, Finance Department
Colin Couper, Transportation Dept.
✔Paul Hudspith, Cole Sherman

SOUTH DOWNTOWN SECONDARY PLAN REVIEW - ENVIRONMENTAL ASSESSMENT
West Service Road

Alternative design #1

Property	Frontage (ft)	Depth (ft)	Area (ft2)	Road Area (ft2)	Residual (ft2)
4578 Yonge Street	67	130	8658	8653	5
4630 Yonge Street	195.37	124.43	24310	5705	18605
4664 Yonge Street	79	124	9795	3122	6674
12 Franklin Avenue	31	130	4049	3337	713
14 Franklin Avenue	25	130	3248	2476	772
16 Franklin Avenue	25	130	3248	2583	665
20 Franklin Avenue	50	130	6496	6028	468
22 Franklin Avenue	50	130	6496	4736	1760
24 Franklin Avenue	40	130	5200	2583	2617
30 Franklin Avenue	55	130	7146	646	6500
15 Cameron Avenue	77	130	9974	538	9436
21 Cameron Avenue	136	130	17647	3310	14337
27 Cameron Avenue	25	130	3240	2648	592
29 Cameron Avenue	45	130	5840	5840	0
33 Cameron Avenue	30	130	3879	3337	542
34 Cameron Avenue	25	130	3240	215	3024
35 Cameron Avenue	37	130	4774	2368	2406
36 Cameron Avenue	25	130	3240	2153	1087
38 Cameron Avenue	30	130	3879	3879	0
39 Cameron Avenue	37	130	4774	431	4343
40 Cameron Avenue	45	130	5840	5840	0
44 Cameron Avenue	49	130	6394	1399	4994
15 Florence Avenue	25	130	3240	377	2863
17 Florence Avenue	50	130	6479	807	5672
21 Florence Avenue	25	130	3240	377	2863
23 Florence Avenue	50	130	6479	807	5672
26 Florence Avenue	50	130.5	6525	1184	5341
27 Florence Avenue	40	130	5200	646	4554
31 Florence Avenue	35	130	4561	592	3969
32 Florence Avenue	70	130	9079	8396	683
33 Florence Avenue	50	130	6479	1292	5187
36 Florence Avenue	37	130	4774	4575	199
37 Florence Avenue	37	130	4859	3983	877
39 Florence Avenue	50	130	6479	6479	0
40 Florence Avenue	30	130	3879	1938	1941
44 Florence Avenue	50	130	6479	431	6048
47 Florence Avenue	50	130	6500	861	5639
26 Johnston Avenue	48	130	6181	2691	3490
27 Johnston Avenue	50	130	6479	1292	5187
28 Johnston Avenue	34	130	4433	4433	0
29 Johnston Avenue	52	130	6735	6243	492
32 Johnston Avenue	31	130	4007	3337	670
33 Johnston Avenue	45	130	5840	5059	781
34 Johnston Avenue	37	130	4774	4090	684
37 Johnston Avenue	31	130	4030	969	3061
39 Johnston Avenue	50	130	6500	22	6478
25 Poyntz Avenue	40	110	4399	2045	2354
27 Poyntz Avenue	35	110	3858	3858	0
31 Poyntz Avenue	50	110	5481	4521	960
	TOTAL:		298333	143128	155205

SOUTH DOWNTOWN SECONDARY PLAN REVIEW - ENVIRONMENTAL ASSESSMENT
West Service Road

Alternative design #2

Property	Frontage (ft)	Depth (ft)	Area (ft2)	Road Area (ft2)	Residual (ft2)
4578 Yonge Street	67	130	8653	8653	0
4630 Yonge Street	195.37	124.43	24310	5597	18713
4664 Yonge Street	79	125	9817	3122	6695
12 Franklin Avenue	31	130	4049	3337	713
14 Franklin Avenue	25	130	3240	2476	764
16 Franklin Avenue	25	130	3240	2583	656
20 Franklin Avenue	50	130	6479	6028	451
22 Franklin Avenue	50	130	6479	4736	1743
24 Franklin Avenue	40	130	5200	2583	2617
30 Franklin Avenue	55	130	7161	646	6515
15 Cameron Avenue	77	130	9974	538	9436
21 Cameron Avenue	136	130	17647	3310	14337
27 Cameron Avenue	25	130	3240	2648	592
29 Cameron Avenue	45	130	5840	5840	0
33 Cameron Avenue	30	130	3879	3337	542
34 Cameron Avenue	25	130	3240	215	3024
35 Cameron Avenue	37	130	4774	2368	2406
36 Cameron Avenue	25	130	3240	2153	1087
38 Cameron Avenue	30	130	3879	3879	0
39 Cameron Avenue	37	130	4774	431	4343
40 Cameron Avenue	45	130	5840	5840	0
44 Cameron Avenue	49	130	6394	1399	4994
15 Florence Avenue	25	130	3240	377	2863
17 Florence Avenue	50	130	6479	807	5672
21 Florence Avenue	25	130	3240	377	2863
23 Florence Avenue	50	130	6479	807	5672
27 Florence Avenue	40	130	5200	646	4554
31 Florence Avenue	35	130	4561	592	3969
33 Florence Avenue	50	130	6479	646	5833
36 Florence Avenue	37	130	4774	1830	2944
37 Florence Avenue	37	130	4859	3337	1522
39 Florence Avenue	50	130	6479	6479	0
40 Florence Avenue	30	130	3879	3879	0
44 Florence Avenue	50	130	6479	6479	0
46 Florence Avenue	50	130	6479	1507	4972
47 Florence Avenue	50	130	6479	1938	4542
26 Johnston Avenue	47.5	130	6175	54	6121
28 Johnston Avenue	34	130	4433	1830	2603
32 Johnston Avenue	31	130	4007	3767	239
33 Johnston Avenue	45	130	5840	4951	888
34 Johnston Avenue	37	130	4774	4413	361
36 Johnston Avenue	37	130	4774	2260	2514
37 Johnston Avenue	34	130	4433	2368	2065
38 Johnston Avenue	25	130	3240	431	2809
39 Johnston Avenue	50	130	6479	6479	0
45 Johnston Avenue	40	130	5200	3229	1971
25 Poyntz Avenue	40	110	4399	861	3538
27 Poyntz Avenue	35	110	3858	3444	414
31 Poyntz Avenue	50	110	5481	5382	99
35 Poyntz Avenue	50	110	5481	431	5050
	TOTAL:		295025	141318	153706

SOUTH DOWNTOWN SECONDARY PLAN REVIEW - ENVIRONMENTAL ASSESSMENT
East Service Road

Alternative design #1

Property	Frontage (ft)	Depth (ft)	Area (ft2)	Road Area (ft2)	Residual (ft2)
4661 Yonge Street	114	120	13680	4650	9030
4679 Yonge Street	118	120	14173	3272	10901
45/47 Sheppard Avenue East	298	N/A	N/A	10979	N/A
80 Sheppard Avenue East	77.49	N/A	N/A	6997	N/A
9 Bates Avenue	79	119	9403	1722	7681
19 Avondale Avenue	79	118	9300	2368	6932
25 Avondale Avenue	40	118	4728	2583	2144
33 Avondale Avenue	58	120	6934	1292	5642
34 Avondale Avenue	N/A	118	5274	646	4628
35 Avondale Avenue	30	114	3399	700	2699
36 Avondale Avenue	35	118	4146	431	3716
37 Avondale Avenue	35	114	3997	807	3189
38 Avondale Avenue	35	118	4146	431	3716
39 Avondale Avenue	25	114	2839	592	2247
40 Avondale Avenue	45	118	5309	592	4717
41 Avondale Avenue	25	114	2839	700	2139
44 Avondale Avenue	25	118	2945	323	2622
45 Avondale Avenue	50	114	5677	5677	0
46 Avondale Avenue	25	118	2945	323	2622
48 Avondale Avenue	40	118	4728	538	4189
49 Avondale Avenue	50	114	5677	1399	4278
50 Avondale Avenue	40	118	4728	538	4189
51 Avondale Avenue	50	114	5677	1130	4547
55 Avondale Avenue	50	114	5677	1130	4547
56 Avondale Avenue	25	118	2945	323	2622
58 Avondale Avenue	45	118	5270	592	4678
59 Avondale Avenue	50	114	5677	1130	4547
60 Avondale Avenue	50	118	5890	646	5244
63 Avondale Avenue	50	114	5677	1130	4547
64 Avondale Avenue	45	118	5270	592	4678
66 Avondale Avenue	45	118	5270	646	4624
67 Avondale Avenue	50	114	5677	1130	4547
68 Avondale Avenue	46	118	5386	3875	1511
73 Avondale Avenue	50	114	5677	3552	2125
77 Avondale Avenue	50	114	5677	431	5247
78 Avondale Avenue	50	114	5700	108	5592
69 Glendora Avenue	50	118	5890	3875	2015
70 Glendora Avenue	50	118	5890	2314	3576
73 Glendora Avenue	50	118	5900	54	5846
76 Glendora Avenue	50	118	5900	161	5739
14 Anndale Drive	43	100	4300	54	4246
17 Anndale Drive	35	110	3894	2153	1742
21 Anndale Drive	42.5	110	4675	269	4406
2 Bonnington Place	42	113	4740	2207	2533
4 Bonnington Place	42	113	4740	861	3878
6 Bonnington Place	42	113	4740	915	3825
8 Bonnington Place	42	113	4740	969	3771
10 Bonnington Place	42	113	4740	1023	3717
12 Bonnington Place	42	113	4740	1184	3556
14 Bonnington Place	42	113	4740	1238	3502
16 Bonnington Place	42	113	4740	1561	3179
18 Bonnington Place	42	113	4740	1938	2802
20 Bonnington Place	42	113	4740	2476	2264
22 Bonnington Place	42	113	4746	1615	3131
24 Bonnington Place	42	113	4746	1184	3562
26 Bonnington Place	35	112.95	3953	969	2984
	TOTAL:		289629	90992	216612

SOUTH DOWNTOWN SECONDARY PLAN REVIEW - ENVIRONMENTAL ASSESSMENT
East Service Road

Alternative design #2

Property	Frontage (ft)	Depth (ft)	Area (ft2)	Road Area (ft2)	Residual (ft2)
4661 Yonge Street	114	120	13680	4650	9030
4679 Yonge Street	40	120	4819	1722	3097
45/47 Sheppard Avenue East	298	N/A	N/A	22497	N/A
43 Sheppard Avenue East	249.83	N/A	N/A	15177	N/A
East Side of Bales Avenue	N/A	N/A	N/A	8073	N/A
2 Forest Laneway	N/A	N/A	N/A	2045	N/A
9 Bales Avenue	79	119	9403	1722	7681
19 Avondale Avenue	79	118	9300	2368	6932
25 Avondale Avenue	40	118	4728	2583	2144
33 Avondale Avenue	58	120	6934	1292	5642
34 Avondale Avenue	N/A	118	5274	646	4628
35 Avondale Avenue	30	114	3399	700	2699
36 Avondale Avenue	35	118	4146	431	3716
37 Avondale Avenue	35	114	3997	807	3189
38 Avondale Avenue	35	118	4146	431	3716
39 Avondale Avenue	25	114	2839	592	2247
40 Avondale Avenue	45	118	5309	592	4717
41 Avondale Avenue	25	114	2839	700	2139
44 Avondale Avenue	25	118	2945	323	2622
45 Avondale Avenue	50	114	5677	5677	0
46 Avondale Avenue	25	118	2945	323	2622
48 Avondale Avenue	40	118	4728	538	4189
49 Avondale Avenue	50	114	5677	1399	4278
50 Avondale Avenue	40	118	4728	538	4189
51 Avondale Avenue	50	114	5677	1130	4547
55 Avondale Avenue	50	114	5677	1130	4547
56 Avondale Avenue	25	118	2945	323	2622
58 Avondale Avenue	45	118	5270	700	4570
59 Avondale Avenue	50	114	5677	1130	4547
60 Avondale Avenue	50	118	5890	5597	293
63 Avondale Avenue	50	114	5677	3337	2341
64 Avondale Avenue	45	118	5270	5059	211
66 Avondale Avenue	45	118	5270	1184	4086
67 Avondale Avenue	50	114	5677	5677	0
73 Avondale Avenue	50	114	5677	1399	4278
46 Glendora Avenue	40	118	4720	75	4645
50 Glendora Avenue	35	118	4146	2637	1509
53 Glendora Avenue	25	118	2950	11	2939
54 Glendora Avenue	50	118	5890	5890	0
55 Glendora Avenue	50	118	5890	3498	2392
57 Glendora Avenue	30	118	3526	3526	0
58 Glendora Avenue	50	118	5890	2045	3845
61 Glendora Avenue	35	118	4146	4146	0
63 Glendora Avenue	50	114	5677	1399	4278
1 Anndale Drive	35	110	3894	3767	127
2 Anndale Drive	43	100	4268	3929	339
3 Anndale Drive	42	110	4616	4359	256
4 Anndale Drive	42.6	100	4260	97	4163
5 Anndale Drive	42	110	4620	237	4383
	TOTAL:		230715	138110	140396

SOUTH DOWNTOWN SECONDARY PLAN REVIEW - ENVIRONMENTAL ASSESSMENT
East Service Road

Alternative design #3

Property	Frontage (ft)	Depth (ft)	Area (ft2)	Road Area (ft2)	Residual (ft2)
4661 Yonge Street	114	120	13680	4650	9030
4679 Yonge Street	40	120	4819	1722	3097
45/47 Sheppard Avenue East	298	N/A	N/A	25295	N/A
43 Sheppard Avenue East	249.83	N/A	N/A	12917	N/A
East Side of Bales Avenue	N/A	N/A	N/A	16038	N/A
2 Forest Laneway	N/A	N/A	N/A	2260	N/A
9 Bales Avenue	79	119	9403	1722	7681
19 Avondale Avenue	79	118	9300	2368	6932
25 Avondale Avenue	40	118	4728	2583	2144
33 Avondale Avenue	58	120	6934	1292	5642
34 Avondale Avenue	N/A	118	5274	646	4628
35 Avondale Avenue	30	114	3399	700	2699
36 Avondale Avenue	35	118	4146	431	3716
37 Avondale Avenue	35	114	3997	807	3189
38 Avondale Avenue	35	118	4146	431	3716
39 Avondale Avenue	25	114	2839	592	2247
40 Avondale Avenue	45	118	5309	753	4555
41 Avondale Avenue	25	114	2839	969	1870
44 Avondale Avenue	25	118	2945	2945	0
45 Avondale Avenue	50	114	5677	5677	0
46 Avondale Avenue	25	118	2945	2945	0
48 Avondale Avenue	40	118	4728	4728	0
49 Avondale Avenue	50	114	5677	5220	457
50 Avondale Avenue	40	118	4728	1292	3436
51 Avondale Avenue	50	114	5677	2476	3202
55 Avondale Avenue	50	114	5677	3283	2394
59 Avondale Avenue	50	114	5677	4682	995
63 Avondale Avenue	50	114	5677	5328	349
67 Avondale Avenue	50	114	5700	2906	2794
73 Avondale Avenue	50	114	5700	377	5323
41 Glendora Avenue	50	118	5900	11	5889
42 Glendora Avenue	50	118	5900	86	5814
43 Glendora Avenue	35	118	4146	3767	379
44 Glendora Avenue	50	118	5890	4467	1423
45 Glendora Avenue	50	118	5890	5890	0
46 Glendora Avenue	40	118	4728	4728	0
50 Glendora Avenue	35	118	4146	861	3285
51 Glendora Avenue	40	118	4728	2325	2403
1 Anndale Drive	35	110	3894	3606	288
2 Anndale Drive	43	100	4268	3229	1039
	TOTAL:		191111	147005	100616

Job # 18094

February 28, 1995

THE CITY OF NORTH YORK
SOUTH DOWNTOWN SECONDARY PLAN REVIEW
ENVIRONMENTAL ASSESSMENT STUDY

SUMMARY OF CONSTRUCTION COSTS

East Service Road	
• Alternative #1 (Tradewind)	$3,920,000
• Alternative #2 (Combination)	$4,514,000
• Alternative #3 (Midblock)	$4,121,000
West Service Road	
• Alternative #1	$1,473,000
• Alternative #2	$1,492,000
East-West Link (Lower Service Road)	
• Preferred Alignment	$853,000
Yonge Street Reconstruction	
• Preferred Alignment with detour	$5,788,000
Interchange	
• Ramp 401 East to Service Road	$2,162,000
• Ramp 401 East to Yonge North & South	$1,641,000
• Ramp 401 West to Yonge North & Service Road	$591,000
• Ramp Service Road to 401 West	$1,503,000
• Ramp Yonge South to 401 West	$691,000
• Ramp Yonge North to 401 East	$9,528,000
• Ramp Yonge North to 401 West	$10,215,000
Total Construction Cost	
• Based on Average Cost of Alternatives	$38,640,000
• 10% Contingency	$3,860,000
• 10% Engineering	$3,860,000

TOTAL COST **$46,400,000**

PRELIMINARY

North York South Downtown Secondary Plan Review
Environmental Assessment Study

Summary of Construction Costs For Service Road Alternatives

Description	Unit	Unit Price	Alternative #1 East Tradewind Alignment Service Road Only		Alternative #2 East Combination Alignment Service Road Only		Alternative #3 East Midblock Alignment Service Road Only		Alternative #1 West Service Road Only		Alternative #2 West Service Road Only		East - West Link (Lower Service Road)	
			Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
Removals														
Remove Curb and Gutter	m	$30.00	1900	$57,000	1550	$46,500	780	$23,400	810	$24,300	790	$23,700	0	$0
Remove Concrete Sidewalk	m^2	$40.00	2850	$114,000	2330	$93,200	1170	$46,800	1220	$48,800	1180	$47,200	0	$0
Remove Asphalt	m^2	$20.00	9200	$184,000	9250	$185,000	5150	$103,000	4280	$85,600	4050	$81,000	0	$0
Roadway														
Base (Granular 'A')	t	$12.00	9150	$109,800	9300	$111,600	8900	$106,800	6600	$79,200	6100	$73,200	3600	$43,200
Sub Base (Granular 'B')	t	$10.00	22800	$228,000	23200	$232,000	22200	$222,000	16380	$163,800	15200	$152,000	9000	$90,000
Asphalt Base	t	$42.00	3750	$157,500	3800	$159,600	3700	$155,400	2700	$113,400	2500	$105,000	1500	$63,000
Asphalt Top	t	$52.00	1900	$98,800	1900	$98,800	1800	$93,600	1350	$70,200	1250	$65,000	750	$39,000
Sub drain	m	$12.00	2950	$35,400	2050	$24,600	1800	$21,600	1550	$18,600	1550	$18,600	700	$8,400
Concrete Curb and Gutter	m	$40.00	2950	$118,000	2050	$82,000	1700	$68,000	1550	$62,000	1550	$62,000	700	$28,000
Sewer & Watermain														
Storm sewer (incl., catchbasins and manholes)	Say			$350,000		$240,000		$205,000		$130,000		$165,000		$90,000
Sanitary Sewer	Say			$225,000		$155,000		$140,000		$110,000		$110,000		$55,000
Watermain	Say			$190,000		$145,000		$128,000		$100,000		$105,000		$50,000
Boulevard Treatment														
Sodding	m^2	$5.00	11500	$57,500	8700	$43,500	7700	$38,500	5940	$29,700	6120	$30,600	2800	$14,000
Trees and Landscaping	Say			$24,000		$27,000		$23,000		$18,000		$20,000		$9,000
Concrete Sidewalk	m^2	$40.00	3825	$153,000	2900	$116,000	2550	$102,000	1980	$79,200	2040	$81,600	990	$39,600
Light Standards	Each	$6,000.00	53	$318,000	39	$234,000	34	$204,000	30	$180,000	32	$192,000	14	$84,000
Traffic Lights														
Traffic Signals	Each	$80,000.00	5	$400,000	4	$320,000	3	$240,000	2	$160,000	2	$160,000	3	$240,000
Reconfiguration At Marathon														
Underground Parking	Say			$1,100,000		$1,400,000		$1,400,000		N/A		N/A		N/A
Transformer Relocation	Say			$0		$800,000		$800,000		N/A		N/A		N/A
Total Construction Cost				**$3,920,000**		**$4,513,800**		**$4,121,100**		**$1,472,800**		**$1,491,900**		**$853,200**

Notes:

1. Property acquisition costs not included
2. Cost of removing trees and residential homes not included
3. Cost of driveway re-construction not included
4. Cost of utility relocation not included
5. Temporary construction lighting not included
6. All costs are preliminary only and are to be confirmed

PRELIMINARY

North York South Downtown Secondary Plan Review
Environmental Assessment Study

Summary of Construction Costs For Yonge Street Reconstruction

Description	Unit	Unit Price	Yonge Street Reconstruction	
			Quantity	Total
Removals				
Remove Curb and Gutter	m	$30.00	1,850	$55,500
Remove Concrete Sidewalk	m^2	$40.00	2,800	$112,000
Remove Asphalt	m^2	$20.00	10,700	$214,000
Remove Concrete Base	m^2	$30.00	11,000	$330,000
Roadway				
Concrete Base	m^2	$50.00	11,200	$560,000
Asphalt Base	t	$42.00	2,000	$84,000
Asphalt Top	t	$52.00	1,000	$52,000
Sub drain	m	$12.00	1,700	$20,400
Concrete Curb and Gutter	m	$40.00	1,700	$68,000
Detour				
Base (Granular 'A')	t	$12.00	3,000	$36,000
Sub Base (Granular 'B')	t	$10.00	14,400	$144,000
Asphalt Base	t	$42.00	2,450	$102,900
Asphalt Top	t	$52.00	1,000	$52,000
Drainage	Say			$35,000
Sewer & Watermain				
Storm sewer (incl., catchbasins and manholes)	Say			$250,000
Sanitary Sewer	Say			$130,000
Watermain	Say			$125,000
Boulevard Treatment				
Sodding	m^2	$5.00	2,000	$10,000
Trees and Landscaping	Say			$5,000
Concrete Sidewalk	m^2	$40.00	750	$30,000
Light Standards	Each	$6,000.00	32	$192,000
Traffic Lights				
Traffic Signals	Each	$80,000.00	1	$80,000
Structures				
Yonge/Service Road/Ramp Structure	Say			$3,100,000
Total Construction Cost				**$5,787,800**

1. Property acquisition costs not included
2. Cost of driveway re-construction not included
3. Temporary construction lighting not included
4. Cost of utility relocation not included
5. All costs are preliminary only and are to be confirmed

PRELIMINARY

North York South Downtown Secondary Plan Review
Environmental Assessment Study

Summary of Construction Costs For Interchange Ramps and Structures

Description	Unit	Unit Price	Ramp 401 East to Service Road		Ramp 401 East to Yonge North/South		Ramp 401 West to Yonge/Service Rd.		Ramp Service Road to 401 West		Ramp Yonge South to 401 West		Ramp Yonge North to 401 East		Ramp Yonge North to 401 West	
			Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
Removals																
Remove Curb and Gutter	m	$30.00		$0	1545	$46,350	340	$10,200		$0	510	$15,300	670	$20,100	905	$27,150
Remove Asphalt	m²	$20.00		$0	5460	$109,200	1600	$32,000		$0	2000	$40,000	3200	$64,000	4060	$81,200
Roadway - Ramps																
Base (Granular 'A')	t	$12.00	875	$10,500	2350	$28,200	1000	$12,000	1120	$13,440	870	$10,440	1630	$19,560	1700	$20,400
Sub Base (Granular 'B')	t	$10.00	2190	$21,900	5900	$59,000	2500	$25,000	2800	$28,000	2160	$21,600	4060	$40,600	4250	$42,500
Asphalt Base	t	$42.00	300	$12,600	890	$37,380	350	$14,700	380	$15,960	300	$12,600	550	$23,100	580	$24,360
Asphalt Top	t	$52.00	240	$12,480	720	$37,440	280	$14,560	300	$15,600	240	$12,480	440	$22,880	460	$23,920
Asphalt OFC	t	$100.00	150	$15,000	410	$41,000	175	$17,500	195	$19,500	150	$15,000	280	$28,000	295	$29,500
Sub drain	m	$12.00	720	$8,640	500	$6,000	420	$5,040	520	$6,240	450	$5,400	980	$11,760	770	$9,240
Concrete Curb and Gutter	m	$40.00	720	$28,800	500	$20,000	420	$16,800	520	$20,800	500	$20,000	1120	$44,800	770	$30,800
Highway 401																
Highway Widening	Say			$500,000		$0		$0		$0		$0		$500,000		$500,000
Retaining Walls	Say			$1,000,000		$700,000		$0		$0		$0		$400,000		$0
Noise Barrier	Say			$300,000		$0		$0		$150,000		$0		$350,000		$0
Drainage																
Storm sewer (incl., catchbasins and manholes)	Say			$160,000		$110,000		$100,000		$110,000		$100,000		$130,000		$150,000
Slope Treatment																
Topsoil	m³	$7.00	500	$3,500	2700	$18,900	1900	$13,300	250	$1,750	1900	$13,300	1500	$10,500	2000	$14,000
Seeding and Mulching	Kg	$20.00	20	$400	100	$2,000	60	$1,200	10	$200	60	$1,200	160	$3,200	60	$1,200
Trees and Landscaping	Say			$1,500		$7,000		$5,000		$500		$6,000		$10,000		$6,000
Illumination																
High Mast Poles	Each	$50,000.00	1	$50,000	1	$50,000	1	$50,000		$0	1	$50,000	2	$100,000	1	$50,000
Structures																
Bridges	Say			$0		$320,000		$250,000		$1,100,000		$350,000		$7,000,000		$8,500,000
Retaining Walls	Say			$25,000		$0		$0		$0		$0		$700,000		$675,000
Concrete Barrier	m	$90	125	$11,250	535	$48,150	265	$23,850	235	$21,150	195	$17,550	550	$49,500	325	$29,250
Total Construction Cost				**$2,161,570**		**$1,640,620**		**$591,150**		**$1,503,140**		**$690,870**		**$9,528,000**		**$10,214,520**

Total Interchange Construction Cost =
$26,329,870

Notes:
1. Property acquisition costs not included
2. Cost of Utility relocation not included
3. Temporary construction lighting not included
4. Temporary construction barriers and signage not included
5. All costs are preliminary only and are to be confirmed

PRELIMINARY

CITY OF
North York

Transportation Department

APPENDIX B

TRAFFIC REPORT

NORTH YORK DOWNTOWN AREA SOUTH OF SHEPPARD AVENUE

TRAFFIC ANALYSIS DOCUMENTATION

The following documents the information and the results of the traffic analysis undertaken in support of the Environmental Assessment for the transportation infrastructure required to support OPA 393.

For this project, CSA conducted capacity analysis at signalized intersections within the study area using turning movement volumes provided by the City of North York Transportation Department. Land use and other traffic generation assumptions were also provided by the City of North York.

LAND USE

Westnor Site - Phase 1

	sq.m.	**units**
residential	94,758	900
commercial	48,773	--

Oakburn Site - Phase 1

	sq.m.	**units**
residential	--	532
retail	600	--

other relevant land use assumptions: 1.8 residents/unit
30 sq.m./employee

TRIP GENERATION (As Per OPA 343)

Base assumptions:

peak hour factor	45%
car occupancy	1.2 persons/vehicle
absenteeism rate (emp.)	10%
walk/other	10%
transit modal split	60%

PM peak hour trip rates:

employment:	0.34 autos/100 sq. m outbound off-peak direction (inbound) is 20% of peak
residential:	0.16 autos/res. unit inbound off-peak direction (outbound) is 50% of peak

AM peak hour trip rates: the reverse of PM peak hour.

ARTERIAL ROAD TRAFFIC OPERATIONS

The 1995 Highway Capacity Manual was used to conduct capacity analyses at signalized intersections under existing and future traffic conditions. Intersection capacity analysis worksheets are included at the back of this document. Intersection configuration adjustments and other design refinements (e.g. storage length for turn lanes) were undertaken as necessary to ensure that the road system would operate without undue delays or queue spillovers.

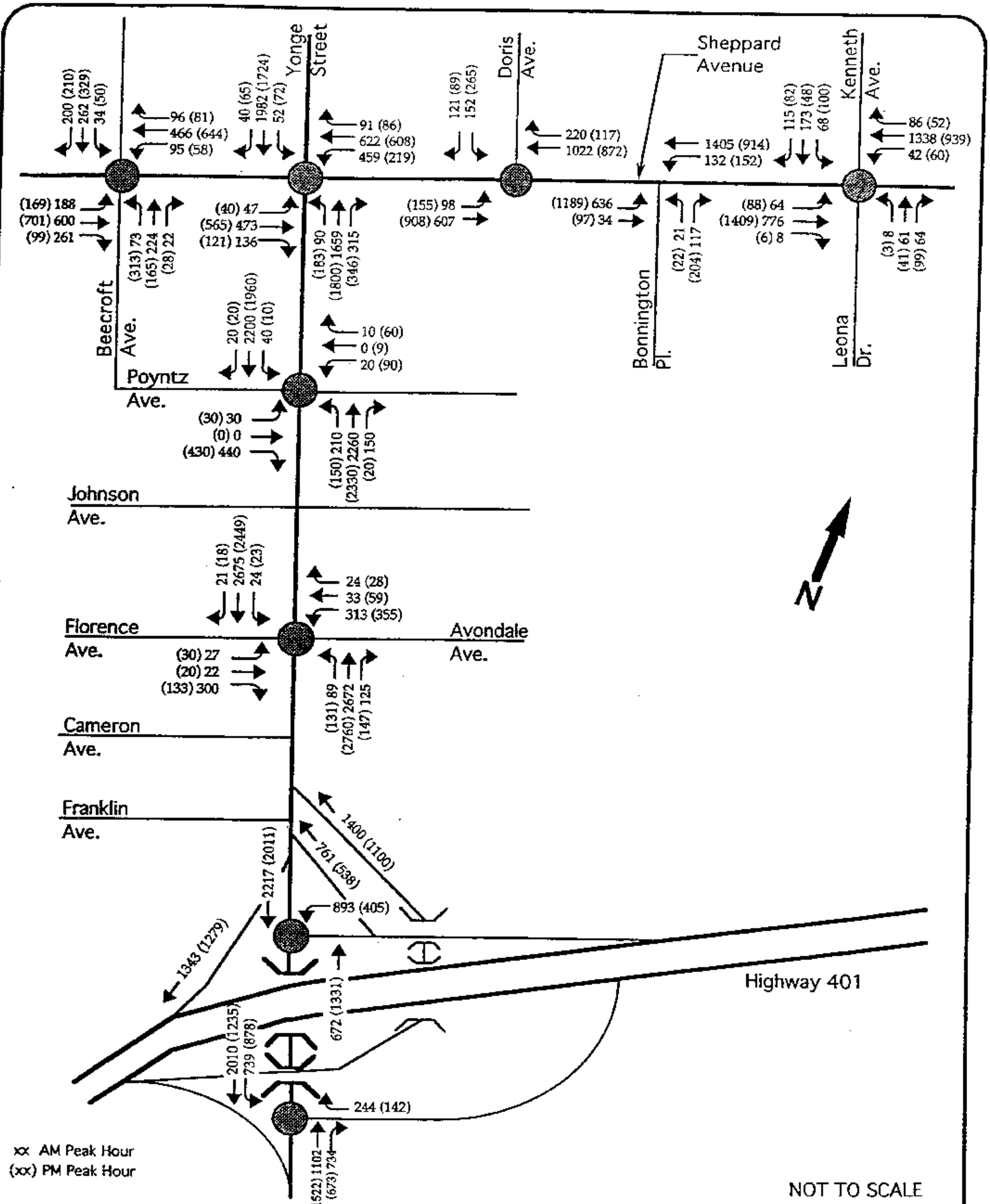
Existing Turning Movements

All existing turning movements, except the westbound Highway 401 to northbound Yonge Street ramp, were obtained from Metro counts. The west-north off ramp volume was obtained from the existing volumes used by the BA Group in their traffic impact study of the Westnor Development Project. The existing turning volumes are provided in Figure 1.

Under existing conditions capacity analysis was conducted for the AM and PM peak hours at all signalized intersections along Yonge Street between Sheppard Avenue and Avondale Avenue, as well as the intersections of Sheppard Avenue with Beecroft Road and Doris Avenue. The existing volumes and existing traffic signal timing were used in the analysis, however some signal timing adjustments were required to keep the v/c ratio below 1.2. Since the traffic signals on Yonge Street are under SCOOT Control it is acceptable to adjust the signal timing for the existing conditions. At all intersections, except Yonge Street and Avondale Avenue, adjustments were made to the phase times but the cycle length remained the same. A saturation flow of 1800 vph and a peak hour factor of 0.95 were used in the analyses. For the Avondale Avenue and Yonge Street intersection a saturation flow of 1900 vph and a peak hour factor of 0.98 were assumed due to the saturated conditions experienced at that intersection. The performance characteristics and critical movements of these intersections are summarized in Table 1.

Future Turning Movements

Future turning movement volumes for the proposed development and transportation infrastructure improvements proposed under OPA 393 were provided by the City of North York



North York Environmental Assessment	EXISTING TRAFFIC VOLUMES AM/PM PEAK HOUR	FIGURE 1

Table 1

Intersection Analysis - Existing Conditions

Intersection	Period	Intersection			Critical Movement			
		v/c	delay	LOS	Movement	v/c	delay	LOS
Beecroft/Sheppard	AM Peak	0.711	13.3	B				
Beecroft/Sheppard	PM Peak	1.013	36	D	EBLTR	1.05	55.9	E
					WBTR	0.92	28.4	D
					NBL	0.98	50.2	E
Yonge/Sheppard	AM Peak	0.961	27.9	D	WB L	1.02	61.5	F
					NB L	1.19	202.4	F
					NBTR	0.9	23.2	C
					SBTR	0.9	23.2	C
Yonge/Sheppard	PM Peak	0.829	31.4	D	NBTR	0.97	25.7	D
					SB L	0.94	78	F
					SB TR	1.04	46.5	E
Doris/Sheppard	AM Peak	0.555	9.6	B				
Doris/Sheppard	PM Peak	0.756	10	B				
Yonge/Poyntz	AM Peak	0.876	23.3	C	SB TR	0.96	27.6	D
					NBTR	0.87	16.1	C
Yonge/Poyntz	PM Peak	0.859	16.9	C				
Yonge/Avondale	AM Peak	1.1	85.9	F	WB LTR	1.12	113.3	F
					NBTR	1.08	64.3	F
					SB TR	1.17	115	F
Yonge/Avondale	PM Peak	1.165	98.4	F	WBLTR	1.15	118.9	F
					NBTR	1.18	111.6	F
					SB TR	1.14	89.7	F

critical if LOS = E or F
or if v/c >= 0.85 for through, v/c >= 1.00 for left or right

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Transportation Department. These are shown in Figures 2 and 3 for the AM and PM peak hours respectively.

Capacity analyses were conducted for the future AM and PM peak hours at all existing and proposed signalized intersections in the study area. A saturation flow of 1900 vph and peak hour factors of 0.95-0.98 were used in the analyses. The performance characteristics and critical movements of the existing and proposed signalized intersections in the study area are summarized in Table 2.

The storage length requirements were calculated for all exclusive left and right turn lanes. The vehicle arrival rates were calculated for each movement at the intersections. The arrival rates for the left turn movements are based on a probability that 95% of the time vehicles will clear the intersection in one cycle. Using the Vehicle Arrival Rate Table provided in the Ministry of Transportation Geometric Design Standards the number of vehicles that will be stopped per cycle was determined. This number was multiplied by 7.5 metres, the average length of a vehicle, to determine the required storage. This adjustment for 95% probability of clearance results in an increase in storage length requirement of about 80% - 120% over the non-adjusted storage length requirement (depending on the arrival rate, this increase may range from about 45% to over 200%).

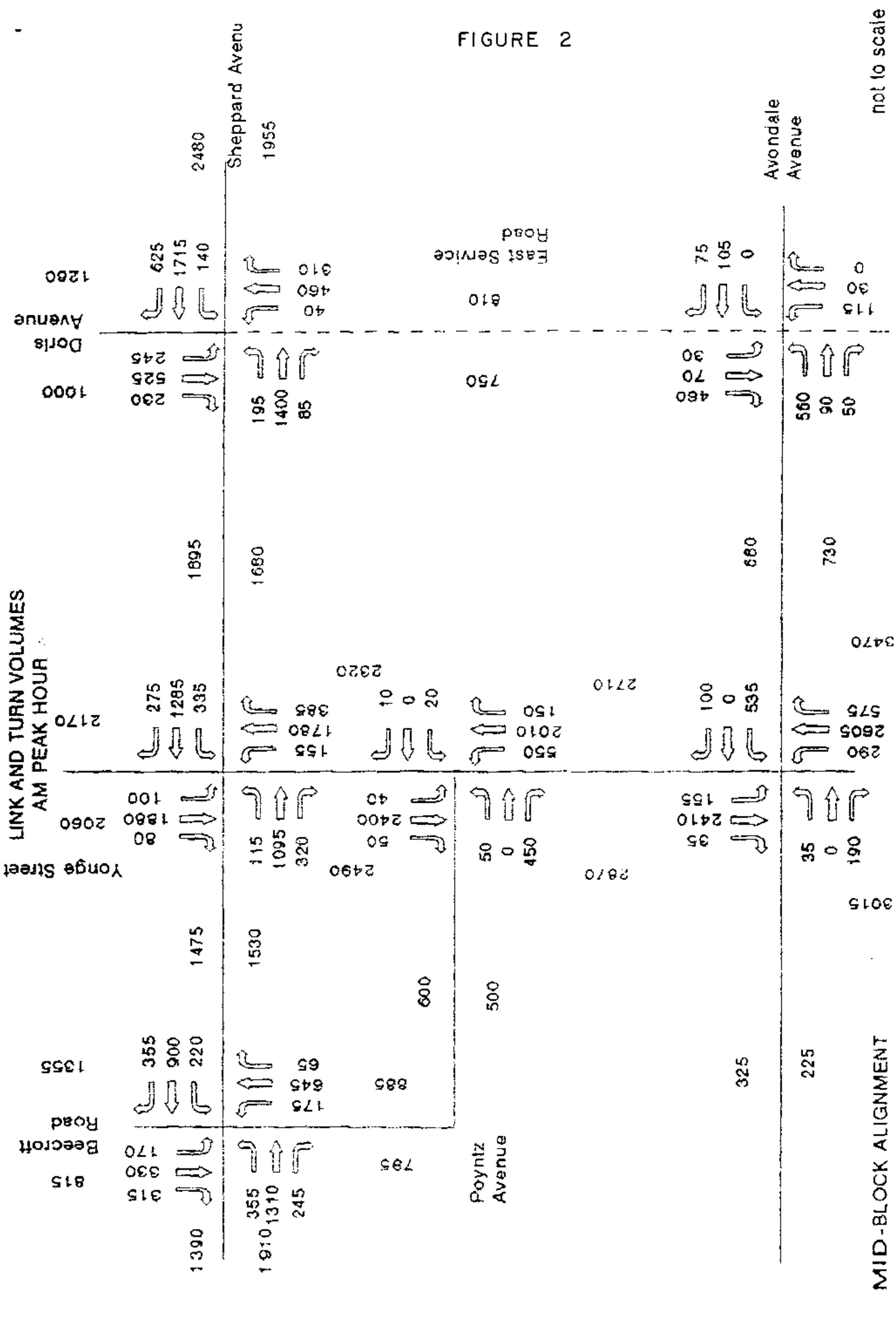
The queue length analysis and storage length requirements for all exclusive left and right turn lanes are shown in the attached capacity analysis outputs. These storage lengths are also reflected in the preliminary design drawings prepared for the proposed road improvements.

CONCLUSIONS

- Arterial roads and certain intersections in the study area (e.g. Yonge/Sheppard, Yonge/Avondale) are presently near or at capacity.

- The proposed east service road and the widening of Avondale Avenue would provide the necessary capacity, provide for balanced traffic flows, and provide enhanced and flexible circulation of traffic as generated by the development outlined in OPA 393.

FIGURE 2



LINK AND TURN VOLUMES
AM PEAK HOUR
Sheppard Avenue
Avondale Avenue
Doris Avenue
East Service Road
Yonge Street
Beecroft Road
Poyntz Avenue
MID-BLOCK ALIGNMENT
not to scale

FIGURE 3

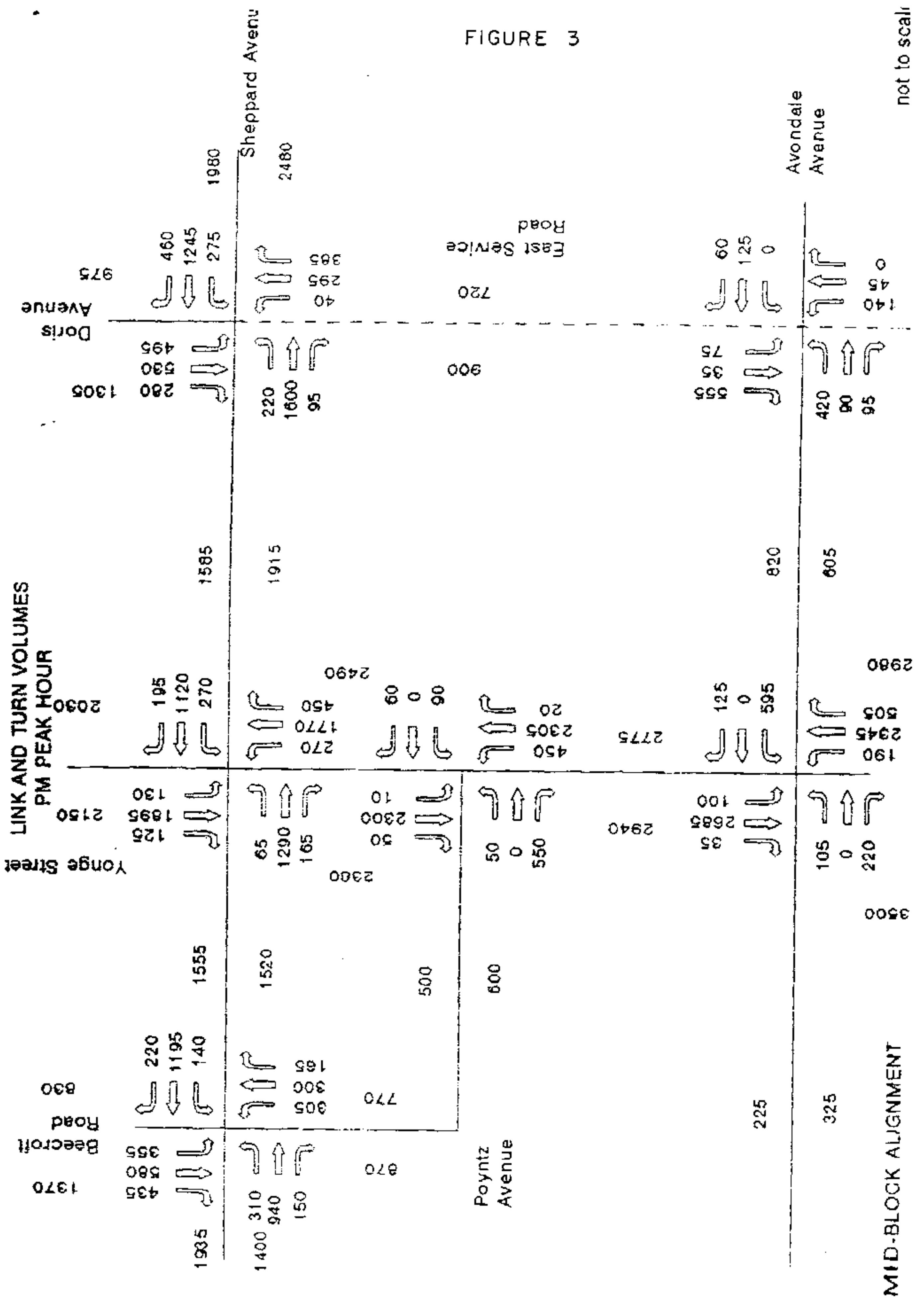

LINK AND TURN VOLUMES
PM PEAK HOUR
Sheppard Avenu
Doris Avenue
East Service Road
Avondale Avenue
Yonge Street
Beecroft Road
Poyntz Avenue
MID-BLOCK ALIGNMENT
not to scal

Table 2

Intersection Analysis - Future Conditions

Intersection	Period	Intersection			Critical Movement			
		v/c	delay	LOS	Movement	v/c	delay	LOS
Beecroft/Sheppard	AM Peak	0.82	25	C	WBT	0.87	32	D
Beecroft/Sheppard	PM Peak	0.94	39	D	EBL	1.07	76	F
					WBT	0.97	42	E
					SBT	1.04	55	E
Yonge/Sheppard	AM Peak	0.91	30	D	WBL	1.08	79	F
					WBT	0.97	32	D
					NBT	0.92	34	D
					SBT	0.97	30	D
Yonge/Sheppard	PM Peak	0.94	32	D	EBT	0.97	37	D
					WBL	1.00	67	F
					NBL	1.01	59	E
					NBT	0.94	36	D
					SBT	1.01	38	D
Doris/Sheppard	AM Peak	1.01	39	D	WBTR	1.06	50	E
					NBTR	1.03	58	E
					SBL	1.04	75	F
Doris/Sheppard	PM Peak	1.02	44	E	EBT	0.97	45	E
					WBL	1.05	69	F
					WBTR	1.01	41	E
					NBTR	0.98	49	E
					SBL	1.00	84	F
Yonge/Poyntz	AM Peak	1.06	26	D	NBL	1.18	125	F
					SBT	1.01	29	D
Yonge/Poyntz	PM Peak	0.96	22	C	SBTR	1.04	38	D
Yonge/Avondale	AM Peak	0.94	40	D	NBL	1.04	62	F
					NBT	1.07	53	E
					SBT	1.01	35	D
	PM Peak	0.99	37	D	WBL	1.06	76	F
					NBT	0.92	20	C
					SBT	1.07	54	E
Avondale / ESR	AM Peak	0.42	10	B				
Avondale / ESR	PM Peak	0.5	10	B				

critical if LOS = E or F
or if v/c >= 0.85 for through, v/c >= 1.00 for left or right

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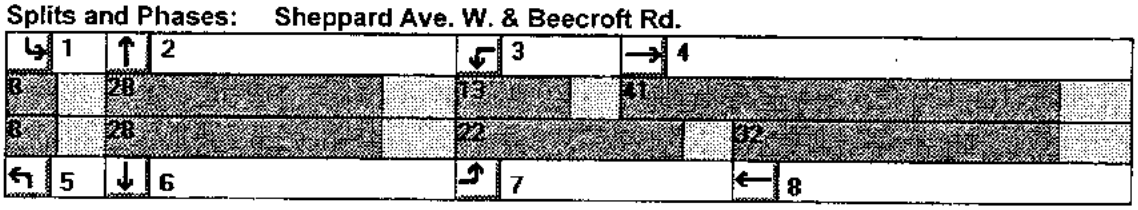
INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	355	1310	245	220	900	355	175	645	65	170	330	315
Adj. Lane Grp. Vol.	362	1745	0	224	1408	0	179	761	0	173	692	0
Lanes	1	3	0	1	3	0	1	2	0	1	2	0
Satd. Flow (Prot.)	1770	5471		1770	5370		1770	3677		1770	3465	
Satd. Flow (Perm.)	233	5471		276	5370		324	3677		324	3465	
Left Turn Type		P/P			P/P			P/P			P/P	
Phase Number	7	4		3	8		5	2		1	6	
Phase Lagging?		Yes			Yes			Yes			Yes	
Current Split (s.)	22	41		13	32		8	28		8	28	
Yellow Time (s.)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
V/C Ratio	0.76	0.80		0.75	0.87		0.82	0.81		0.79	0.78	
Platoon Factor	1.00	1.00		1.71	1.22		1.00	1.00		1.00	1.00	
Average Delay (s.)	19	20		29	32		27	28		24	27	
Level of Service	C	C		D	D		D	D		C	D	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 82%
Intersection Delay: 25.4
Intersection LOS: C

Splits and Phases: Sheppard Ave. W. & Beecroft Rd.



Queue Lengths, and Potential Blocking Problems

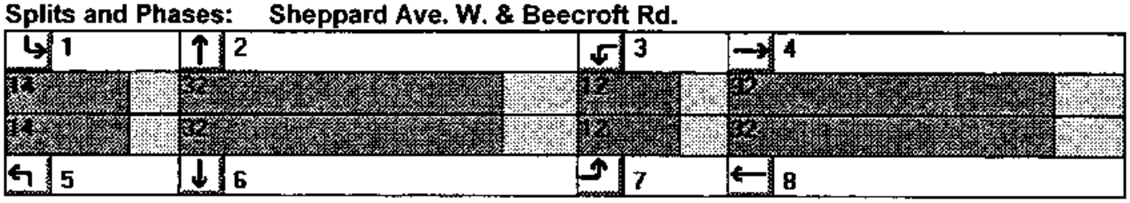
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Volume	362	1745	224	1408	179	761	173	692
Queue Length 50%ile (m.)	63.2	97.2	40.3	57.7	21.4	67.7	20.6	61.1
Queue Length 95%ile (m.)	83.2	135.3	51.4	113.2	45.7	97.4	44.8	89.5
Link Length (m.)	109.5	109.5	197.5	197.5	174.5	174.5	75.9	75.9
% of Link Used	76%	124%	26%	57%	26%	56%	59%	118%
Blocks Upstream?		Yes						Yes
Storage Length (m.)								
% of storage Used	79%	129%	69%	151%	51%	108%	43%	85%
Fills Storage?	105.0	Yes	75.0	Yes	90.0	Yes	105.0	

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	310	940	150	140	1195	220	305	300	165	355	580	435
Adj. Lane Grp. Vol.	316	1223	0	143	1588	0	311	498	0	362	1087	0
Lanes	1	3	0	1	3	0	1	2	0	1	2	0
Satd. Flow (Prot.)	1770	5482		1770	5471		1770	3535		1770	3498	
Satd. Flow (Perm.)	276	5482		276	5471		276	3535		389	3498	
Left Turn Type		P/P			P/P			P/P			P/P	
Phase Number	7	4		3	8		5	2		1	6	
Phase Lagging?		Yes			Yes			Yes			Yes	
Current Split (s.)	12	32		12	32		14	32		14	32	
Yellow Time (s.)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
V/C Ratio	1.07	0.74		0.49	0.97		0.93	0.47		0.97	1.04	
Platoon Factor	1.00	1.00		2.07	1.31		1.00	1.00		1.00	1.00	
Average Delay (s.)	76	23		19	42		37	20		39	55	
Level of Service	F	C		C	E		D	C		D	E	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 94%
Intersection Delay: 39.3
Intersection LOS: D

Splits and Phases: Sheppard Ave. W. & Beecroft Rd.



Queue Lengths, and Potential Blocking Problems

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Volume	316	1223	143	1588	311	498	362	1087
Queue Length 50%ile (m.)	60.0	69.7	25.2	86.2	58.1	38.5	68.1	103.2
Queue Length 95%ile (m.)	76.5	96.6	32.0	126.9	81.1	56.2	87.9	132.0
Link Length (m.)	77.1	77.1	193.4	193.4	163.2	163.2	70.5	70.5
% of Link Used	99%	125%	17%	66%	50%	34%	125%	187%
Blocks Upstream?		Yes					Yes	Yes
Storage Length (m.)								
% of storage Used								
Fills Storage?								

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	115	1095	320	335	1285	275	155	1780	385	100	1880	80
Adj. Lane Grp. Vol.	117	1229	327	342	1442	281	158	1998	393	102	2110	82
Lanes	1	3	1	1	3	1	1	3	1	1	3	1
Satd. Flow (Prot.)	1770	5588	1583	1770	5588	1583	1770	5588	1583	1770	5588	1583
Satd. Flow (Perm.)	311	5588	1583	311	5588	1583	212	5588	1583	212	5588	1583
Left Turn Type		P/P			P/P			P/P			P/P	
Phase Number	7	4		3	8		5	2		1	6	
Phase Lagging?		Yes			Yes			Yes			Yes	
Current Split (s.)	13	29		13	29		8	40		8	40	
Yellow Time (s.)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
V/C Ratio	0.37	0.82	0.62	1.08	0.97	0.53	0.74	0.92	0.49	0.48	0.97	0.10
Platoon Factor	1.00	1.00	1.00	1.08	0.82	0.53	2.27	1.44	1.32	1.00	1.00	1.00
Average Delay (s.)	10	26	20	79	32	10	26	34	13	8	30	8
Level of Service	B	D	C	F	D	B	D	D	B	B	D	B

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 91%
Intersection Delay: 30.1
Intersection LOS: D

Splits and Phases: Sheppard Ave. E. & Yonge St.

1	2	3	4
8	40	13	29
8	40	13	29
5	6	7	8

Queue Lengths, and Potential Blocking Problems

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Volume	117	1229	327	342	1442	281	158	1998	393	102	2110	82
Queue Length 50%ile (m.)	11.8	73.1	50.4	45.1	88.2	26.1	28.9	101.1	36.4	8.8	131.1	7.6
Queue Length 95%ile (m.)	15.3	98.3	68.3	55.8	112.9	36.8	23.7	153.6	44.4	11.0	164.0	9.5
Link Length (m.)	23.3	23.3	23.3	211.8	211.8	211.8	376.2	376.2	376.2	71.8	71.8	71.8
% of Link Used	66%	422%	293%	26%	53%	17%	6%	41%	12%	15%	228%	13%
Blocks Upstream?		Yes	Yes								Yes	
Storage Length (m.)												
% of storage Used	31%	197%	98%	62%	125%	74%	30%	192%	56%	22%	328%	38%
Fills Storage?	50.0	Yes	70.0	90.0	Yes	50.0	80.0	Yes	80.0	50.0	Yes	25.0

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	65	1290	165	270	1120	195	270	1770	450	130	1895	125
Adj. Lane Grp. Vol.	66	1448	168	276	1257	199	276	1987	459	133	2127	128
Lanes	1	3	1	1	3	1	1	3	1	1	3	1
Satd. Flow (Prot.)	1770	5588	1583	1770	5588	1583	1770	5588	1583	1770	5588	1583
Satd. Flow (Perm.)	311	5588	1583	311	5588	1583	220	5588	1583	220	5588	1583
Left Turn Type		P/P			P/P			P/P			P/P	
Phase Number	7	4		3	8		5	2		1	6	
Phase Lagging?		Yes			Yes			Yes			Yes	
Current Split (s.)	11	29		11	29		11	39		11	39	
Yellow Time (s.)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
V/C Ratio	0.24	0.97	0.29	1.00	0.84	0.34	1.01	0.94	0.61	0.49	1.01	0.17
Platoon Factor	1.00	1.00	1.00	2.09	0.44	0.41	1.34	1.41	1.33	1.00	1.00	1.00
Average Delay (s.)	10	37	14	67	14	6	59	36	17	8	38	9
Level of Service	B	D	B	F	B	B	E	D	C	B	D	B

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 94%
Intersection Delay: 32.0
Intersection LOS: D

Splits and Phases: Sheppard Ave. E. & Yonge St.

1	2	3	4
11	39	11	29
11	39	11	29
5	6	7	8

Queue Lengths, and Potential Blocking Problems

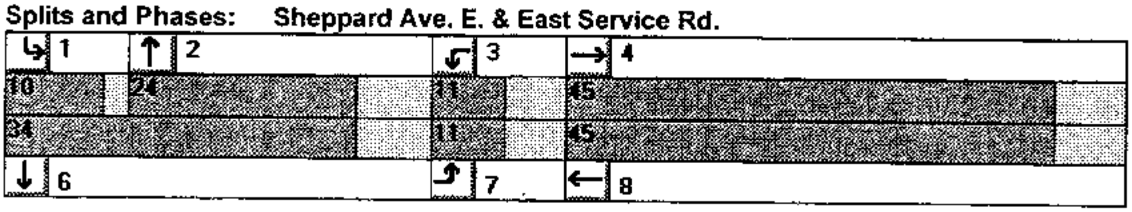
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Volume	66	1448	168	276	1257	199	276	1987	459	133	2127	128
Queue Length 50%ile (m.)	6.7	90.6	21.8	52.1	64.5	18.2	35.0	112.1	51.4	11.2	134.7	13.2
Queue Length 95%ile (m.)	8.7	116.0	28.5	49.4	100.2	25.5	63.3	151.8	62.8	14.0	164.7	16.5
Link Length (m.)	23.3	23.3	23.3	211.8	211.8	211.8	376.2	376.2	376.2	71.8	71.8	71.8
% of Link Used	37%	498%	122%	23%	47%	12%	17%	40%	17%	19%	229%	23%
Blocks Upstream?		Yes	Yes								Yes	
Storage Length (m.)												
% of storage Used	17%	232%	41%	55%	111%	51%	79%	190%	79%	28%	329%	66%
Fills Storage?	50.0	Yes	70.0	90.0	Yes	50.0	80.0	Yes	80.0	50.0	Yes	25.0

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	195	1400	85	140	1715	625	40	460	310	245	525	230
Adj. Lane Grp. Vol.	199	1666	0	143	2627	0	41	825	0	250	808	0
Lanes	1	3	0	1	3	0	1	2	0	1	2	0
Satd. Flow (Prot.)	1770	5532		1770	5320		1770	3442		1770	3509	
Satd. Flow (Perm.)	177	5532		177	5320		354	3442		311	3509	
Left Turn Type		P/P			P/P			Perm			P/P	
Phase Number	7	4		3	8			2		1	6	
Phase Lagging?		Yes			Yes			Yes				
Current Split (s.)	11	45		11	45			24		10	34	
Yellow Time (s.)	5.0	6.0		5.0	6.0			6.0		2.0	6.0	
V/C Ratio	0.75	0.65		0.54	1.06		0.50	1.03		1.04	0.67	
Platoon Factor	1.61	1.52		1.00	1.00		1.00	1.00		1.00	1.00	
Average Delay (s.)	23	22		7	50		26	58		75	20	
Level of Service	C	C		B	E		D	E		F	C	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 101%
Intersection Delay: 39.1
Intersection LOS: D

Splits and Phases: Sheppard Ave. E. & East Service Rd.



Queue Lengths, and Potential Blocking Problems

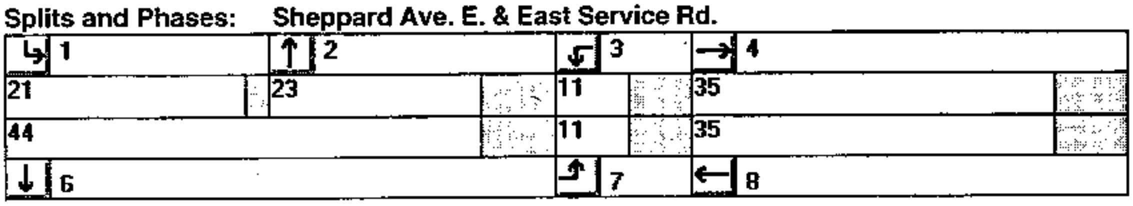
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Volume	199	1666	143	2627	41	825	250	808
Queue Length 50%ile (m.)	30.5	78.5	10.8	166.3	6.7	78.3	47.5	65.3
Queue Length 95%ile (m.)	38.7	102.8	30.9	200.8	9.6	106.8	63.0	96.0
Link Length (m.)	211.8	211.8	284.9	284.9	372.8	372.8	80.1	80.1
% of Link Used	18%	49%	11%	70%	3%	29%	79%	120%
Blocks Upstream?								Yes
Storage Length (m.)								
% of storage Used	52%	137%	36%	236%	38%	427%	47%	71%
Fills Storage?	75.0	Yes	85.0	Yes	25.0	Yes	135.0	

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	220	1600	95	275	1245	460	40	295	385	495	530	280
Adj. Lane Grp. Vol.	224	1903	0	281	1913	0	41	728	0	505	868	0
Lanes	1	3	0	1	3	0	1	2	0	1	2	0
Satd. Flow (Prot.)	1770	5532		1770	5314		1770	3327		1770	3483	
Satd. Flow (Perm.)	233	5532		233	5314		373	3327		324	3483	
Left Turn Type		P/P			P/P			Perm			P/P	
Phase Number	7	4		3	8			2		1	6	
Phase Lagging?		Yes			Yes			Yes				
Current Split (s.)	11	35		11	35			23		21	44	
Yellow Time (s.)	5.0	6.0		5.0	6.0			6.0		2.0	6.0	
V/C Ratio	0.84	0.97		1.05	1.01		0.49	0.98		1.11	0.55	
Platoon Factor	1.78	1.63		1.00	1.00		1.00	1.00		1.00	1.00	
Average Delay (s.)	32	45		69	41		27	49		84	14	
Level of Service	D	E		F	E		D	E		F	B	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 102%
Intersection Delay: 43.7
Intersection LOS: E

Splits and Phases: Sheppard Ave. E. & East Service Rd.



Queue Lengths, and Potential Blocking Problems

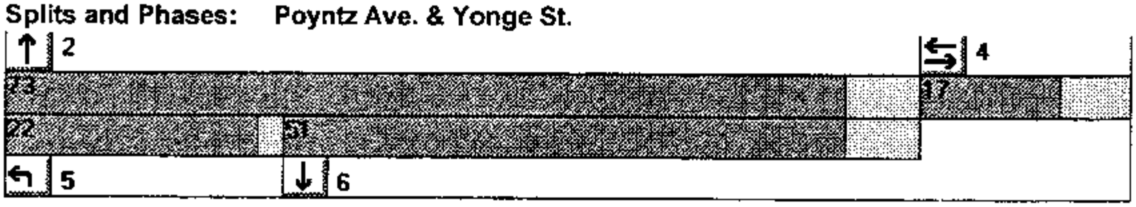
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Volume	224	1903	281	1913	41	728	505	868
Queue Length 50%ile (m.)	32.4	120.5	30.3	121.1	6.8	68.8	95.9	59.7
Queue Length 95%ile (m.)	49.6	148.9	65.7	149.2	9.9	95.7	123.3	84.9
Link Length (m.)	211.8	211.8	284.9	284.9	372.8	372.8	80.1	80.1
% of Link Used	23%	70%	23%	52%	3%	26%	154%	106%
Blocks Upstream?							Yes	Yes
Storage Length (m.)								
% of storage Used	66%	199%	77%	176%	40%	383%	91%	63%
Fills Storage?	75.0	Yes	85.0	Yes	25.0	Yes	135.0	

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	50	0	450	20	0	10	550	2010	150	40	2400	50
Adj. Lane Grp. Vol.	51	0	459	20	0	10	561	2424	0	47	2872	0
Lanes	1	0	1	1	0	1	1	3	0	1	3	0
Satd. Flow (Prot.)	1770		1583	1770		1583	1770	5538		1751	5571	
Satd. Flow (Perm.)	1773		1583	1773		1583	145	5538		694	5571	
Left Turn Type		Perm			Perm			P/P			Perm	
Phase Number		4			4		5	2			6	
Phase Lagging?											Yes	
Current Split (s.)		17			17		22	73			51	
Yellow Time (s.)		6.0			6.0		2.0	6.0			6.0	
V/C Ratio	0.22		0.82	0.08		0.05	1.18	0.58		0.13	1.01	
Platoon Factor	1.00		1.00	1.00		1.00	1.69	0.05		0.53	0.83	
Average Delay (s.)	27		26	26		26	125	0		5	29	
Level of Service	D		D	D		D	F	A		A	D	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 102%
Intersection Delay: 26.1
Intersection LOS: D

Splits and Phases: Poyntz Ave. & Yonge St.



Queue Lengths, and Potential Blocking Problems

Lane Group	EBL	EBR	WBL	WBR	NBL	NBT	SBL	SBT
Lane Group Volume	51	459	20	10	561	2424	47	2872
Queue Length 50%ile (m.)	8.6	79.0	3.3	1.6	106.6	3.7	3.7	181.8
Queue Length 95%ile (m.)	12.8	127.4	9.8	4.8	127.8	174.9	4.6	219.5
Link Length (m.)	185.6	185.6	25.6	25.6	201.7	201.7	174.5	174.5
% of Link Used	7%	69%	38%	19%	63%	87%	3%	126%
Blocks Upstream?								Yes
Storage Length (m.)								
% of storage Used					85%	117%	31%	1463%
Fills Storage?					150.0	Yes	15.0	Yes

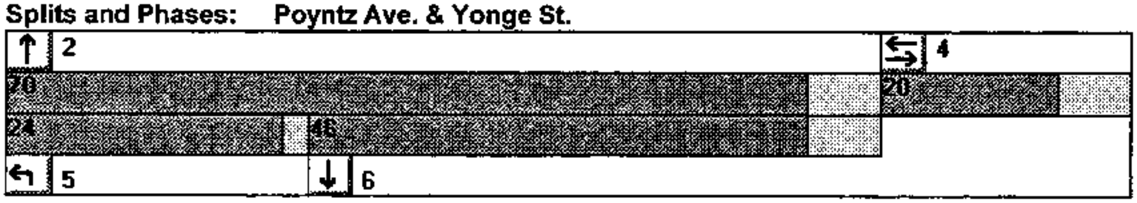
Poyntz Ave. & Yonge St. June 26, 1996

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	50	0	550	90	0	60	450	2305	20	10	2300	50
Adj. Lane Grp. Vol.	51	0	561	92	0	61	459	2609	0	10	2638	0
Lanes	1	0	1	1	0	1	1	3	0	1	3	0
Satd. Flow (Prot.)	1770		1583	1770		1583	1770	5583		1770	5571	
Satd. Flow (Perm.)	1773		1583	1773		1583	162	5583		227	5571	
Left Turn Type		Perm			Perm			P/P			Perm	
Phase Number		4			4		5	2			6	
Phase Lagging?											Yes	
Current Split (s.)		20			20		24	70			46	
Yellow Time (s.)		6.0			6.0		2.0	6.0			6.0	
V/C Ratio	0.17		0.86	0.31		0.23	0.89	0.65		0.10	1.04	
Platoon Factor	1.00		1.00	1.00		1.00	1.55	0.12		0.38	0.72	
Average Delay (s.)	24		26	25		25	39	1		4	38	
Level of Service	C		D	C		C	D	A		A	D	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 96%
Intersection Delay: 21.6
Intersection LOS: C

Splits and Phases: Poyntz Ave. & Yonge St.



Queue Lengths, and Potential Blocking Problems

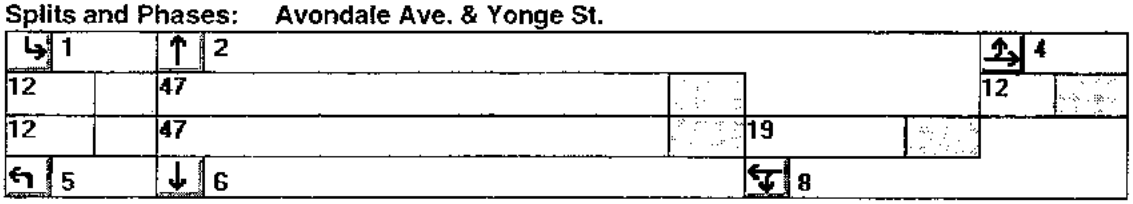
Lane Group	EBL	EBR	WBL	WBR	NBL	NBT	SBL	SBT
Lane Group Volume	51	561	92	61	459	2609	10	2638
Queue Length 50%ile (m.)	8.3	97.1	15.3	10.0	77.9	11.2	0.8	167.0
Queue Length 95%ile (m.)	12.0	151.6	29.7	19.0	104.2	13.8	0.9	202.5
Link Length (m.)	192.2	192.2	30.4	30.4	202.0	202.0	174.2	174.2
% of Link Used	6%	79%	98%	63%	52%	7%	1%	116%
Blocks Upstream?								Yes
Storage Length (m.)								
% of storage Used					69%	9%	6%	1350%
Fills Storage?					150.0		15.0	Yes

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	35	0	190	535	0	100	290	2605	575	155	2410	35
Adj. Lane Grp. Vol.	36	0	194	562	0	102	296	2924	587	158	2744	0
Lanes	1	0	1	2	0	1	1	3	1	1	3	0
Satd. Flow (Prot.)	1770		1583	3533		1583	1770	5588	1583	1770	5571	
Satd. Flow (Perm.)	1770		1494	3533		1494	170	5588	1494	170	5571	
Left Turn Type		Split			Split			P/P			P/P	
Phase Number	4	4		8	8		5	2		1	6	
Phase Lagging?	Yes	Yes						Yes			Yes	
Current Split (s.)	12	12		19	19		12	47		12	47	
Yellow Time (s.)	6.0	6.0		6.0	6.0		5.0	6.0		5.0	6.0	
V/C Ratio	0.20		0.60	0.89		0.23	1.04	1.07	0.58	0.55	1.01	
Platoon Factor	1.00		1.00	1.00		1.00	1.00	1.00	1.00	2.63	1.13	
Average Delay (s.)	28		16	38		17	62	53	4	14	35	
Level of Service	D		C	D		C	F	E	A	B	D	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 94%
Intersection Delay: 39.8
Intersection LOS: D

Splits and Phases: Avondale Ave. & Yonge St.



Queue Lengths, and Potential Blocking Problems

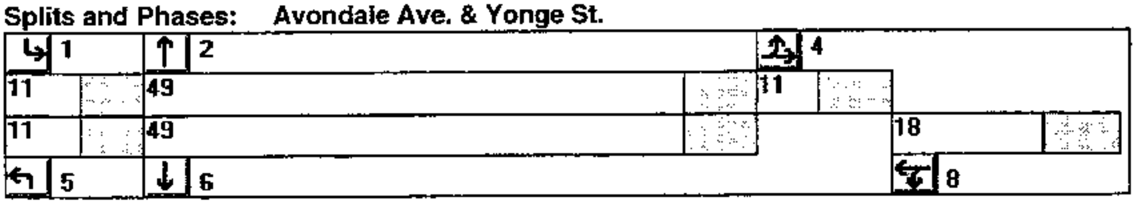
Lane Group	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Volume	36	194	562	102	296	2924	587	158	2744
Queue Length 50%ile (m.)	6.2	23.5	52.1	14.3	31.2	185.1	30.6	24.9	173.7
Queue Length 95%ile (m.)	10.7	62.1	75.3	20.8	36.7	217.6	40.4	30.2	209.0
Link Length (m.)	59.3	59.3	216.1	216.1	240.0	240.0	240.0	376.2	376.2
% of Link Used	18%	105%	35%	10%	15%	91%	17%	8%	56%
Blocks Upstream?		Yes							
Storage Length (m.)									
% of storage Used	27%		84%		41%	242%	40%	55%	380%
Fills Storage?	40.0		90.0		90.0	Yes	100.0	55.0	Yes

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	105	0	220	595	0	125	190	2345	505	100	2685	35
Adj. Lane Grp. Vol.	107	0	224	625	0	128	194	2632	515	102	3053	0
Lanes	1	0	1	2	0	1	1	3	1	1	3	0
Satd. Flow (Prot.)	1770		1583	3533		1583	1770	5588	1583	1770	5577	
Satd. Flow (Perm.)	1770		1494	3533		1494	162	5588	1494	162	5577	
Left Turn Type		Split			Split			P/P			P/P	
Phase Number	4	4		8	8		5	2		1	6	
Phase Lagging?				Yes	Yes			Yes			Yes	
Current Split (s.)	11	11		18	18		11	49		11	49	
Yellow Time (s.)	6.0	6.0		6.0	6.0		5.0	6.0		5.0	6.0	
V/C Ratio	0.68		0.77	1.06		0.31	0.73	0.92	0.50	0.38	1.07	
Platoon Factor	1.00		1.00	1.00		1.00	1.00	1.00	1.00	2.70	1.05	
Average Delay (s.)	38		33	76		14	17	20	5	11	54	
Level of Service	D		D	F		B	C	C	A	B	E	

Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2-NBT, Begin Of Green
Intersection V/C Ratio: 99%
Intersection Delay: 37.3
Intersection LOS: D

Splits and Phases: Avondale Ave. & Yonge St.



Queue Lengths, and Potential Blocking Problems

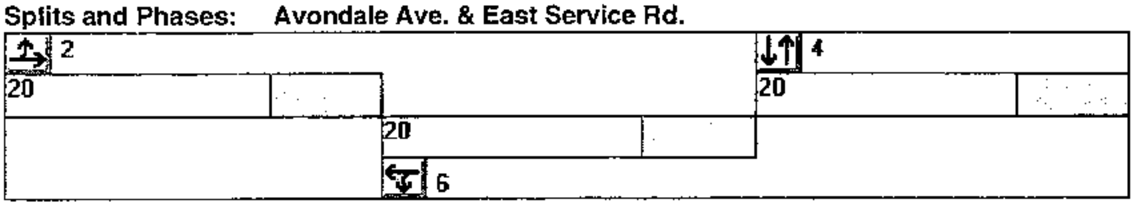
Lane Group	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Volume	107	224	625	128	194	2632	515	102	3053
Queue Length 50%ile (m.)	19.6	40.4	59.3	15.3	35.1	153.9	43.0	17.3	193.3
Queue Length 95%ile (m.)	31.9	67.0	82.2	22.0	42.6	197.9	56.6	20.8	231.0
Link Length (m.)	59.3	59.3	216.1	216.1	240.0	240.0	240.0	376.2	376.2
% of Link Used	54%	113%	38%	10%	18%	82%	24%	6%	61%
Blocks Upstream?		Yes							
Storage Length (m.)									
% of storage Used	80%		91%		47%	220%	57%	38%	420%
Fills Storage?	40.0		90.0		90.0	Yes	100.0	55.0	Yes

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	560	90	50	0	105	75	115	30	0	30	70	460
Adj. Lane Grp. Vol.	0	784	0	0	107	77	117	32	0	31	71	469
Lanes	1	2	0	1	1	1	1	2	0	1	1	1
Satd. Flow (Prot.)	1770	3559		1770	1863	1583	1770	3725		1770	1863	1583
Satd. Flow (Perm.)	1770	3559		1770	1863	1583	1416	3725		1615	1863	1583
Left Turn Type		Split			Split			Perm			Perm	
Phase Number	2	2		6	6			4			4	
Phase Lagging?				Yes	Yes							
Current Split (s.)	20	20		20	20			20			20	
Yellow Time (s.)	6.0	6.0		6.0	6.0			6.0			6.0	
V/C Ratio		0.52			0.20	0.17	0.29	0.03		0.07	0.13	0.52
Platoon Factor		0.85			0.85	0.85	0.85	0.85		0.85	0.85	0.85
Average Delay (s.)		13			11	10	11	10		10	10	5
Level of Service		B			B	B	B	B		B	B	A

Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2-EBTL, Begin Of Green
Intersection V/C Ratio: 42%
Intersection Delay: 10.0
Intersection LOS: B

Splits and Phases: Avondale Ave. & East Service Rd.



Queue Lengths, and Potential Blocking Problems

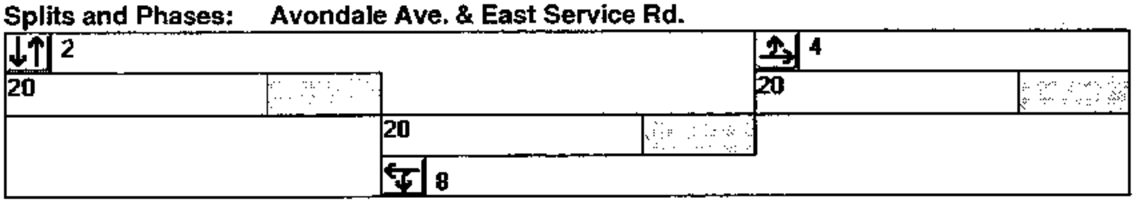
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Volume	784	107	77	117	32	31	71	469
Queue Length 50%ile (m.)	30.3	10.3	7.3	11.5	1.4	2.8	6.6	32.2
Queue Length 95%ile (m.)	48.9	21.2	14.9	26.1	3.0	4.4	10.4	72.3
Link Length (m.)	216.1	142.4	142.4	144.2	144.2	372.8	372.8	372.8
% of Link Used	23%	15%	10%	18%	2%	1%	3%	19%
Blocks Upstream?								
Storage Length (m.)								
% of storage Used	70%	85%	99%	65%	8%	18%	42%	
Fills Storage?			15.0	40.0		25.0		

Lanes, Volumes, and Timings Summary

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph.)	420	90	95	0	125	60	140	45	0	75	35	555
Adj. Lane Grp. Vol.	0	674	0	0	128	61	143	48	0	77	36	566
Lanes	1	2	0	1	1	1	1	2	0	1	1	1
Satd. Flow (Prot.)	1770	3531		1770	1863	1583	1770	3725		1770	1863	1583
Satd. Flow (Perm.)	1770	3531		1770	1863	1583	1572	3725		1544	1863	1583
Left Turn Type		Split			Split			Perm			Perm	
Phase Number	4	4		8	8			2			2	
Phase Lagging?	Yes	Yes										
Current Split (s.)	20	20		20	20			20			20	
Yellow Time (s.)	6.0	6.0		6.0	6.0			6.0			6.0	
V/C Ratio		0.45			0.24	0.14	0.32	0.05		0.18	0.07	0.63
Platoon Factor		0.85			0.85	0.85	0.85	0.85		0.85	0.85	0.85
Average Delay (s.)		12			11	10	11	10		10	10	6
Level of Service		B			B	B	B	B		B	B	B

Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2-NB-SB, Begin Of Green
Intersection V/C Ratio: 50%
Intersection Delay: 9.7
Intersection LOS: B

Splits and Phases: Avondale Ave. & East Service Rd.



Queue Lengths, and Potential Blocking Problems

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Volume	674	128	61	143	48	77	36	566
Queue Length 50%ile (m.)	25.1	12.4	5.7	14.2	2.2	7.3	3.3	42.7
Queue Length 95%ile (m.)	43.1	25.8	11.5	30.3	4.3	11.2	5.0	99.0
Link Length (m.)	216.1	142.4	142.4	144.2	144.2	372.8	372.8	372.8
% of Link Used	20%	18%	8%	21%	3%	3%	1%	27%
Blocks Upstream?								
Storage Length (m.)								
% of storage Used	62%	172%	77%	76%	11%	45%	20%	
Fills Storage?		Yes	15.0	40.0		25.0		

City of North York

Transportation Department

APPENDIX C

NOISE IMPACT ASSESSMENT FOR THE
PROPOSED EAST SERVICE ROAD

S.S. WILSON AND ASSOCIATES
DIV. OF M.H.G. ENGINEERING INC.
Consulting Engineers

REPORT NO. W95-01

NOISE IMPACT ASSESSMENT FOR THE PROPOSED EAST SERVICE ROAD DOWNTOWN AREA SOUTH OF SHEPPARD AVENUE NORTH YORK, ONTARIO

PREPARED FOR :

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PROVINCE OF ONTARIO

AUGUST 30, 1996

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NOISE IMPACT ASSESSMENT FOR THE PROPOSED EAST SERVICE ROAD DOWNTOWN AREA SOUTH OF SHEPPARD AVENUE NORTH YORK, ONTARIO

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1.0 BACKGROUND

1.1 The services of S.S. Wilson and Associates were retained by Cole, Sherman & Associates Ltd. to prepare an environmental noise impact study related to traffic associated with the proposed road known as the East Service Road in the Downtown Area south of Sheppard Avenue in the City of North York.

1.2 This report analyzes the existing ambient sound levels and the future impact on the ambient sound levels due to vehicular traffic movements on the East Service Road.

Figures 1 and 2 illustrate the 2 proposed alignment alternatives of the proposed East Service Road.

1.3 The purposes of this study are:

a. To determine the potential changes to the ambient environment due to future vehicular traffic on the proposed East Service Road.

b. To assess the significance of the above changes and to recommend measures to mitigate noise impact; where warranted.

c. To advise on the noise compatibility of possible land use changes, the applicable criteria and requirements for noise control in the vicinity of the proposed road.

1.4 In future, the East Service Road is expected to have four lanes with an Average Annual Daily Traffic (AADT) of 10,000 vpd with a posted speed limit of 50 km/hr.

1.5 This study represents a joint effort with the Consulting Engineering firm Cole, Sherman & Associates Ltd., who provided the necessary road and traffic data and overall project direction.

2.0 SOUND LEVEL CRITERIA

2.1 MOEE/MTO PROTOCOL FOR RESIDENTIAL LAND USE

The MOEE/MTO Protocol is a joint effort of both the Ministry of the Environment & Energy (MOEE) and Ministry of Transportation (MTO) as outlined in the document titled "A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments", February 1986; a copy of which is included in Appendix A. It primarily applies to Provincial highway undertakings such as Freeways and King's Highways.

The MOEE has informally extended the use of the MOEE/MTO Protocol criteria to also cover other roadways such as Regional and local Municipal roads subject to the provisions of the Environmental Assessment Act (EAA) administered by the MOEE. Since there is no formal direction published by the MOEE on the Protocol application, it is recommended that the same direction with regards to mitigation that applies to the MTO projects be applied also for this municipal project. It should be noted that the MTO may also be involved in granting noise control subsidies related to municipal roads. In other words, the criteria should apply to mitigation within the road r-o-w and also to consider noise impact assessment primarily in Outdoor Living (amenity) Areas alone. While the Protocol does not specify if the Leq sound levels are based on 24 hr time base or else, the MOEE extended the appropriate technical logic to municipal roads by requesting calculations be done on the basis of daytime Leq (16 hrs.).

The other point worth noting is that despite the presence of a Provincial objective for outdoor levels of Leq 55 dBA, the decision for mitigation depends primarily on the significance of relative noise increases attributable to the future road expansion above the ambient situation when dealing with urban roads.

With regards to the specific sound level criteria, the following statements are quoted from the Protocol:

"1. The objective for outdoor sound levels is the higher of the Leq 55 dBA or the existing ambient. The significance of a noise impact will be quantified by using this objective in addition to the change in noise level above the ambient.

2. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically, and administratively feasible.

3. The following Table summarizes the degree of mitigation effort to be applied for various noise level increases."

SUMMARY OF MITIGATION EFFORT

CHANGE IN NOISE LEVEL ABOVE AMBIENT	MITIGATION EFFORT
0 - 5 dBA	- None
> 5 dBA	- Investigate noise control measures on R.O.W.
	- If project cost is not significantly affected introduce noise control measure within R.O.W.
	- Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers.
	- Mitigate to ambient, as administratively, economically and technically feasible.

2.2 SOUND LEVEL CRITERIA FOR NOISE IMPACT ON OFFICES AND COMMERCIAL LAND USE

a. In order to maintain acceptable indoor sound levels in private offices and commercial land use, the outdoor sound levels should not exceed Leq 55 and 60 dBA respectively during the daytime assuming standard building construction with open windows. These maximum level outdoors are based on the MOEE's indoor acceptable Leq sound levels of 45 and 50 dBA in private offices and commercial land uses respectively which are included in the MOEE Publication LU-131, Table 131-1. If the windows are sealed or closed during the summer time as a result of the use of central air conditioning system, then the maximum allowable outdoor levels to meet the MOEE indoor objectives would be Leq 70 dBA and 75 dBA for private and general offices respectively.

b. Since it is difficult to decide on what constitutes a private office or a general office for the purposes of this noise study, we are recommending the use of the private office criterion, which is more conservative, for impact assessment purposes.

Therefore, for the purposes of this study we are recommending the use of a maximum sound level Leq 70 dBA outside the building facades as the level below which thère will be no concern for traffic noise interfering with the indoor activities of office and commercial land use occupants.

2.3 MTO DIRECTIVE A-1

Although aimed at Provincial Highways, the MTO also applies Directive A-1 to arterial and municipal roads.

The following are some of the applicable highlights of the MTO Directive supplemented also by our discussions with the MTO:

1. The MOEE/MTO Protocol is the applicable technical guide and all assessment work to be performed for the outdoor situations

2. No subsidy for off r-o-w mitigation.

3. The MTO favours the institution of retrofit programs for residential land use where the present or future sound levels exceed Leq 70 dBA irrespective of how small the excess of future level is above the present ambient, or the future-do-nothing ambient.

2.4 MTO DIRECTIVE B-11

To be eligible for MTO subsidy, several conditions must be met as detailed in Directive B-11. However, the most serious concern is the fact that municipalities that ignored the MOEE guidelines for noise control in new land use plans after 1980 are NOT eligible for the subsidy.

2.5 SOUND LEVEL CRITERIA FOR RE-DEVELOPMENT PURPOSES

As a result of the potential changes to the land use in the subject area and the possibility of developing new residential land use on some of the vacant and/or existing properties, the following paragraphs provide an outline of the criteria recommended by the MOEE.

i) **Surface Transportation Criteria**

The surface transportation noise is to be based on the objective sound levels recommended by the Ontario Ministry of the Environment and Energy (Ref.: Publication LU-131) and Metropolitan Toronto for different land uses and spaces.

The following is summary of the applicable sound level criteria for surface transportation sources:

Outdoor Living Areas (OLA)

Area & Time Period	$L_{eq}(16)$ (dBA) Road and Rail
Individual or Common Outdoor Living Areas (16 hr, 07:00 - 23:00)	55

Indoor Areas

Type of Space	L_{eq}(Time Period) (dBA)
	Road
Living/dining areas of residences, hospitals, schools, nursing/ retirement homes, day-care centres, etc. (Time period: 16 hr, 07:00 - 23:00)	45
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. (Time period: 8 hr, 23:00 - 07:00)	40
General offices, reception areas, retail stores, etc. (Time period: 16 hr, 07:00 - 23:00)	50
Living/dining areas of residences, hospitals, schools, nursing/ retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc.	45
Sleeping quarters of hotels/motels (Time period: 8 hr, 23:00 - 07:00)	45

The criteria for acceptable outdoor and indoor sound levels are to be based on "free-field" predicted and/or measured sound levels at the applicable receiver locations, thus the effects of sound reflections and reverberant sound fields are not considered.

If the sound level is less than or equal to the sound level criteria, no control measures will be required.

The outdoor sound levels *may* exceed the outdoor sound level criterion by up to 5 decibels, provided that it can be demonstrated that it is not technically feasible to achieve the criterion and that the occupants are informed of a potential disturbance due to the excess noise by means of a warning clause or cautionary note to be registered on title and included in all Development Agreement(s) and Offers of Sale and Purchase or Lease.

Central air conditioning is required when the night-time sound level at the outside wall of the sleeping quarters or bedrooms is equal to or exceeds $Leq_{16hrs.}$ 65 dBA.

If the night-time sound level at the outside wall exceeds $Leq_{8hrs.}$ 50 dBA but is less than 60 dBA, or if the daytime sound level at the outside wall exceeds 55 dBA but is less than Leq_{16hrs} 65 dBA, then forced air heating with provision for future installation of central air conditioning is required.

ii) **<u>Criteria For Stationary Noise Sources</u>**

The following criteria apply to the impact of Stationary Sources of noise as defined by the MOEE to include commercial facilities. The criteria equally apply to, firstly the impact of Stationary Sources external to the development on the proposed development or, secondly to the impact of any proposed Stationary Sources internal to the development on the development itself or on to other existing noise-sensitive land uses external to the development.

The criteria to be used are based on the guidelines prepared by the Ontario Ministry of the Environment and Energy for the assessment of planned "Stationary Sources" of sound, Publications NPC-133, NPC-205 and NPC-232 included in the Model Municipal Noise Control by-law, 1978.

The predicted and/or measured "predictable worst case" 1-hour equivalent sound levels (Leq_{1hr}) of the stationary source(s) are normally compared with the higher of the corresponding Leq_{1hr} of road traffic or the following criteria:

Outdoor Points of Reception

The criteria for outdoor points of reception in any area amenable for use are:

Area	Time Of Day	Sound Level, dBA
Major population centres or urban areas (MOEE Class 1 Area)	Daytime and Evening 07:00 - 23:00	Leq_{1hr} 50

In the Plane of a Window

The criteria for bedrooms, living/dining areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, etc. during the day and evening time periods are:

Area	Time Of Day	Sound Level, dBA
Major population centres or urban areas (MOEE Class 1 Area)	Evening 19:00 - 23:00	Leq_{1hr} 45

The criteria for bedrooms or sleeping quarters during the night-time period are:

Area	Time Of Day	Sound Level, dBA
Major population centres or urban areas (MOEE Class 1 Area)	Night-time 23:00 - 07:00	Leq_{1hr} 45

For specific impulsive sources, reference should be made to the more date-stringent criteria in the MOEE Publication NPC-105.

3.0 ANALYSIS AND RESULTS

3.1 Noise Impact Methodology

1. Noise impact is a comparative evaluation of the new or intruding noise versus the existing or ambient noise in the area. Noise impact is also a comparative evaluation of the new or intruding noise versus a pre-set sound level limit (criterion) such as Leq 55 dBA. The degree of noise impact varies directly as the ratio between the intruding and existing noise levels; i.e. the more the intruding noise level exceeds the existing noise level, the higher the impact.

   Since the proposed corridor traffic noise represents a future consideration, predictions must be made as to the sound noise levels which will be generated by the proposed undertaking after the roadway has been in operation for a period of at least 10 years.

2. Road traffic sound levels in this study have been predicted using the technique developed by the U.S. Federal Highway Administration (FHWA) enhanced by the Ministry of Transportation and the Ministry of the Environment and Energy.

   The U.S. FHWA model was jointly revised by the MTO and the MOEE to incorporate procedures for the calculation of additional attenuation due to ground (the additional attenuation is due to the type of ground cover; for example hard, soft, ...etc. and also due to the terrain configuration or topographic features). The computerized version of the ORNAMENT model, STAMSON 5.0 was used for calculating the sound levels in all sections of the proposed undertaking. The technical data of the ORNAMENT model used and the various adjustments implemented are summarized in Appendix B.

3. The calculations are primarily based on the Peak P.M. Traffic volumes, percentages of medium and heavy trucks, posted speed limit, road to receptor distance and elevation differentials between road and the receptor, roadway gradient, pavement type and the type of ground cover between the road and the receptor in question.

   Further adjustment has been applied to the P.M. Peak Leq sound levels to convert the results to the equivalent Leq 16 hrs. based on P.M. Peak - 16 hr. relationships for urban arterials in the City of North York.

Based on the MOEE directions the equivalent daytime sound level in dBA, Leq corresponding to the average hourly volume of the 16 hours traffic was used, i.e. Leq_{16} in dBA.

3.2 STUDY OF THE ALTERNATIVES OF THE PROPOSED ROAD ALIGNMENT

(a) Description of the Receptors

For impact assessment purposes, the worst case receptors have been selected for the alternative alignments based on consideration of their close proximity to the proposed East Service Road, the largest angle of exposure to the proposed East Service Road and possibly the lowest ambient sound levels.

For convenience, the selected points of reception have been given code names based on abbreviations of the street names and based on the municipal street number. For example, GA76 refers to # 76 Glendora Avenue. The selected street codes are as follows:

- BP = Bonnington Place
- AD = Anndale Drive
- GA = Glendora Avenue
- AA = Avondale Avenue
- MR = Marathon Reality Office Towers
  - .N = North building
  - .S = South building
    - .E = East Face
    - .W = West Face
    - .S = South Face
- SC-APT = Sheppard Centre Apartment Tower

In accordance with the MTO/MOEE protocol, the points of reception have been taken as the closest **outdoor living areas** close to the edge of the dwelling units closest to the proposed East Service Road.

The figures included in Appendix C show the selected receptor locations.

Although for some alternatives the building facades overlooking a collector street are exposed to higher levels of ambient noise, the lower sound levels in the backyards have been used for assessment purposes where the proposed East Service Road is likely to be of concern to these homes. This approach is conservative.

In certain cases, the impact on the dwelling facades may be a little higher than the impact on the outdoor living area.

(b) **<u>Description Of The Sources Of Ambient Noise (Existing)</u>**

The dominant sources of noise in the area are vehicular traffic movements on Sheppard Avenue to the north, Yonge Street to the west, Highway 401 to the south and several local collectors within the study area. In particular, the influence of Sheppard Avenue, Yonge Street and Highway 401 are dominant within the first 2 or 3 rows of houses, beyond which the so-called "urban hum" is the dominant noise which arrives at all locations practically from all directions. The urban hum prevails most of the time within the study area until a vehicle goes by on the nearest local street to become the dominant source for a few seconds and the levels start to recede down again to the urban hum background level.

The actual sample sound level readings taken by S.S. Wilson & Associates in the summer of 1994 in the entire east and west study areas during the PM peak hours provided further assistance in establishing some form of ambient levels in the areas where predictions are less accurate and where traffic data are not available.

The measured urban hum or residual sound levels along the local roads and further away from the major roadways show minimum hourly Leq of not less than 56 dBA during the PM peak hour (equivalent to Leq day 52-53 dBA based on a 16 hour day).

When the sound levels due to local traffic is added to the urban hum, the measured PM peak hours Leq reached 62 dBA (equivalent to Leq day 59 dBA) at several locations representing the property line of the closest dwellings.

Therefore, the following are the generalized conclusions:

i) Residences located on local collector roads in the study area may have PM peak hour Leq 60 dBA (equivalent to Leq day 57 dBA).

ii) Residences located on Avondale Avenue are currently exposed to PM peak hour Leq 66 dBA for a typical flanking lot based on the predicted sound levels at 15 metres (equivalent to Leq day 63 dBA). These levels are the levels expected at the exposed building facades. As most of the houses on Avondale have their backyards on the other shielded house face, it is expected that a minimum reduction of 10 to 12 dBA due to the houses themselves will reduce the sound levels in the backyards to PM peak hour Leq 55 dBA (equivalent to Leq day 52 dBA).

iii) Residences located on local streets or dead-end streets are expected to have ambient sound levels of approximately PM peak hour Leq 55 dBA (equivalent to Leq day 52 dBA).

Table 1 shows sample ambient levels based p.m. peak hours.

It is important to note that while the first row of dwellings flanking on a collector street could have sound levels up to Leq 60 dBA PM peak, and up to Leq 66 dBA PM peak hour along a "major" collector street, the sound levels are expected to go down quickly to the Leq 55 dBA urban hum level within a range of 3 to 4 rows of houses due to the following reasons:

i) Reduced angle of exposure to the street.
ii) Increased distance setback from the street.
iii) The presence of fences and mature vegetation in this established community.
iv) The presence of some minor structures such as garages.

The effect of the distance and angle of exposure have been accounted for in developing the expected ambient sound levels at the receptors of concern in the analysis to follow.

(c) **Future Sound Levels**

The proposed East Service Road may bring some of the outdoor living areas of the existing residences as close as 15 to 18 metres from the road centre line. As a result of the alignment alternatives and the expected removal of some dwelling units, there could be buffering distances up to 35 metres from the East Service Road centre line to the closest dwellings.

With the projected future PM peak hour traffic volume on the East Service Road, the following levels are predicted.

- At the closest backyards (15-18m) = Leq 69 dBA (1 hr. PM peak).
- At the further backyards (35m) = Leq 64 dBA (1 hr. PM peak).

(d) Impact Assessment

Ambient sound levels were calculated at all the receptors excluding the noise generated by the proposed road. These ambient sound levels are due to the vehicular traffic on Hwy. 401, Yonge Street, Sheppard Avenue and local streets.

Sound levels due to vehicular traffic on the proposed road were calculated with the latest traffic and road information. Tables 2 and 3 include the ambient sound levels, the calculated sound levels due to the proposed road and the excess sound levels over the ambient for the alternatives.

The data in the tables show the following parameters:

- Existing ambient sound levels.
- Future sound levels due to the proposed East Service Road.
- Applicable sound level objectives for both residential and commercial buildings.
- Calculated excesses above the ambient and objective.
- Subjective assessments of the calculated excesses.

Figures 3 (a & b) and 4 (a & b) show graphically the predicted sound levels and excesses.

Presently, the 2 office commercial buildings owned by Marathon Reality are exposed to varying levels of traffic noise from Sheppard Avenue, Yonge Street and Doris Avenue depending on the direction of the building facade. The quietest faces are the south facades.

Several points of reception have been selected as shown in the figures in Appendix C. The ambient sound levels for the "Do-nothing" future years have been calculated and the future sound levels from the proposed East Service Road are also predicted at typical 2nd storey levels. It should be noted that the predicted ambient sound levels above the 2nd or 3rd storey levels are expected to be considerably higher than those shown in Tables 2 and 3, i.e. will result in lower noise impact.

The highest predicted sound levels due to the widening for both alternatives is a maximum Leq day 66 dBA and excess of up to 10 dBA. While the change is considered significant, the resulting outdoor sound levels on the east facade of the building are comparable and in fact lower than the Leq 70 dBA for the offices facing north, east and west.

With a predicted Leq day of 66 dBA due to the East Service Road, the anticipated indoor sound level is 45 to 50 dBA which is well within the acceptable range of indoor sound levels in offices in general.

Concerning the potential impact on the existing high rise apartment tower at the north-west corner of Sheppard and Doris, the calculated ambient due to Sheppard Avenue is Leq day 70 dBA along the south face and approximately 68 dBA along the east face. With the worst case scenarios for the re-alignment of Doris Avenue, with the mid block the predicted sound levels will result in acoustically insignificant changes for the building facing east.

(e) Noise Control Measures

In order to reduce the significance of the impact, there are two basic noise control measures which include the use of buffering distances and the use of sound barriers. A combination of such measures may offer more flexibility in meeting other planning and objectives.

Table 4 shows summary of the buffering distances for the first row of houses to meet the shown sound levels.

From the table, it is concluded that at the highest impact receptor(s), where it is desirable to meet the lowest possible objective level of Leq 52 dBA, the road set back should ideally be approximately 120 metres (measured from the road centre line to the subject residential property). As up to 5 dBA excess is allowed under the Protocol without the need for mitigation, then a more realistic, but still hypothetical, setback is 60 metres (the corresponding objective sound level is Leq day 57 dBA). Therefore, it is expected that all dwelling units with low ambient sound levels within 60 metres from the East Service Road centre line may require consideration for noise control measures.

The use of sound barriers may also be considered as one of the noise control alternatives. There are 2 possibilities for sound barriers:

a. Sound barriers to be constructed along the road r-o-w, where required, at a typical distance of 13 metres from the East Service Road centre line.
b. Sound barrier to be constructed along the property line(s) of the dwellings of concern.

In all cases, the proposed sound barrier alternatives are aimed at protecting the ground-related outdoor amenity areas such as the backyards with little or no reduction for the 2nd storeys of the subject dwellings.

The acoustical effectiveness of the planned sound barriers depend on their locations with respect to the road and the area(s) to be protected.

The minimum required height of a barrier depends on the predicted excess above the criteria. Therefore, dwellings located further away from the East Service Road may require lower barrier heights.

Table 5 provides typical information to show minimum required barrier heights to achieve Leq day 52 and 57 dBA for a barrier located along the proposed East Service Road r-o-w.

The calculated barrier heights are approximate only as the exact barrier height depends on the actual ground elevations at the house, the base of the barrier and the road elevation as well as the location of the receptor.

The use of sound barriers, however, may introduce some negative effects such as sun shading, snow accumulation and drifting, wind effect, security and the need for periodic maintenance. Other important considerations are the visual impact of building long, continuous and high structures in existing residential areas and the associated costs of building the barrier and making the necessary changes to the existing landscaping of the areas on both sides of the barriers.

In the context of the overall planning and redevelopment of the subject area, another viable option for noise mitigation is the "redevelopment" of limited parcels of land immediately adjacent to the selected East Service Road alignment for land uses that are more compatible with transportation noise. This may also include <u>new residential dwellings</u> or clusters of residential dwellings that incorporate noise control measures as part of the redevelopment plans in accordance with the proposed criteria in Section 3. The noise control measures may include one or a combination of the following measures:

a) Site planning techniques for noise control to protect the new homes as well as the existing residential dwellings.
b) Improved building acoustical insulation and design principles that are noise defensive.
c) The use of localized sound barriers that can be integrated as part of the new development plan.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SUMMARY

A study has been carried out to research all aspects related to the potential noise impact of the proposed East Service Road on the noise sensitive receptor locations along the proposed road. The study dealt with the documentation of the established existing ambient sound levels, the future noise associated with the movement of the vehicular traffic on the proposed road.

The excess sound levels associated with the proposed road and existing ambient have been calculated.

Tables 2 and 3 provide a summary of the existing ambient and future sound levels with the impact above the existing ambient. They also indicate if mitigation is required or not.

From the tables the following paragraphs summarize the results:

For the residential receptors located along the alignments, the calculated sound levels are in excess of 5 to 11 dBA when compared with the existing ambient sound levels. This has warranted the need for further review of the noise control measures for these receptors.

The highest predicted sound levels due to the East Service Road at the points of reception for the two office commercial buildings are up to 66 dBA. These are the worst case locations.

There is a change of up to 7 dBA in excess of the present ambient sound levels at the 2 office buildings. While the change by itself is significant, the resulting outdoor levels at these locations are comparable and in fact lower than the acceptable outdoor criterion of 70 dBA for the private and general offices. With a predicted Leq day of 66 dBA due to the East Service Road, the anticipated indoor sound level is 45 to 50 dBA, which is well within the acceptable range of indoor sound levels in general. Therefore, the sound levels due to the proposed East Service Road will have an acoustically insignificant impact on the commercial/office building receptors and there is no need of noise control measures for these commercial receptor locations.

It is worth noting that the north, east and west facades of the north commercial building are currently exposed to high sound levels due to Sheppard Avenue, and in fact the current levels are higher than the future sound levels due to the East Service Road.

4.2 Recommendations

1. Noise Control During Construction

In addition to the noise emitted by the operation of vehicles on the proposed undertaking, noise during the construction phase is an issue that should also be addressed.

Unlike operational noise, construction noise is temporary in nature depending on the type of work required and its location relative to the noise-sensitive receptors.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, time of operation and their proximity to the receptors in question.

The following is a brief outline of the procedures to be followed in handling construction noise during the Detail Design and Construction phases:

a. Noise sensitive areas will be identified.

b. Applicable local municipal noise control by-laws will be identified and obeyed. The by-laws include those enacted under the authority of the Municipal; Act, the Environmental Protection Act or any other Provincial Legislation. Where timing constraints or any other provisions of the municipal by-law may cause hardship to the proponent, an explanation of this will be outlined in a submission to the MOEE and an exemption from such by-law will be sought directly from the area municipality in question.

c. "General noise control measures" (not sound level criteria) will be referred to, or placed into the contract documents.

d. Should the municipality receive any complaint from the public, the municipality staff will verify that the "general noise control measures" agreed to are in effect. The municipality will investigate any noise concerns, warn the contractor of any problems and enforce its contract.

e. If the "general noise control measures" are complied with, but the public still complain about noise, the municipality will require the contractor to comply with the MOEE sound level criteria for construction equipment contained in the MOEE's Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available.

f. In selecting the appropriate construction noise control and mitigation measures, the municipality will give consideration to the technical, administrative, and economic feasibility of the various alternatives.

The above noted procedures are based on the construction noise provisions included in Section 8 of the MOEE/MTO Protocol.

2. **Noise Control Measures**

In order to reduce the significance of the impact, three basic noise control measures may be applied. These include the selection of the alternative alignment with the least impact, creation of the buffering distances and the use of sound barriers. When selecting sound barriers as sound control measures, the extent of these barriers, their top elevations and material specifications should be studied during the detail design stage of the proposed road.

3. **Planning of Future Residential Land Use Adjacent to East Service Road**

In the course of preparing the Environmental Assessment for the subject road, the existing and future sound levels at typical existing residential neighbourhoods along this road have been predicted. In general, the future sound levels exceeded Leq 55 dBA, which is the Provincial Objective sound level for new residential developments.

With the potential future increase in traffic volumes along the proposed East Service Road and the existing roads, the sound levels are expected to be in excess of the Provincial Objective.

Therefore, it is recommended that future development and re-development proposals for planning of new residential developments along the proposed road be examined for their noise compatibility. The Provincial and Ministry of the Environment and Energy policies and guidelines should, therefore, be consulted concerning implementation at the municipal planning levels. The noise control measures may include one or a combination of the following measures:

a) Site planning techniques for noise control to protect the new homes as well as the existing residential dwellings.
b) Improved building acoustical insulation and design principles that are noise defensive.
c) The use of localized sound barriers that can be integrated as part of the new development plan.

TABLES

TABLE 1

Location	Existing Ambient Leq (PM peak hours)
Residences located on Avondale Avenue	55 dBA
Residences on dead end roads and minor streets (e.g. Anndale Dr.)	56 dBA

Table2
PREDICTED AMBIENT SOUND LEVELS AND FUTURE SOUND LEVELS
EAST SERVICE ROAD
NOISE IMPACT
TRADEWIND

Receptor No.	Ambient Leq, dBA	Future Leq, dBA	Appicable Sound Level Criteria	Excess Criteria for mitigation	Future Leq, dBA Minus Ambient Leq, dBA	Significance of the Change due to the Future Leq, dBA Minus Ambient Leq, dBA	Future Leq, dBA Minus Criteria
GA63	52.0	64.0	55	5	12.0	Very Significant	9.0
GA64	52.0	64.0	55	5	12.0	Very Significant	9.0
GA73	56.0	64.0	55	5	8.0	Significant	9.0
GA76	59.0	64.0	55	5	5.0	Significant	9.0
*********			55	5			
BP1	59.0	58.0	55	5	-1.0	Reduction	3.0
*******			55	5			
AD11	52.0	66.0	55	5	14.0	Very Significant	11.0
AD21	57.0	62.0	55	5	5.0	Significant	7.0
AD12	52.0	66.0	55	5	14.0	Very Significant	11.0
******			55	5			
S.C.APT-ES	68.0		70	5			
******				5			
MR-N-EF	59.0	64.0	70	5	5.0	Significant	-6.0
MR-N-WF			70	5			
MR-N-SF	52.0	55.0	70	5	3.0	Noticeable	-15.0
MR-S-EF	57.0	62.0	70	5	5.0	Significant	-8.0
MR-S-WF			70	5			
MR-S-SF	52.0	57.0	70	5	5.0	Significant	-13.0

Impact Assessment Rating :

0 to < 3 dB change : Insignificant => 5 to < 10 dB change: Significant
=>3 to < 5 dB change : Noticeable => 10 dB change : Very Significant

Table3
PREDICTED AMBIENT SOUND LEVELS AND FUTURE SOUND LEVELS
FUTURE EAST SERVICE ROAD
MIDBLOCK
NOISE IMPACT

Receptor No.	Ambient Leq, dBA	Future Leq, dBA	Applicable Sound Level Criteria	Excess Criteria for mitigation	Future Leq, dBA Minus Ambient Leq, dBA	Significance of the Change due to the Future Leq, dBA Minus Ambient Leq, dBA	Future Leq, dBA Minus Criteria
GA41	52.0	66.0	55	5	14.0	Very Significant	11.0
GA42	52.0	66.0	55	5	14.0	Very Significant	11.0
GA53	52.0	64.0	55	5	12.0	Very Significant	9.0
GA54	52.0	63.0	55	5	11.0	Very Significant	8.0
*******				5			
AD3	52.0	66.0	55	5	14.0	Very Significant	11.0
AD4	52.0	66.0	55	5	14.0	Very Significant	11.0
*****				5			
AA51	52.0	65.0	55	5	13.0	Very Significant	10.0
AA56	52.0	63.0	55	5	11.0	Very Significant	8.0
******				5			
S.C.APT-ES	68.0	71.0	70	5	3.0	Noticeable	1.0
******				5			
MR-N-EF				5			
MR-N-WF	59.0	66.0	70	5	7.0	Significant	-4.0
MR-N-SF	52.0	57.0	70	5	5.0	Significant	-13.0
MR-S-EF			70	5			
MR-S-WF	57.0	65.0	70	5	8.0	Significant	-5.0
MR-S-SF	52.0	59.0	70	5	7.0	Significant	-11.0

Impact Assessment Rating : 0 to < 3 dB change : Insignificant => 5 to < 10 dB change: Significant
=>3 to < 5 dB change : Noticeable => 10 dB change : Very Significant

TABLE 4

Desired Leq Day Sound Level dBA	Minimum Distance from the Road Centre Line (m)
66	18
65	20
64	23
63	26
62	30
61	35
60	40
59	46
58	53
57	61
56	70
55	80
54	92
53	106
52	121

TABLE 5

Distance from East Service Road Centre Line to Dwelling Property Line (m)	Barrier Height to Achieve	
	Leq (d) 52 dBA (m)	Leq (d) 57 dBA (m)
15	5.0	3.0
20	4.7	2.8
25	4.5	2.5
30	4.2	2.1
35	3.9	2.0
40	3.6	2.0
50	3.0	1.8
60	2.4	Not Required

FIGURES

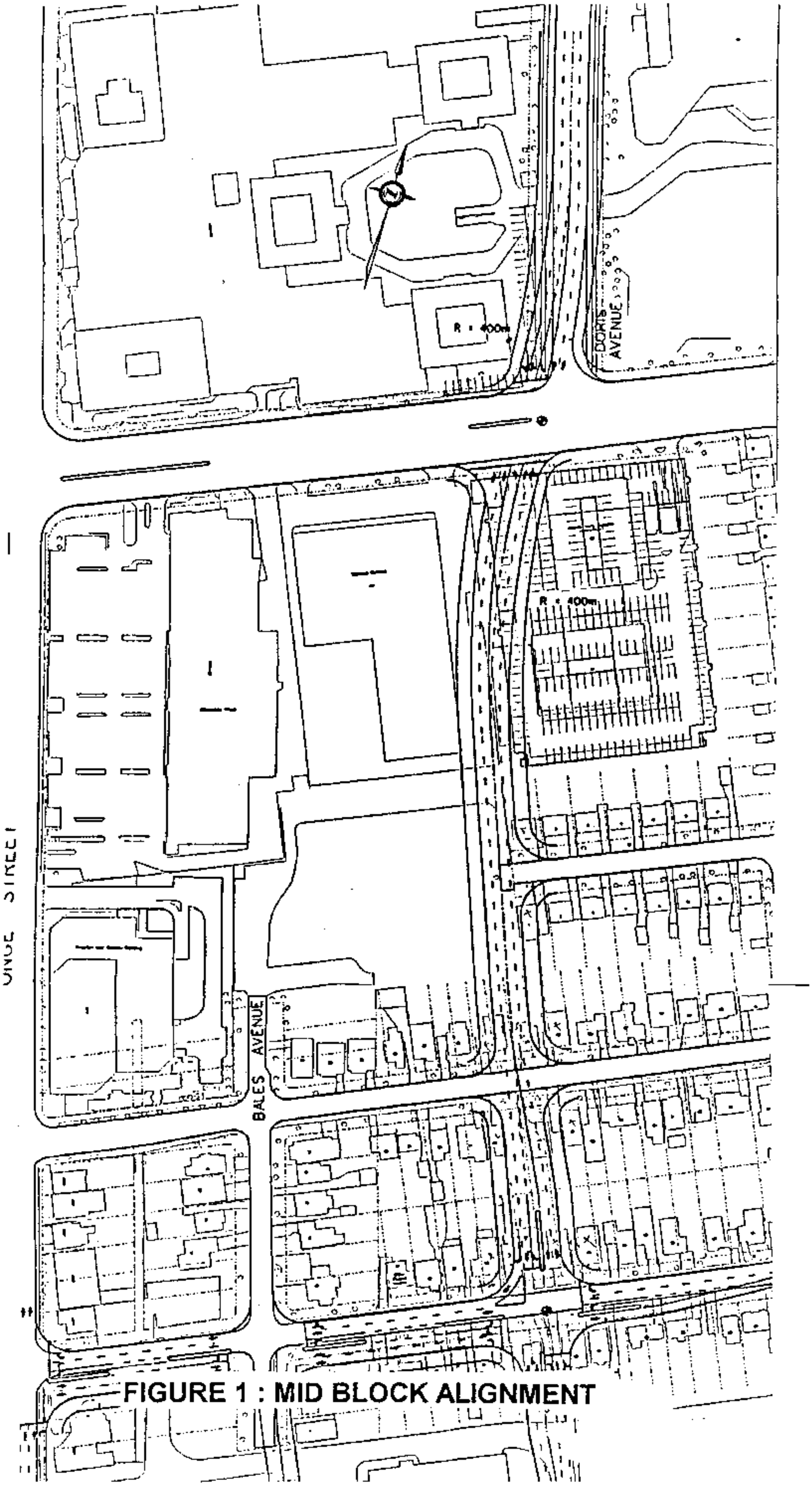


FIGURE 1 : MID BLOCK ALIGNMENT

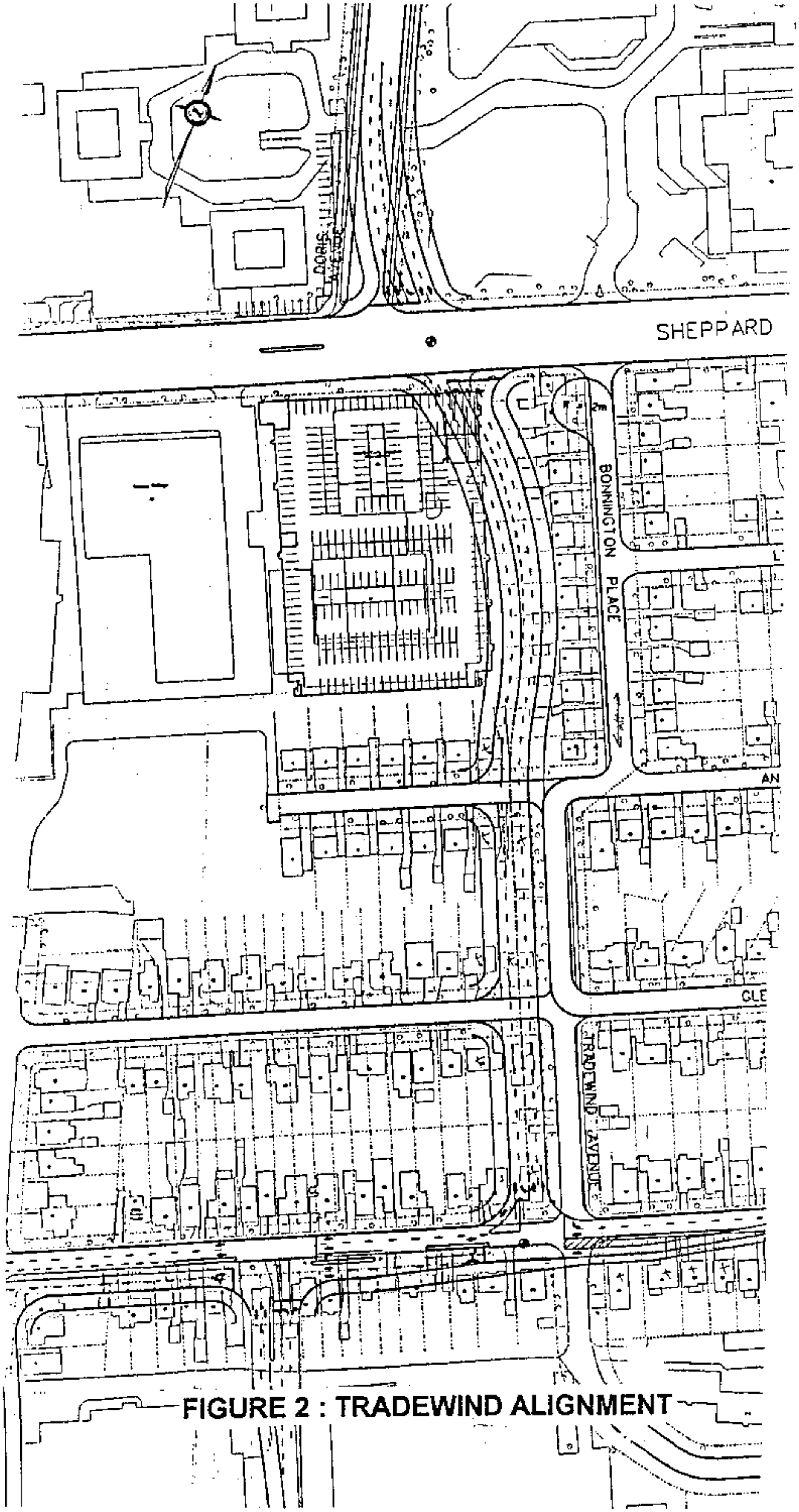


FIGURE 2 : TRADEWIND ALIGNMENT

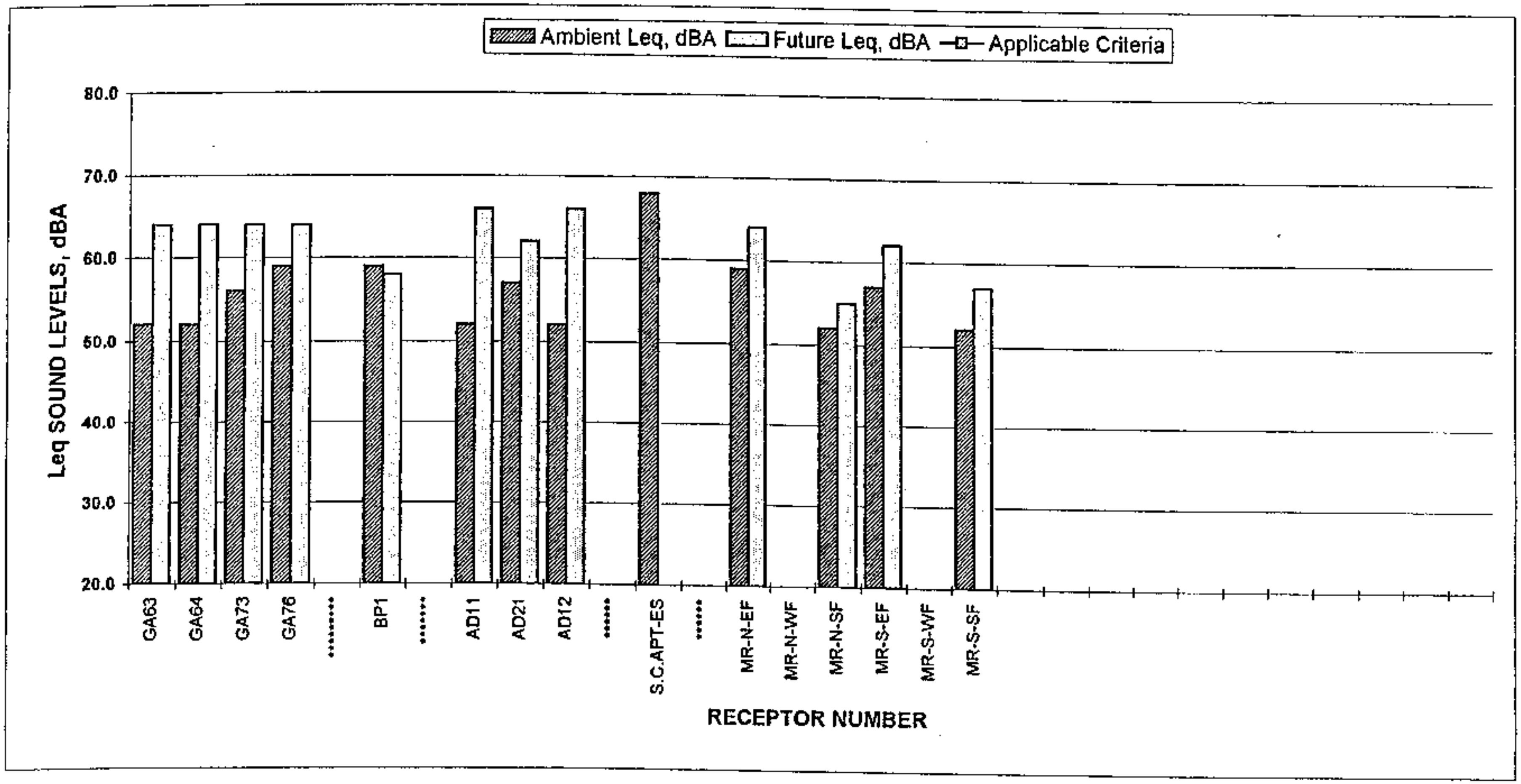
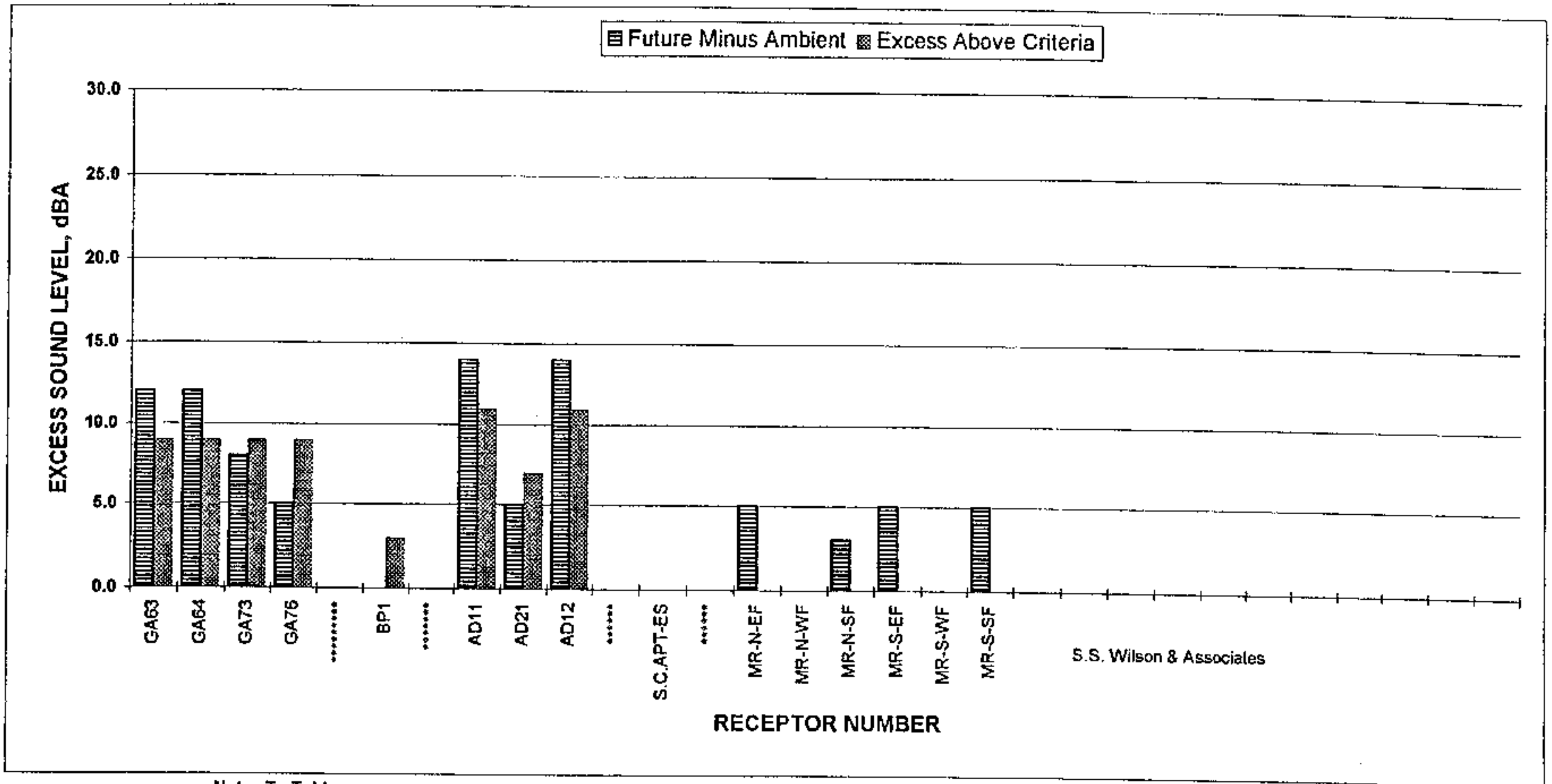


FIGURE 3.a

S.S. Wilson & Associates

PREDICTED AMBIENT SOUND LEVELS AND FUTURE SOUND LEVELS
EAST SERVICE ROAD
NOISE IMPACT
TRADEWIND



S.S. Wilson & Associates

Notes To Table :

- Positive excess level indicates increase in future sound levels.
- Negative excess level indicates decrease in future sound levels.

FIGURE 3.b

RECEPTORS EXPERIENCING INCREASED SOUND LEVELS
EAST SERVICE ROAD
NOISE IMPACT
TRADEWIND

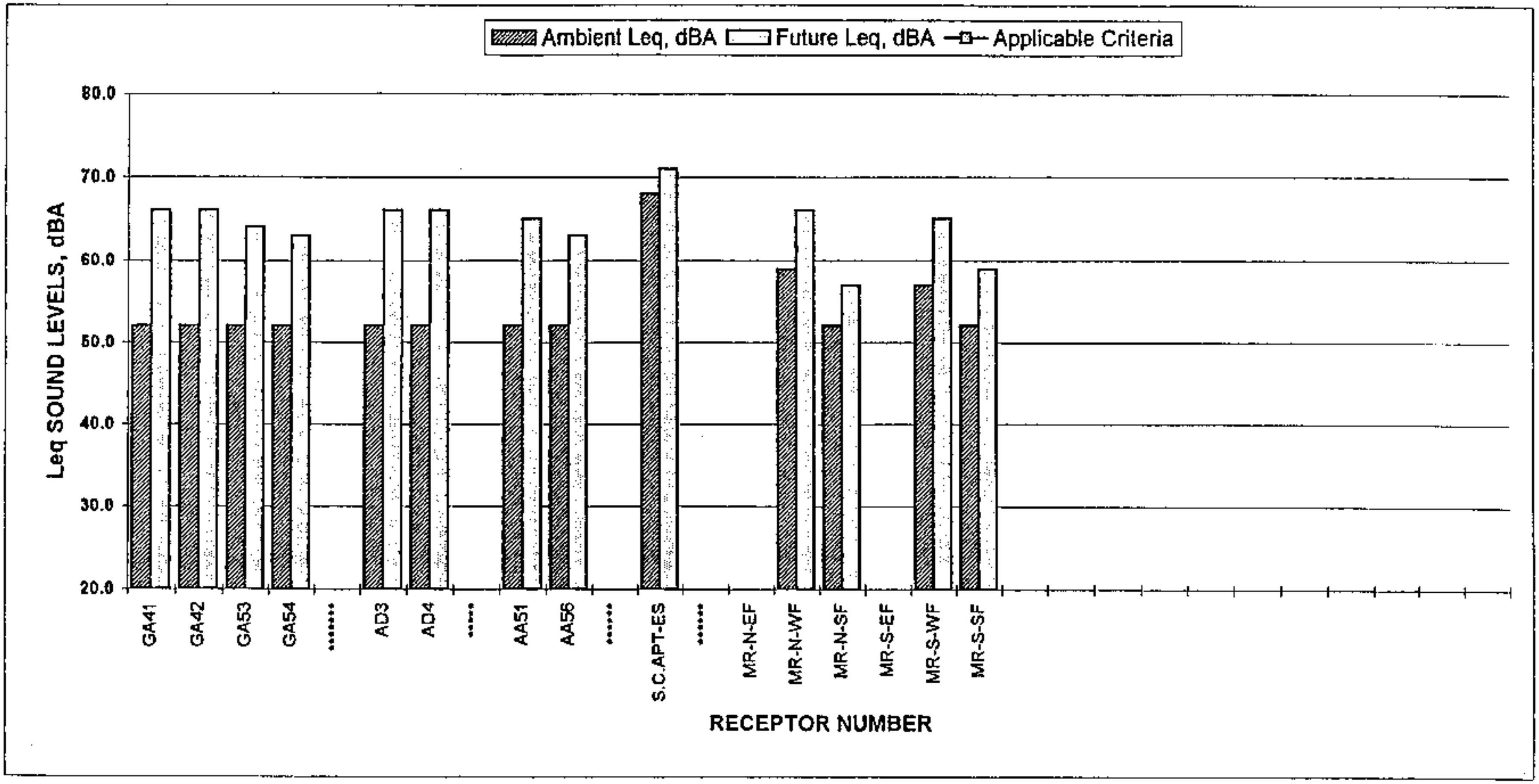
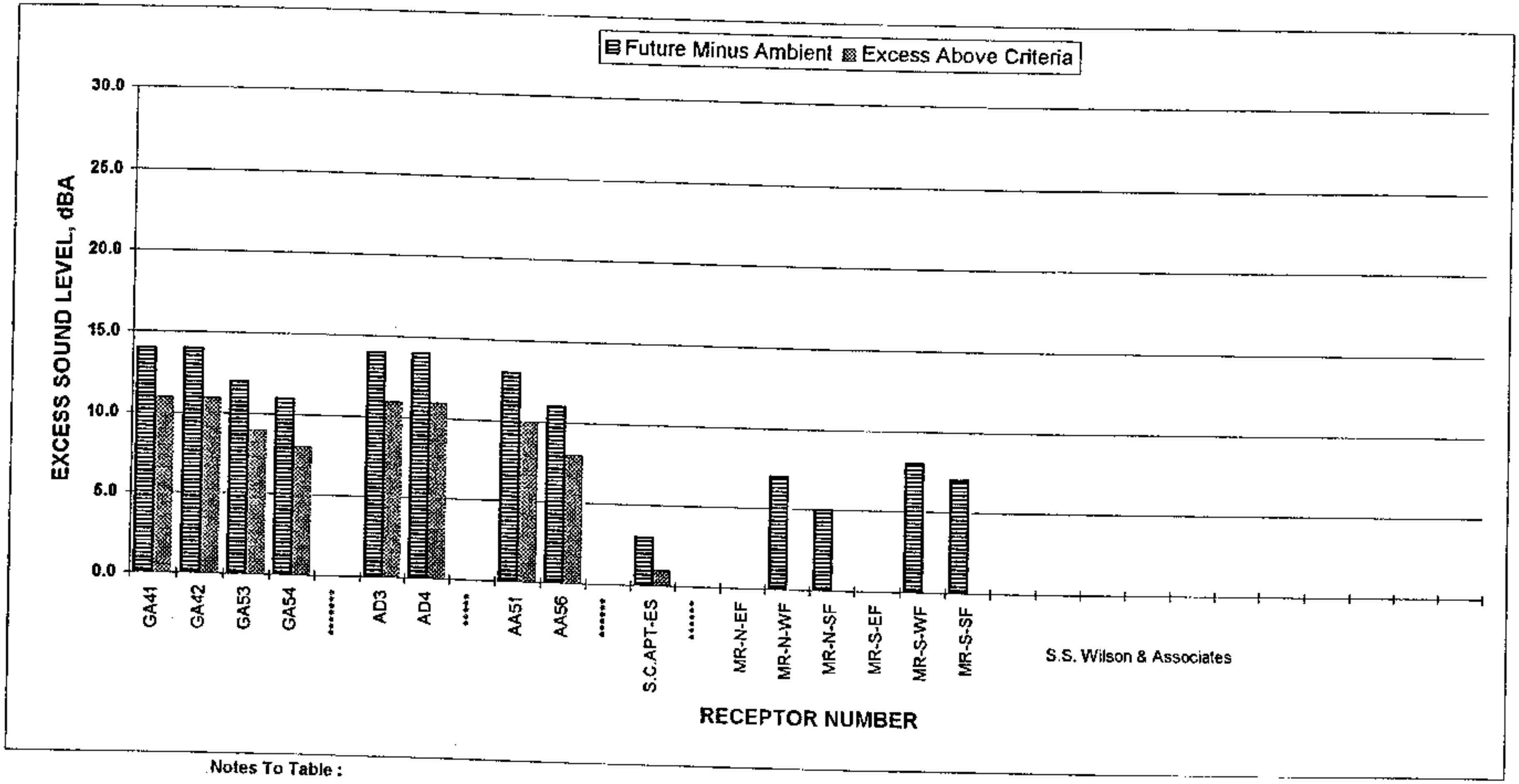


FIGURE 4.a

S.S. Wilson & Associates

PREDICTED AMBIENT SOUND LEVELS AND FUTURE SOUND LEVELS
FUTURE EAST SERVICE ROAD
MIDBLOCK
NOISE IMPACT



Notes To Table :

- Positive excess level indicates increase in future sound levels.
- Negative excess level indicates decrease in future sound levels.

S.S. Wilson & Associates

FIGURE 4.b

RECEPTORS EXPERIENCING INCREASED SOUND LEVELS
FUTURE EAST SERVICE ROAD
MIDBLOCK
NOISE IMPACT

APPENDIX A:

MOEE/MTO PROTOCOL
FOR
PROVINCIAL HIGHWAYS NOISE

This Protocol contains areas of policy agreement between the Ministries of Transportation and Communications, and Environment for dealing with noise concerns during the preparation, review and evaluation of environmental assessments for Provincial Highway undertakings.

As common understandings are resolved for any outstanding issues, these will be added to the Protocol by formal agreement.

D.P. Caplice
Assistant Deputy Minister
Operations Division
Ministry of Environment

J.R. Barr
Assistant Deputy Minister
Engineering and Construction
Ministry of Transportration
and Communications

FEBRUARY
1986

a 2

1. Retroffit The MTC policy for retrofit of existing freeways with sound barriers will remain in effect and unchanged.

2. Scope of Protocol

   This protocol applies to the MTC Capital Construction Program for all classes of MTC Provincial roads, both urban and rural. The policy for each situation may require different noise control measures and further, that an assessment of the feasibility of providing noise control measures includes technical and economic considerations.

3. Definition of Noise Sensitive Areas

   To be clearly defined, as guided by the One-Stage Procedural Guide-lines and the specific definitions of "residential areas" and "quiet zones" found in the municipal noise control by-laws, approved by MOE under the Environmental Protection Act.

4. Establishing Existing and Future Noise Levels

   Presently used prediction methodologies and measurement procedures are satisfactory. Any future changes, in noise prediction method-ologies or measurement procedures, shall be compatible with those of both MOE and MTC.

   Staff of MTC and MOE together shall set a standard for ambient noise levels in rural areas where predictions cannot be done.

5. Impact Assessment

   Noise impacts for all MTC Provincial roads will be predicted based on traffic projections ten years after completion, or best available data when 10-year projections are not available.

   The study area shall be defined using the smaller of one of the two following methods; using 5 decibel contour lines extending from the source to the point where there is no increase above the ambient level, or a distance of 600 m from the source.

   The noise impact on noise-sensitive land uses will be determined for outdoor spaces.

   All reference to 65 dBA as a "target" and 70 dBA as a "maximum" will be removed from MTC directives A-1 and B-94. Further, reference to a 70 dBA maximum should be removed from the Provincial Policy. The objective for outdoor sound levels is the higher of the Leq 55 dBA or the existing ambient. The significance of a noise impact will be quantified by using this objective in addition to the change in noise level above the ambient.

Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically, and administratively feasible.

6. <u>Noise Control Measures</u>

The attached Table summarizes the degree of mitigation effort to be applied for various noise level increases.

On right-of-way mitigation measures will be identified, considered and implemented where warranted.

Mitigation measures within the right-of-way include: barriers, berms, vertical and horizontal alignments, pavement surfaces, etc.

Where noise increases above the ambient do not exceed 5 dBA no mitigation is required.

Where noise increases above the ambient exceed 5 dBA MTC will:
- investigate noise control measures within the right-of-way
- if project costs are not significantly affected and where averaged over first row receivers, a minimum attenuation of 5 dBA can be achieved, MTC will introduce the selected measures within the right-of-way.

Where a freeway is to be expanded through an existing residential area that has been included on the retrofit priority list, noise attenuation measures should be considered as part of the freeway expansion project when the MTC policy for <u>Retrofit of Existing Freeways</u> can be satisfied.

7. <u>Documentation</u>

MTC will increase its E.A. documentation with respect to the feasibility of all potential mitigation measures within the right-of-way. The feasibility of each measure would be evaluated by such factors as effectiveness and technical and economic feasibility.

8. <u>Construction Noise</u>

The following is a brief outline of the procedures to be followed in handling construction noise during the Environmental Assessment process and during the construction phase. Commitment to the following shall be made in all E.A. Documents:

(a) Noise sensitive areas will be identified;

(b) Applicable municipal noise control by-laws will be identified and obeyed. Where timing constraints, or any other municipal by-law may cause hardship to MTC, an explanation of this will be outlined in the EA document, and an exemption from such by-law will be sought directly from the municipality in question.

(c) General noise control measures (not sound level criteria) will be referred to, or placed into MTC contract documents;

(d) Any initial complaint from the public will require verification by MTC that the general noise control measures agreed to are in effect; MTC will investigate any noise concerns, warn the contractor of any problems, and enforce its contract;

(e) Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available; and

(f) In selecting the appropriate construction noise control and mitigation measures, MTC will give consideration to the technical, administrative, and economic feasibility of the various alternatives.

9. Miscellaneous

(a) All future technical documents referred to in this agreement and prepared to become part of the Protocol shall be jointly approved by MOE and MTC. These include:

- o ambient levels in Rural Areas where predictions cannot be done;
- o general construction noise control measures; and
- o any other alterations to this Protocol.

(b) As the intent of this Protocol will be followed during their preparation, joint MOE/MTC approval is not required for MOE or MTC procedural/operational documents such as:

- o internal directives;
- o contract documents; and
- o E.A. procedural/technical guidelines.

TABLE 1: SUMMARY OF MITIGATION EFFORT

CHANGE IN NOISE LEVEL ABOVE AMBIENT	MITIGATION EFFORT
0 - 5 dBA	- None
> 5 dBA	- Investigate noise control measures on R.O.W. - If project cost is not significantly affected introduce noise control measure within R.O.W. - Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers. - Mitigate to ambient, as administratively, economically, and technically feasible.

APPENDIX B:

TRAFFIC NOISE PREDICTION MODEL

GENERAL PROCEDURES AND ADJUSTMENTS

1.1 MOE ROAD TRAFFIC NOISE PREDICTION TECHNIQUE

The road traffic noise assessment method is based on a model originally developed by the U.S. Federal Highway Administration in 1978 as modified by the Ontario Ministry of the Environment to suit the provincial requirements.

The analytical model predicts hourly Leq due to road traffic. It is modular in structure and thereby lends itself to applications requiring detailed analysis.

The variables required for the road traffic assessment include the following: road traffic volume per hour, percentages of automobiles, medium trucks and heavy trucks, average speed of traffic flow, roadway gradient, source to receiver distance(s), type of ground cover, road element size and shielding applicable.

The details of the model could be found in the publication "Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT)[1]", Ministry of the Environment, November 1988.

The applicable procedures are summarized in the following paragraphs. Sample calculations are included in this report for a typical receiver location.

1.1.1. Predicted sound level data are generally based on two daily periods or the full 24 hour period as requested by the MOE for specific sources:

07:00 to 23:00 hours
23:00 to 07:00 hours

1.1.2. Roadway traffic volumes (AADT) split:

Regional Roads	Provincial Highways
07:00 to 23:00 hours = 91%	07:00 to 23:00 hours = 85%
23:00 to 07:00 hours = 9%	23:00 to 07:00 hours = 15%

1.1.3. Reference Hour Sound Level:

$$Leq_{ref} = 10 \log \sum_{i=1}^{3} \left(K_g \, P_i \, 10^{\frac{(L_0)_i}{10}} \right) - 10 \log S + 2.76$$

---

[1] The computerized versions of this model are 'STAMSON 3.0 and STAMSON 4.1'.

$$(L_0)_{AUTOMOBIL} = 38.1 \log(S) - 2.4$$

$$(L_0)_{MEDIUM\ TRUCK} = 33.9 \log(S) + 16.4$$

$$(L_0)_{HEAVY\ TRUCK} = 24.6 \log(S) + 38.5$$

where Leq_{ref} is the reference hourly sound level;
K_g the road gradient adjustment factor for heavy trucks;
P_i the percentage of ith vehicle class, expressed as fraction of the total volume;
$(L_0)_i$ the reference energy mean emission level of ith vehicle class;
S the posted speed limit in km/h.

1.1.4. Adjustments to Reference Level (dB)

o Traffic Volume:

Adjustment = 10 log (V/V_{ref}) = 10 log (V/40)

where V is the total traffic volume.

o Distance:

Adjustment = 10 log $(D_{ref}/D)^{1+\alpha}$

where D_{ref} is reference distance of 15 m.

α = 0 for reflective surfaces (hard ground)

α = 0.66 for absorptive surfaces (soft ground) where $h_{eff} \leq 3$ m

$\alpha = 0.75(1-(h_{eff}/25))$ for absorptive surfaces where $3 < h_{eff} \leq 25$ m

α = 0 for absorptive surfaces where $h_{eff} > 25$ m

$h_{eff} = s + p + t + r$

where h_{eff} is the total effective height.

α is ground absorbtion coefficient.

o Road Segment

Non-Reflective Surface :

$$Adjustment = 10 \log \left(\frac{1}{\pi} \int_{\Phi_1}^{\Phi_2} \cos^{\alpha}\Phi \, d\Phi\right)$$

Reflective Surface :

$$Adjustment = 10 \log \{\frac{\Phi_2 - \Phi_1}{\pi}\}$$

where ϕ_1 is the negative angle of view;
ϕ_2 is the positive angle of view.

1.1.5. Typical Receiver and Source Heights:

Outdoor Living Areas (OLA) = 1.5 m

Second Storey Bedroom = 4.5 m

Source Height = 0.5 m where $P_{HT} < 0.01$

Source Height = $\sqrt[4]{100\, P_{HT}}$ where $0.01 \leq P_{HT} \leq 0.30$

Source Height = 2.4 m where $P_{HT} > 0.30$

where P_{HT} is the percentage of heavy trucks, unadjusted by the gradient factor, expressed as a fraction of the total volume.

1.2 BARRIER CALCULATION MODEL

1.2.1. Barrier attenuation is calculated using optical diffraction theory.

1.2.2. Attenuation for road traffic noise is calculated at 500 Hz for an incoherent infinite line source.

1.2.3. The barrier prediction model has been developed by the National Research Council which is somewhat more conservative than the Kurze and Anderson original model.

$$Barrier\ Atenuation = 0\ dB, \qquad for\ (N_0)_i \cos\phi \leq -0.1916$$

$$Barrier\ Attenuation = 10\log\{\frac{1}{\Phi_2-\Phi_1}\int_{\Phi_1}^{\Phi_2}\frac{\tan^2\sqrt{2\pi\,|N_0|_i\cos\phi}}{\sqrt{10}\ 2\pi\,|N_0|_i\cos\phi}\,d\Phi\},$$

$$for\ -0.1916 \leq (N_0)_i \cos\phi \leq 0$$

$$Barrier\ Attenuation = 10\log\{\frac{1}{\Phi_2-\Phi_1}\int_{\Phi_1}^{\Phi_2}\frac{\tanh^2\sqrt{2\pi\,(N_0)_i\cos\phi}}{\sqrt{10}\ 2\pi\,(N_0)_i\cos\phi}\,d\Phi\},$$

$$for\ 0 \leq (N_0)_i \cos\phi \leq 5.03$$

$$Barrier\ Attenuation = 20\ dBA \qquad for\ (N_0)_i \cos\phi \geq 5.03$$

where N_0 is Fresnel Number, $N_0 = 2.915 \times (P.L.D.)$

APPENDIX C:

RECEPTOR LOCATIONS

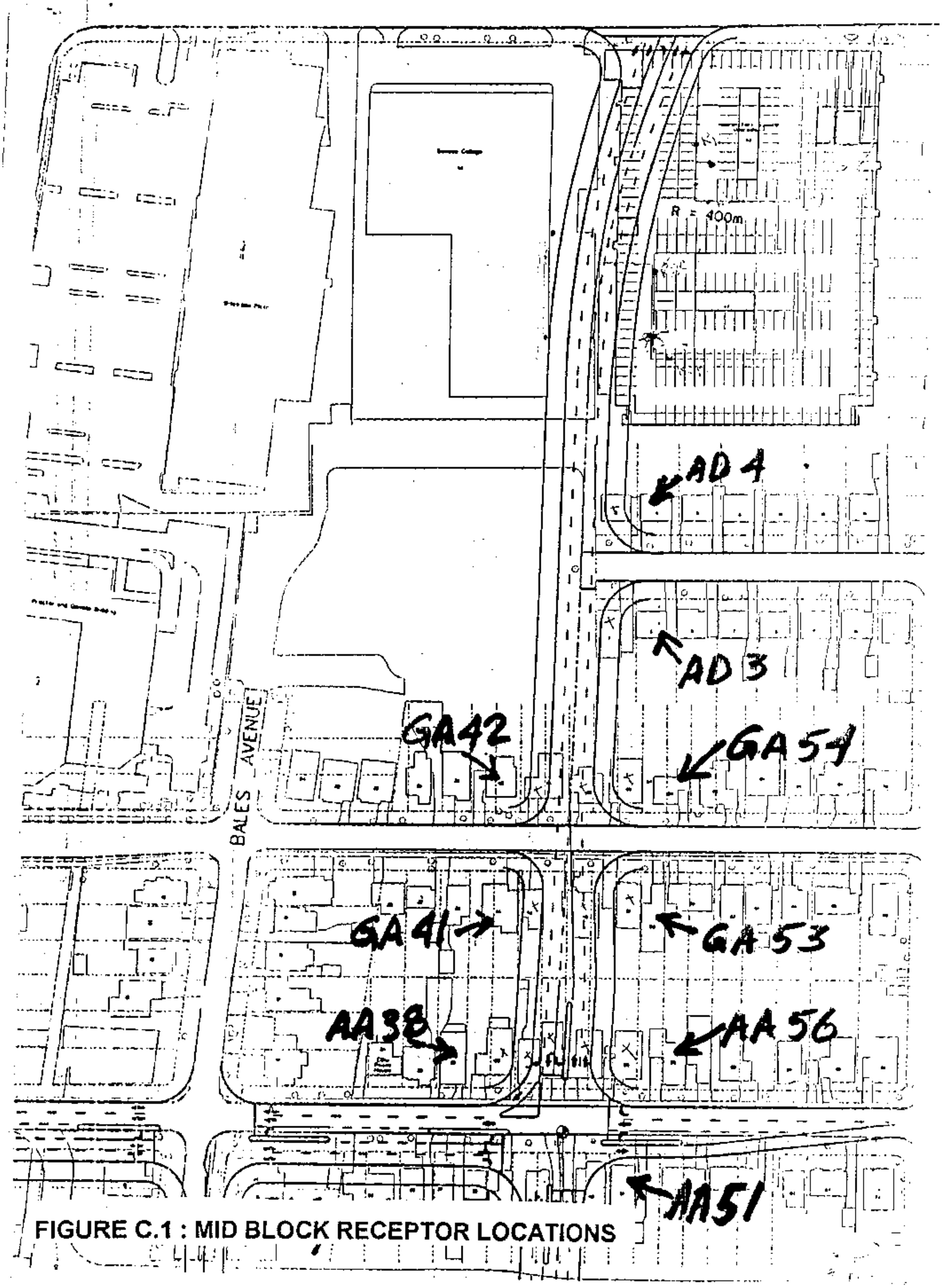


FIGURE C.1 : MID BLOCK RECEPTOR LOCATIONS

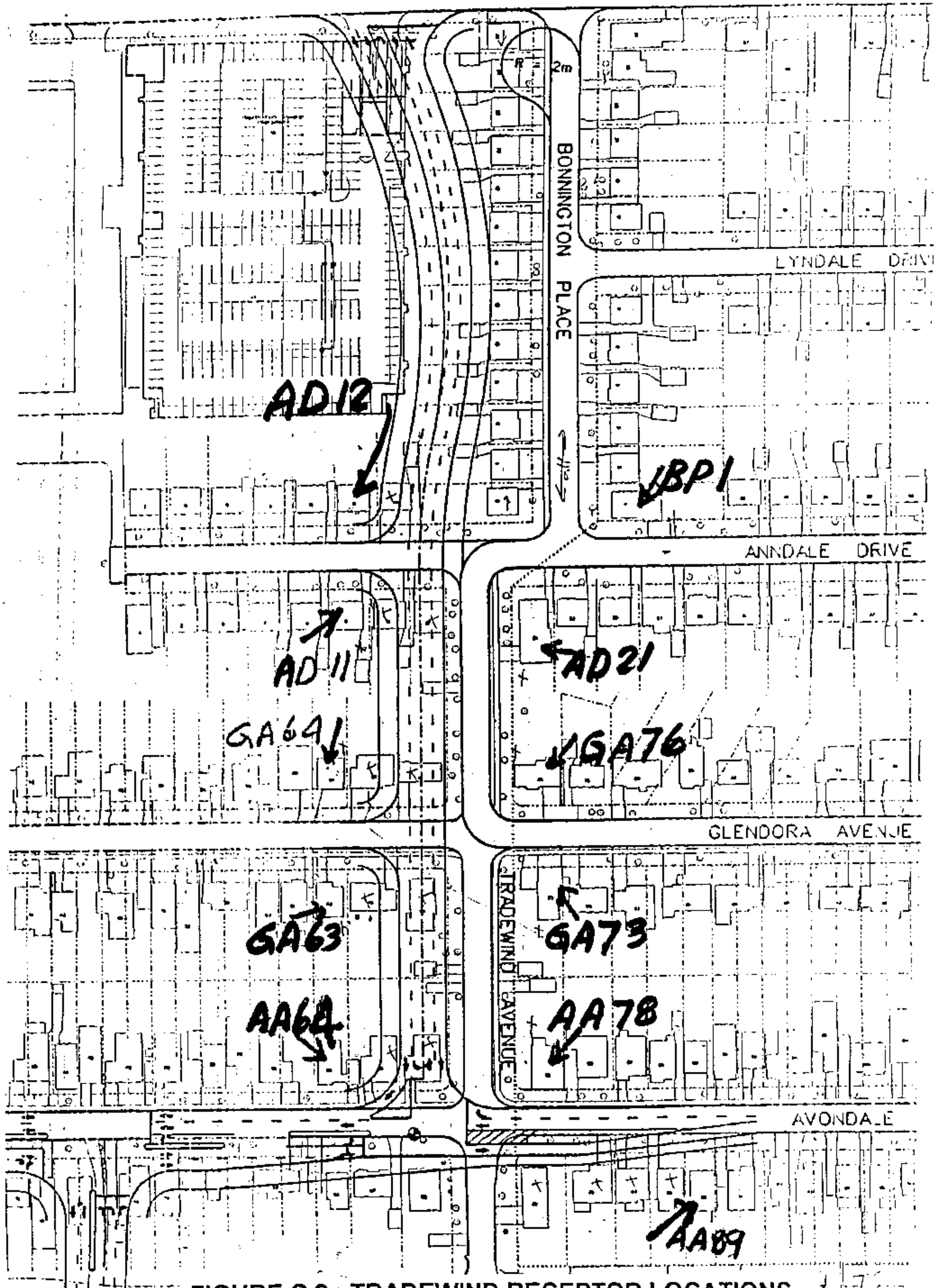


FIGURE C.2 : TRADEWIND RECEPTOR LOCATIONS

CITY OF North York

Transportation Department

APPENDIX D

AIR QUALITY ASSESSMENT FOR THE EAST SERVICE ROAD, NORTH YORK, ONTARIO

Rowan Williams
Davies & Irwin Inc.

Consulting Engineers
Microclimate Specialists

AIR QUALITY ASSESSMENT FOR

EAST SERVICE ROAD

NORTH YORK, ONTARIO

Report 95-199T-14B

September 4, 1996

Submitted to:

COLE SHERMAN AND ASSOCIATES LTD.

By:

ROWAN WILLIAMS DAVIES & IRWIN Inc.

GUELPH, ONTARIO

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TABLE OF CONTENTS

1. INTRODUCTION

Rowan Williams Davies and Irwin Inc. (RWDI) was retained by Cole Sherman and Associates to address air quality concerns resulting from the proposed North York South Downtown Development. The initial study was completed under RWDI Report Number 95-199T-14, dated April 26, 1995. Both qualitative and quantitative air quality assessments were performed in the initial study, with the prediction that future vehicular traffic in the North York South Downtown Development will not produce pollutant levels of carbon monoxide (CO) and nitrogen dioxide (NO_2) that exceed the applicable provincial criteria.

The present report details further study of the proposed East Service Road. Air quality concerns were addressed by numerically modelling vehicular emissions of CO and oxides of nitrogen (NO_x) for a representative intersection along the proposed route. NO_x consists primarily of nitric oxide (NO) and nitrogen dioxide. The objectives of this study were to:

i) conduct a qualitative review of the seven initial roadway route alternatives, and

ii) quantify, under worst-case conditions, the impact of the preferred route alternative on the local air quality.

The qualitative review involved an evaluation of a number of signalized intersections, number of vehicle movements, proximity to receptors of interest, and the amount of vehicle queuing. The results of this review were forwarded to Cole Sherman in a letter dated April 4, 1996, and are attached in Appendix A.

2. METHODOLOGY

The purpose of this assessment was to determine the impact of emissions from vehicles using the proposed East Service Road for the build year 2020. The assessment was conducted using both worst-case meteorological and traffic assumptions. The pollutants examined were tailpipe emissions of CO and NO_x (specifically NO_2) from both cars and trucks idling at nearby intersections and travelling along adjacent roadways. These pollutants both have readily available emissions data and provincial criteria as established by the Ontario Ministry of Environment and Energy (MOEE). The numerical analysis concentrated on the intersection with the highest predicted traffic volumes, which was found to be the morning rush-hour period.

2.1 Vehicular Emission Analysis

Environment Canada's MOBILE5C vehicular emissions model was used to determine emission rates of CO and NO_x [1]. Table 1 presents the key inputs into the MOBILE5C model. The vehicle mix was based on information provided by Cole Sherman [3], which indicated that 15% of future traffic is trucks and buses (one-third buses, one-third medium trucks, and one-third heavy trucks). The MOBILE5C model classifies all vehicles that weigh more than 3 860 kg (8 500 lb) as "heavy duty diesel vehicles". This classification encompasses the Ministry of Transportation classifications of both medium trucks (4 500 kg to 12 000 kg) and heavy trucks (> 12 000 kg).

Table 1: MOBILE5C Input Parameters

Design Year: 2020

Ambient Temperature:

-6.6^{0}C, based on the mean daily temperature at Downsview Airport for the coldest month of the year (i.e., January) [2].

Vehicle Mix:

Vehicle mix from data obtained from Cole Sherman [3] and MOBILE5C default values.

light-duty gas vehicles	49.8%
light-duty gas trucks	30.9%
heavy-duty gas vehicles	3.1%
light-duty diesel vehicles	0.2%
light-duty diesel trucks	0.6%
heavy-duty diesel vehicles (includes buses)	15.0%
motorcycles	0.4%

Ontario vehicle statistics and default cold-start vehicle fraction as given by the MOBILE5C manual.

Vehicle Speeds:

Default vehicle speed (33 km/h) for urban roads as given by the MOBILE5C model.

2.2 Vehicular CO and NO_x Emission Rates

The vehicular CO and NO_x emission rates obtained from the MOBILE5C model are summarized in Table 2.

Table 2: Predicted Vehicle Emission Rates

Emission Source	Pollutant Emission Rate	
	CO	NO_x
Idling (g/veh/min)	5.43	0.159
Mobile (g/veh/km)	18.7	1.50

2.3 Air Quality Criteria

Emissions from vehicles are currently regulated by Transport Canada (Federal) regulations. Provincial regulations do not directly control the emissions from vehicles or pollutant concentrations arising from vehicular activities. However, Ontario Regulation 337 provides desirable ambient air quality objectives under which emissions from vehicles can be evaluated [4]. Table 3 presents Ontario's Ambient Air Quality Criteria (AAQC) for 1-hour CO and 1-hour NO_2. Note that there are no AAQCs for NO_x or NO.

Table 3: Ontario's Ambient Air Quality Criteria

Pollutant	Averaging Period	Air Quality Criteria (ppm)
Carbon Monoxide (CO)	1-hour	30
Nitrogen Dioxide (NO_2)	1-hour	0.20

2.4 Dispersion Analysis

The vehicular emissions obtained from the MOBILE5C model were used to predict worst-case concentrations of NO_x and CO at selected areas using dispersion modelling techniques. The dispersion simulation model used was CAL3QHC. This model, which was originally developed by the U.S. Environmental Protection Agency, was designed specifically for modelling the dispersion of emissions from motor vehicles travelling near roadway intersections [5]. By including emissions from idling vehicles, CAL3QHC represents a reliable model for predicting pollutant concentrations near signalized intersections where idling vehicles interact with moving vehicles. The model has been accepted by the MOEE for use in roadway environmental assessments.

2.5 Modelled Scenario

The air quality impact due to highway emissions are, among other factors, dependent upon the traffic volume, vehicle speed, and the roadway cross-sections. The assessment considered the proposed East Service Road bound by Greenfield Ave. to the north and Avondale Ave. to the south. The modelled roadway scenario was based on the drawing entitled Midblock - North York South Downtown Class Environmental Assessment Study, as supplied by Cole Sherman [6]. For detailed numerical modelling, the intersection of the proposed East Service Road with Sheppard Ave. was selected, as it is predicted to service the greatest volume of future traffic of all intersections along the East Service Road study area (see Figure 1).

2.6 Input Parameters for CAL3QHC Dispersion Model

The CAL3QHC model required the following input parameters to assess the pollutant levels.

i) Roadway and Receptor Coordinates

Figure 1 illustrates the roadways that were modelled and the receptor locations at which pollutant levels were predicted. Twenty-two receptors were selected, including entrances to nearby buildings and residences, and other sensitive locations. Receptors were placed at specific locations to evaluate the impact on pedestrian traffic, such as at entrances to the Sheppard Centre and Marathon commercial buildings. Nearby residences were also selected as receptors, as persons residing within are exposed to the ambient air quality on a permanent basis. All of the receptors were located at least 3 m away from the edge of the roadways in order to be outside of the mixing zone created by the wake of moving vehicles. For simplicity, all roadways and receptors were assumed to be located at grade level, producing conservative results.

ii) Traffic Volumes and Traffic Light Cycles

Morning and evening peak hourly traffic volumes for the adjacent roadways were supplied by Cole Sherman [3], together with the information on traffic light cycles at the associated intersections [6]. Analysis of the traffic data indicated that maximum traffic volumes occurred during the morning peak period; therefore, predicted hourly traffic volumes at the East Service Road/Sheppard Ave. intersection for the morning rush-hour were used in the dispersion analysis. A traffic light cycle of 110 seconds was used, with green time equal to two thirds of the cycle time in the east-west direction (along Sheppard Ave.) [7]. Appendix B contains the traffic volumes and model co-ordinates for each traffic link modelled.

iii) Surface Roughness

Mechanical turbulence is generated by air flowing over a surface. This turbulence influences the dispersion of pollutants near the surface. For modelling purposes, the study area was considered to be an office area and, therefore, a generic roughness (Z_o) equal to 175 cm (city land use/offices) was selected.

iv) Meteorological Conditions

Worst-case meteorological conditions used in the CAL3QHC dispersion analysis are documented in Table 4.

Table 4 : Meteorological Inputs to the CAL3QHC Model

Parameter	1- Hour Meteorological Conditions
Pasquill Stability Class	Class E
Wind Speed (m/s)	1.0
Mixing Height (m)	300

v) Background Concentrations

As part of the assessment of vehicle emissions, background concentrations of the contaminants within the ambient air were required. Background levels were added to the levels predicted by CAL3QHC for comparison with the provincial AAQC. Table 5 presents the 99^{th} percentile 1-hour background levels obtained from the MOEE's monitoring station at Hendon Avenue (Yonge/Finch) Station (ID Number 34020) [8] for the year 1993. The background levels in this year were slightly greater than the three-year average background values for this station (1991 to 1993).

Table 5: Ambient Air Concentrations, MOEE's Hendon Avenue Station, 1993

Pollutant	1-Hr Averaging Period
	99^{th} Percentile (ppm)
Carbon Monoxide (CO)	2.5
Nitrogen Dioxide (NO_2)	0.060
Oxides of Nitrogen (NO_x)	0.169
Ozone (O_3)	0.0619

The ozone data presented in Table 5 is required to predict the worst-case NO_2 concentrations. Vehicles emit NO_x (approximately 95% NO and 5% NO_2) and the NO component of the NO_x emission reacts photochemically with O_3 to form NO_2. The reaction rate is restricted by the availability of O_3 and light. The Ozone Limiting Method was used to predict worst-case NO_2 concentrations [9]. Equations 1 and 2 define the method.

$$\begin{gathered} \text{If } [O_3]_B < (A+B(1-A))\ [NO_x]_R \\ [NO_2]_R = A\ [NO_x]_R + [O_3]_B + [NO_2]_B \end{gathered} \tag{1}$$

$$\begin{gathered} \text{If } [O_3]_B \geq (A+B(1-A))\ [NO_x]_R \\ [NO_2]_R = A\ [NO_x]_R + B(1-A)[NO_x]_R + [NO_2]_B \end{gathered} \tag{2}$$

where: $[O_3]_B$ = the background ozone level (ppm);

$[NO_x]_R$ = total NO_x contribution from vehicles at the selected receptor location (ppm);

$[NO_2]_R$ = the predicted worst-case NO_2 concentration at the receptor location (ppm);

$[NO_2]_B$ = the background NO_2 concentration (ppm);

A = the fraction of NO_x emitted vehicle exhaust as NO_2 (assumed to be 0.05) [10][11]; and

B = the fraction of NO_x converted to NO_2 as it disperses towards the receptors (assumed to be 0.25) [12].

In Equation 1, the 99th percentile values used for NO_2 and O_3 are assumed to occur concurrently (i.e., NO_2 plus O_3, as shown in Table 5), which is a conservative assumption.

3. RESULTS

Table 6 summarizes the results of the CAL3QHC dispersion modelling. The table shows the worst-case predicted 1-hour CO and NO_2 concentration at each receptor and the respective 1-hour AAQC. The background concentration of 2.5 ppm is included in the predicted CO values. The predicted NO_2 values were calculated using the Ozone Limiting Method, as described in Section 2.6(v), and include the NO_2 background concentration of 0.060 ppm. The maximum concentrations are presented in bold.

Table 6: Predicted Worst-Case 1-Hour CO and NO_2 Concentrations (ppm) By Receptor

Receptor	Description	1-hour CO	1-hour NO_2
1	NW of intersection (Sheppard Centre)	9.1	0.141
2	NW of intersection (Sheppard Centre)	7.1	0.134
3	NW of intersection (Sheppard Centre)	5.7	0.106
4	SW of intersection (Seneca College entrance)	7.6	0.138
5	SE of intersection (Marathon Bldg)	**10.8**	0.145
6	SE of intersection (Marathon Bldg entrance)	8.9	0.139
7	SE of intersection (Marathon Bldg entrance)	7.3	0.135
8	Sheppard Ave. and Bonnington Pl. (entrance to residence)	8.7	0.141
9	Sheppard Ave. and Bonnington Pl. (entrance to residence)	7.1	0.135
10	Sheppard Ave. and Bonnington Pl. (residence - backyard)	6.2	0.133
11	Sheppard Ave. and Bonnington Pl. (entrance to residence)	10.0	**0.147**
12	Sheppard Ave. and Bonnington Pl. (entrance to residence)	6.9	0.136
13	Sheppard Ave. and Bonnington Pl. (entrance to residence)	9.4	0.144
14	SE of intersection (outside Marathon Bldg)	7.0	0.135
15	East Service Road and Anndale Dr.	5.4	0.109
16	NE of intersection (100 Sheppard Ave)	5.8	0.115
17	NE of intersection (park)	9.8	0.144
18	NE of intersection (park)	9.0	0.141
19	NE of intersection (park)	8.1	0.138
20	NE of intersection (park)	7.4	0.136
21	NE of intersection (park)	6.9	0.134
22	SE of intersection (outside Seneca College)	8.0	0.137
AAQC		**30.0**	**0.20**

The results of the dispersion modelling indicate that the impact of vehicle emissions of CO and NO_2 are all predicted to be below their applicable 1-hour AAQC at all receptors. Maximum levels of CO are predicted to be about one-third of the AAQC value of 30 ppm at receptors showing the greatest concentrations. The results demonstrate that receptors farther away from the intersection are predicted to exhibit lower CO concentrations. Maximum NO_2 levels range from approximately 50% to 75% of the AAQC value among the measured receptor points.

Among the receptors representing commercial or public sites, receptor 5 (outside the Marathon building, nearest the Sheppard Ave./East Service Road intersection) exhibited the greatest concentrations of CO and NO_2. CO and NO_2 levels were predicted to be 10.8 ppm and 0.145 ppm, respectively. This is expected due to its near proximity to the intersection, and associated idling traffic. Among the residences examined, the two receptors representing homes with entrances nearest Sheppard Ave (Receptors 11 and 13) exhibited the greatest CO and NO_2 levels.

4. CONCLUSIONS

The present study addressed air quality concerns with respect to the proposed construction of the North York East Service Road by numerically modelling vehicular emissions of CO and NO_x for a representative intersection along the proposed route. NO_x consists of several species including NO and NO_2, but only NO_2 is regulated in Ontario. It was predicted that, for the design year 2020, vehicular traffic along the proposed North York East Service Road will not produce ambient levels of CO and NO_2 that exceed the AAQC. This conclusion is based on the results of dispersion modelling under a combination of worst-case meteorological conditions, peak traffic, and high background pollutant levels. As this combination occurs very infrequently, it is expected that the levels of CO and NO_2 at the receptors examined, as well as for the intersection as a whole, will frequently be less than the values predicted in the present report.

5. REFERENCES

1. Philpott, S., "MOBILE5C User Guide", Transportation Systems Division, Industrial Pollution Prevention, Environment Canada, 1993.

2. "Canadian Climate Norms, 1961 - 1990, Volume 2, Temperature". Atmospheric Environment Service, Environment Canada, 1992.

3. Facsimile to Mr. David S. Chadder, RWDI, from Mr. Paul Hudspith, Cole Sherman and Associates, March 27, 1996.

4. Environmental Protection Act, "Ambient Air Quality Criteria Regulation", R.R.O. 1990, Reg. 337 (as amended by O. Reg. 794/94).

5. "CAL3QHC - A Modelling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections", Schattanek, G., Kahng, J. and Stratou, T., Parsons Brinckerhoff Quade and Douglas, Inc. New York 10119, September 1990.

6. Drawing entitled "Midblock #3 - North York South Downtown Class Environmental Assessment Study". Supplied to RWDI from Mr. Paul Hudspith, Cole Sherman and Associates, April 17, 1996.

7. Facsimile to Ms. Marion Baldwin, RWDI, from Mr. Paul Hudspith, Cole Sherman and Associates, April 15, 1996.

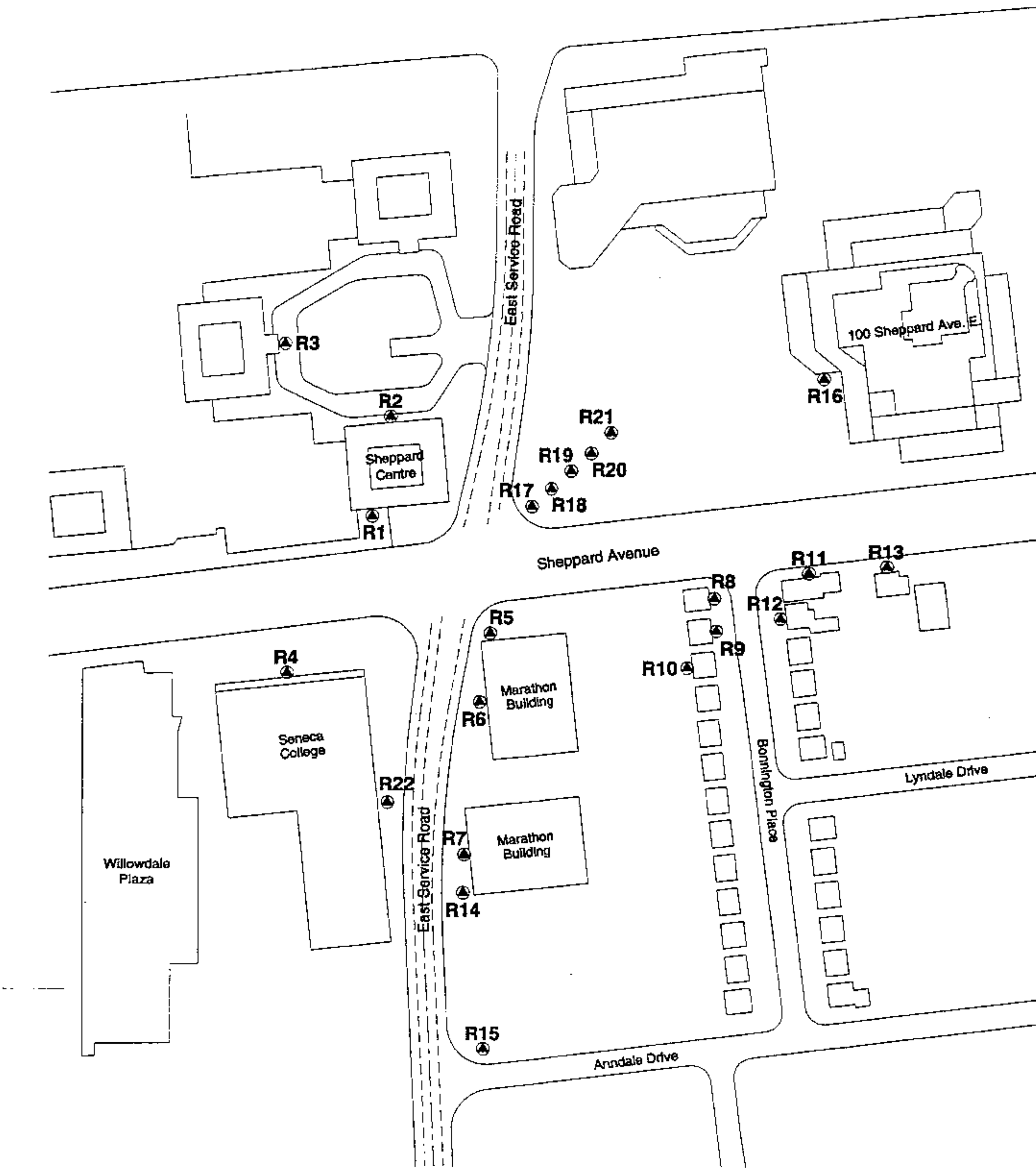
8. Ontario Ministry of Environment and Energy, "Air Quality in Ontario - 1993".

9. Personal Communication between Mr. Mark Vanderheyden, RWDI, and Dr. Robert Bloxam, Ontario Ministry of Environment and Energy, Air Resources Branch, March 2, 1992.

10. Lenner, M., Lindqvist, O. and Rosen, A., "The NO_2/NO_x Ratio in Emissions from Gasoline Powered Cars: High NO_2 Percentage in Idle Engine Measurements", Atmospheric Environment, Vol. 17, No. 8, pp. 1395-1398, 1983.

11. Lenner, M., "Nitrogen Dioxide Exhaust Emissions from Motor Vehicles", Atmospheric Environment, Vol. 21, No. 1, pp. 37-43, 1987.

12. Innes, W.B., "Effects of Nitrogen Dioxide Levels on Ozone Levels in Metropolitan Regions", Environmental Science and Technology, Vol. 12, pp. 904-911, 1981.



Location Plan of Air Quality Receptors	True North	Figure No. **1**	**RWDI**
		Scale: **1:2000**	
East Service Road - North York, Ont.	Job No. 95-199	Date: **Apr. 22,1996**	

APPENDIX A

April 4, 1996

Mr. Paul Hudspith, P.Eng.
Cole Sherman and Associates
75 Commerce Valley Drive East
Thornhill, Ontario
L3T 7N9

Re: North York South Downtown EA
East Service Road Alternatives
Air Quality Assessment
RWDI Reference Number: 95-199T

Dear Mr. Hudspith:

We have completed our qualitative assessment with regard to air quality impacts of the proposed North York East Service Road, and the following comments have been prepared. Our review is based on the information supplied to us by Cole Sherman including seven road alignment alternatives (M1, M2, M3, T1, T2, T5, and Poyntz (P)) and future peak AM and PM traffic volumes. It was assumed that the future AM/PM peak traffic volumes are common to all alternatives. Our qualitative assessment considered the amount of traffic queuing and the number of residences impacted by the proposed roadways.

Based on our qualitative assessment, the seven alternatives have been ranked as follows, in order of preference:

1. Poyntz
2. M1 and M2
3. M3
4. T2
5. T1 and T5

In general, the "midblock" alternatives (M1, M2, M3) will impact fewer residences than the "Tradewind" alternatives (T1, T2, T5), as the East Service Road is routed to the west of the two Marathon office buildings, away from Bonnington Place and the nearby houses. There are no substantive differences among the "midblock" alternatives with regard to air quality impacts. With respect to the impact on the Marathon buildings, M3 is the least desirable of the three "midblock" alternatives, as it is the closest.

Among the "Tradewind" alignments, alternative T2 is more favourable than T1 or T5 from an air quality standpoint, as it ~~does not~~ intersect with Glendora Ave. or Anndale Drive. Tradewind Ave. would remain unchanged, servicing the local streets. A decrease in the number of intersections would reduce the vehicular pollutant emissions (e.g. suspended particulate matter, oxides of nitrogen, carbon monoxide) associated with deceleration, idling and acceleration.

The Poyntz alignment (P) is unique in that it does not intersect with Avondale Ave., instead it curves west to meet Yonge St. This would result in lower vehicular pollutant levels in the residential area east of Bales Ave. compared to the other six alternatives. However, there will be an increase in traffic along Yonge St., as the East Service Road would not carry

traffic all the way to Avondale Ave. It is expected that the overall effect would be an increase in ambient airborne contaminants at locations adjacent to Yonge St., between the proposed East Service Road(Poyntz Ave.)/Yonge St. intersection and the Yonge St./Avondale Ave. intersection.

Overall, the air quality impacts among the seven alternatives are not vastly different, due to the fact that traffic volumes and speeds are assumed to be the same in each case. No particularly sensitive receptors were identified by Cole Sherman within the study area, thus no alternative was selected based on its impact at a specific location. In all cases, it is predicted that the average pollutant emissions *per vehicle* will decrease in the future-build scenario as a result of a more fuel-efficient vehicle fleet in the future and more stringent emissions standards.

In conclusion, the Poyntz alternative is deemed to be the most favourable of the seven alignments. This alternative intersects only two other roads (Sheppard Ave. and Yonge St.), reducing the number of times vehicles must queue at intersections which, in turn, will reduce the amount of emissions from idling and accelerating vehicles. In addition, the Poyntz alternative impacts the fewest number of residences along its route.

It should be noted that these comments are qualitative in nature; a more detailed assessment of the impact on air quality from the preferred roadway alternative will be conducted using numerical models. The present assessment considered only the number of times vehicles would queue and the number of residences impacted for each alternative; whereas, the impacts based on the length of time spent queuing and the distance of receptors from roadways will be assessed for the selected alternative. The resulting quantitative predictions provide a more refined analysis of ambient pollutant levels.

Please don't hesitate to call if you require additional information with respect to this letter.

Yours very truly,

ROWAN WILLIAMS DAVIES & IRWIN Inc.

David S. Chadder, Hon. B.Sc.
Principal

Marion L. Baldwin, B.Sc. (Eng.)
Technical Co-ordinator

DSC/MLB/jt

APPENDIX B

Input Data to CAL3QHC Disperion Model
North York East Service Road

	Link #	Link Description	X1	Co-ordinates Y1	X2	Y2	Effective Width (m)	# of Lanes	Peak a.m Traffic	Cycle Length (s)	Total Red Time (s)
Mobile	M1	East Service Rd. - Approach from S	6.0	0	-8.0	-75.0	13	2	770	-	-
	M1b	East Service Rd. - Approach from S	0.0	0	-12.0	-75.0	9.5	1	40	-	-
	M2	East Service Rd. - Approach from S	-8.0	-75	-11.0	-133.0	13	2	810	-	-
	M2b	East Service Rd. - Approach from S	-11.0	-133	-8.0	-500.0	13	2	810	-	-
	M3	East Service Rd. - Depart to N	10.0	1	22.0	75.0	13	2	1280	-	-
	M4	East Service Rd. - Depart to N	22.0	75	25.0	500.0	13	2	1280	-	-
	M5	East Service Rd. - Approach from N	-2.0	0	13.0	62.0	13	2	755	-	-
	M5b	East Service Rd. - Approach from N	1.0	0	16.0	60.0	13	1	245	-	-
	M6	East Service Rd. - Approach from N	13.0	62	20.0	500.0	13	2	1000	-	-
	M7	East Service Rd. - Depart to S	-5.0	0	-16.0	-60.0	13	2	750	-	-
	M8	East Service Rd. - Depart to S	-16.0	-60	-19.0	-123.0	13	2	750	-	-
	M8b	East Service Rd. - Depart to S	-19.0	-123	-15.0	-500.0	13	2	750	-	-
	M9	Sheppard Ave. - Approach from W	1.0	-8	-494.0	-59.0	16.5	3	1680	-	-
	M10	Sheppard Ave. - Depart to E	1.0	-8	500.0	51.0	16.5	3	1955	-	-
	M11	Sheppard Ave. - Approach from E	0.0	6	500.0	67.0	16.5	3	2480	-	-
	M12	Sheppard Ave. - Depart to W	0.0	6	-499.0	-30.0	16.5	3	1895	-	-
Idling	I1	Sheppard Ave - L. turn north	-30.0	-3	-199.0	-19.0	4	1	195	110	37
	I2	Sheppard Ave through (bound E)	-29.0	-10	-199.0	-27.0	10.5	3	1485	110	37
	I3	Sheppard Ave - L. turn south	31.0	3	249.0	28.0	4	1	140	110	37
	I4	Sheppard Ave through (bound W)	31.0	10	249.0	34.0	10.5	3	2340	110	37
	I5	East Service Rd. - L. turn east	8.0	18	16.0	60.0	3.5	1	122	110	73
	I6	East Service Rd. through (bound S)	2.0	16	13.0	62.0	7	2	878	110	73
	I7	East Service Rd. - L. turn west	-3.0	-17	-12.0	-75.0	3.5	1	40	110	73
	I8	East Service Rd. through (bound N)	3.0	-16	-8.0	-75.0	7	2	770	110	73

Consulting Engineers
Microclimate Specialists

Rowan Williams
Davies & Irwin Inc.

AIR QUALITY ASSESSMENT FOR
NORTH YORK - SOUTH DOWNTOWN DEVELOPMENT

Report 95-199T-14-REV1

June 19 1996

Submitted to:

COLE SHERMAN AND ASSOCIATES LTD.

By:

ROWAN WILLIAMS DAVIES & IRWIN Inc.

GUELPH, ONTARIO

PROJECT TEAM

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Anton E. Davies, Ph.D., P.Eng., QEP
Principal

TABLE OF CONTENTS

1. INTRODUCTION

Rowan Williams Davies and Irwin Inc. (RWDI) was retained by Cole Sherman and Associates to address air quality concerns resulting from the proposed North York South Downtown Development. The present study included both qualitative and quantitative air quality assessments. The qualitative review considered the amount of traffic queuing and number of residences impacted for three East Service Road alternatives and two West Service Road alternatives. A letter outlining the results of the review was provided to Cole Sherman, and is reproduced in Appendix A. For the quantitative assessment, air quality concerns were addressed by numerically modelling vehicular emissions of carbon monoxide (CO) and oxides of nitrogen (NO_x) for selected roadways and intersections, including Yonge Street, in the proposed development.

The following report presents the methodology, results and conclusions of the numerical modelling assessment. A summary of the findings of this study was prepared into a letter report. A copy of this report can be found in Appendix B.

2. METHODOLOGY

The purpose of this assessment was to determine the impact of emissions from vehicles using roadways adjacent to the North York South Downtown Development for the build year 2021. The assessment was conducted using both worst-case meteorological and traffic assumptions. Figure 1 summarizes the steps of the methodology. The emissions examined were tailpipe emissions of carbon monoxide (CO) and nitrogen dioxide (NO_x) from both cars and trucks idling at nearby intersections and travelling along adjacent roadways. These pollutants both have readily available emissions data and provincial criteria as established by the Ontario Ministry of the Environment and Energy (MOEE). The analysis concentrated on the roadways and intersections with the highest predicted traffic volumes, (i.e., evening rush-hour period).

2.1 Vehicular Emission Analysis

Environment Canada's MOBILE5C vehicular emissions model was used to determine emission rates of NO_x and CO [1]. This model is a modification of the U.S. Environmental Protection Agency's (EPA) MOBILE5. The modified version better reflects the emission's performance of Canada's automobile fleet. Table 1 presents the key inputs into the MOBILE5C model. The design year was 2021; however, 2020 was modelled as this is the last year in the MOBILE5C dataset for which emissions information are currently available. Any differences in emissions are expected to be minimal over these two successive years.

Table 1: MOBILE5C Input Parameters

Design Year:

2020, last year in MOBILE5C dataset for which emissions information is available.

Ambient Temperature:

-4.5°C, based on the mean daily temperature at Downsview Airport for the coldest month of the year (i.e., January) [2].

MOBILE5C default values:

default vehicle mix	light-duty gas vehicles	57.0%
	light-duty gas trucks	31.9%
	heavy-duty gas vehicles	3.1%
	light-duty diesel vehicles	0.2%
	light-duty diesel trucks	0.6%
	heavy-duty diesel vehicles (includes buses)	7.8%
	motorcycles	0.4%

Ontario vehicle statistics; and default cold-start vehicle fraction as given by the MOBILE5C manual.

Vehicle speeds:

Default vehicle speed (32 km/h) for urban roads as given by the MOBILE5C model.

2.1.2 Vehicular CO and NO_x Emission Rates

The vehicular CO and NO_x emission rates obtained from the MOBILE5C model are summarized in Table 2.

Table 2: Predicted Vehicle Emission Rates

Emission Source	Pollutant Emission Rate	
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2.2 Air Quality Criteria

Emissions from vehicles are currently regulated by Transport Canada (Federal) regulations. Provincial regulations do not directly control the emissions from vehicles or pollutant concentrations arising from vehicular activities. However, Ontario Regulation 337 provides desirable ambient air quality objectives under which emissions from vehicles can be evaluated [3]. Table 3 presents Ontario's Ambient Air Quality Criteria (AAQC) for 1-hour CO and 1-hour NO_2.

Table 3: Ontario's Ambient Air Quality Criteria

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Carbon Monoxide (CO)	1-hour	30
Nitrogen Dioxide (NO_2)	1-hour	0.20

2.3 Dispersion Analysis

The vehicular emissions obtained from the MOBILE5C model were used to predict worst-case concentrations of NO_x and CO at selected areas using dispersion modelling techniques. The dispersion simulation model used was CAL3QHC. This model, which was originally developed by the U.S. Environmental Protection Agency, was designed specifically for modelling the dispersion of emissions from motor vehicles travelling near roadway intersections [4]. By including emissions from idling vehicles, CAL3QHC represents a reliable model for predicting pollutant concentrations near signalized intersections where idling vehicles interact with moving vehicles. The model has been accepted by the Ontario Ministry of the Environment and Energy for use in roadway environmental assessments.

2.3.1 Modelled Scenario

The air quality impact due to highway emissions are, among other factors, dependant upon the traffic volume, vehicle speed, and the roadway cross-sections. The modelled roadway scenario was based on the design plan review drawing entitled East Service Road #3 (Midblock)/West Service #1 as supplied by Cole Sherman [5].

2.3.2 Input Parameters for CAL3QHC Dispersion Model

The CAL3QHC model required the following input parameters to assess the pollutant levels:

i) Roadway and Receptor Coordinates

Figure 2 illustrates the roadways that were modelled. Also shown in Figure 2 are the receptor locations at which pollutant levels were predicted. The receptors were located at least 3 m from the edge of the roadways. These locations are outside of the mixing zone created by the wake of moving vehicles. For simplicity, all roadways and receptors were assumed to be located on the same plane (i.e., grade level). This would produce conservative results.

ii) Traffic Volumes and Traffic Light Cycles

Morning and evening peak hourly traffic volumes for the adjacent roadways were supplied by Cole Sherman, together with the traffic light cycles at the associated intersections [6]. Analysis of the traffic data indicated that maximum traffic volumes occurred during the evening peak period; therefore, hourly traffic volumes from the evening rush-hour were used in the dispersion analysis. The traffic volumes used in the study are shown in Appendix C along with the coordinates for each roadway link.

iii) Surface Roughness

Mechanical turbulence is generated by air flowing over a surface. This turbulence influences the dispersion of pollutants near the surface. The modelling purposes the study area was considered to be an office area and, therefore, a generic roughness (Z_o) equal to 175 cm (city land use/offices) was selected.

iv) Meteorological Conditions

Worst-case meteorological conditions used in the CAL3QHC dispersion analysis are documented in Table 4.

Table 4 : Meteorological Inputs into the CAL3QHC Model

Parameter	1- Hour Meteorological Conditions
Pasquill Stability Class	Class E
Wind Speed (m/s)	1.0
Mixing Height (m)	300

v) Background Concentrations

As part of the assessment of vehicle emissions, background concentrations of the contaminants within the ambient air were required. Maximum background levels were added to the levels predicted by CAL3QHC for comparison with the provincial AAQC. Table 5 presents the maximum background levels obtained from the MOEE's monitoring station at Hendon Avenue (Yonge/Finch) Station (ID Number 34020) [8]. The latest available data were for the 1992 calender year.

Table 5: Maximum 1-hour Concentrations, MOEE's Hendon Avenue Station, 1992.

Pollutant	**Averaging Period**
	1-hour Maximum (ppm)
Carbon Monoxide (CO)	6
Nitrogen Dioxide (NO_2)	0.09
Oxides of Nitrogen (NO_x)	0.50
Ozone (O_3)	0.106

The ozone data presented in Table 5 is required to predict the worst-case NO_2 concentrations. Vehicles emit NO_x (approximately 95% nitric oxide (NO) and 5% NO_2) and the NO component of the NO_x emission reacts photochemically with O_3 to form NO_2. The reaction rate is restricted by the availability of O_3 and light. The Ozone Limiting Method was used to predict worst-case NO_2 concentrations [9]. Equations 1 and 2 define the method.

$$\begin{gathered} \text{if } [O_3]_B < 0.95\,[NO_x]_R \\ [NO_2]_R = A\,[NO_x]_R + [O_3]_B + [NO_2]_B \end{gathered} \tag{1}$$

$$\begin{gathered} \text{if } [O_3]_B \geq 0.95\,[NO_x]_R \\ [NO_2]_R = A\,[NO_x]_R + B(1-A)[NO_x]_R + [NO_2]_B \end{gathered} \tag{2}$$

where $[O_3]_B$ = the background ozone level;

$[NO_x]_R$ = total NO_x contribution from vehicles at the selected receptor location;

$[NO_2]_R$ = the predicted worst-case NO_2 concentration at the receptor location;

$[NO_2]_B$ = the background NO_2 concentration;

A = the fraction of NO_x emitted vehicle exhaust as NO_2 (assumed to be 0.05); and

B = the fraction of NO_x converted to NO_2 as it disperses towards the receptors (assumed to be 0.10).

In Equation 1, the maximum values used for NO_2 and O_3 are assumed to occur concurrently (i.e., NO_2 plus O_3, as shown in Table 5).

3. RESULTS AND CONCLUSIONS

Table 6 summarizes the results of the CAL3QHC dispersion modelling. The table shows the predicted 1-hour CO and NO_2 concentration at each receptor, together with the relevant 1-hour AAQC. The predicted CO values include the maximum 1-hour background concentrations for 1992 as shown in Table 5 (i.e., 6 ppm CO). The predicted NO_2 values were calculated using the Ozone Limiting Method as described in Section 2.3.3 (v). The predicted NO_2 values include the maximum 1-hour background concentration of 0.09 ppm.

Table 6: Results of Dispersion Modelling

Receptor Number	1-hour CO (ppm)	1-hour NO_2 (ppm)	Receptor Number	1-hour CO (ppm)	1-hour NO_2 (ppm)	Receptor Number	1-hour CO (ppm)	1-hour NO_2 (ppm)
1	19.3	0.17	16	23.0	0.17	31	15.1	0.15
2	17.2	0.16	17	19.6	0.16	32	12.8	0.15
3	19.3	0.16	18	22.1	0.17	33	11.6	0.15
4	19.1	0.16	19	20.8	0.17	34	10.6	0.15
5	20.7	0.17	20	19.7	0.16	35	18.2	0.16
6	21.3	0.16	21	19.2	0.16	36	14.8	0.15
7	18.5	0.16	22	14.6	0.15	37	13.1	0.15
8	20.6	0.16	23	12.7	0.15	38	12.3	0.15
9	19.1	0.16	24	11.6	0.15	39	18.1	0.16
10	20.2	0.16	25	16.1	0.16	40	17.2	0.16
11	19.5	0.16	26	12.9	0.15	42	17.5	0.16
12	21.4	0.17	27	11.4	0.15	42	17.7	0.16
13	20.0	0.16	28	17.9	0.16	43	13.7	0.15
14	22.1	0.17	29	13.3	0.15	44	13.8	0.15
15	18.9	0.16	30	12.0	0.15			
AAQC	**30.0**	**0.20**		**30.0**	**0.20**		**30.0**	**0.20**

The results of the dispersion modelling indicate that the impact of vehicle emissions of CO and NO_2 are all below their applicable 1-hour AAQC at all receptors. This is consistent with monitoring data collected by the MOEE in 1992 which showed that there were no readings in excess of the 1-hour CO and NO_2 criteria at any of their monitoring stations. This includes stations located next to heavily-used roadways such as Hendon Avenue (Yonge/Finch), 381 Yonge Street, and the Evans Street/Arnold Avenue station in Etobicoke, which is located next to the Queen Elizabeth Way.

In summary, it is unlikely that, for the design year 2021, vehicular traffic in the proposed North York South Downtown Development will produce ambient levels of CO and NO_2 that will exceed the AAQC. This conclusion is based on the results of dispersion modelling under worst-case meteorological and traffic conditions and maximum background pollutant levels.

4. REFERENCES

1. Philpott, S., "MOBILE5C User Guide", Transportation Systems Division, Industrial Pollution Prevention, Environment Canada, 1993.

2. "Canadian Climate Norms, 1961 - 1990, Volume 2, Temperature". Atmospheric Environment Service, Environment Canada, 1992.

3. Regulation 337 Under The Ontario Environmental Protection Act, R.S.O. 1992.

4. "CAL3QHC - A Modelling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections", Schattanek, G., Kahng, J. and Stratou, T., Parsons Brinckerhoff Quade and Douglas, Inc. New York 10119, September 1990.

5. Memorandum from Cole Sherman to RWDI, March 9, 1995.

6. Facsimile from Cole Sherman to RWDI, March 16, 1995.

7. Personal communication between Mr. Brian Handy, RWDI, and Mr. Chris Murray of Cole Sherman, March 15, 1995.

8. Ontario Ministry of the Environment and Energy, "Air Quality in Ontario - 1992".

9. Personal Communication between Mr. Mark Vanderheyden, RWDI, and Dr. Robert Bloxam, Ontario Ministry of the Environment and Energy, March 2, 1992.

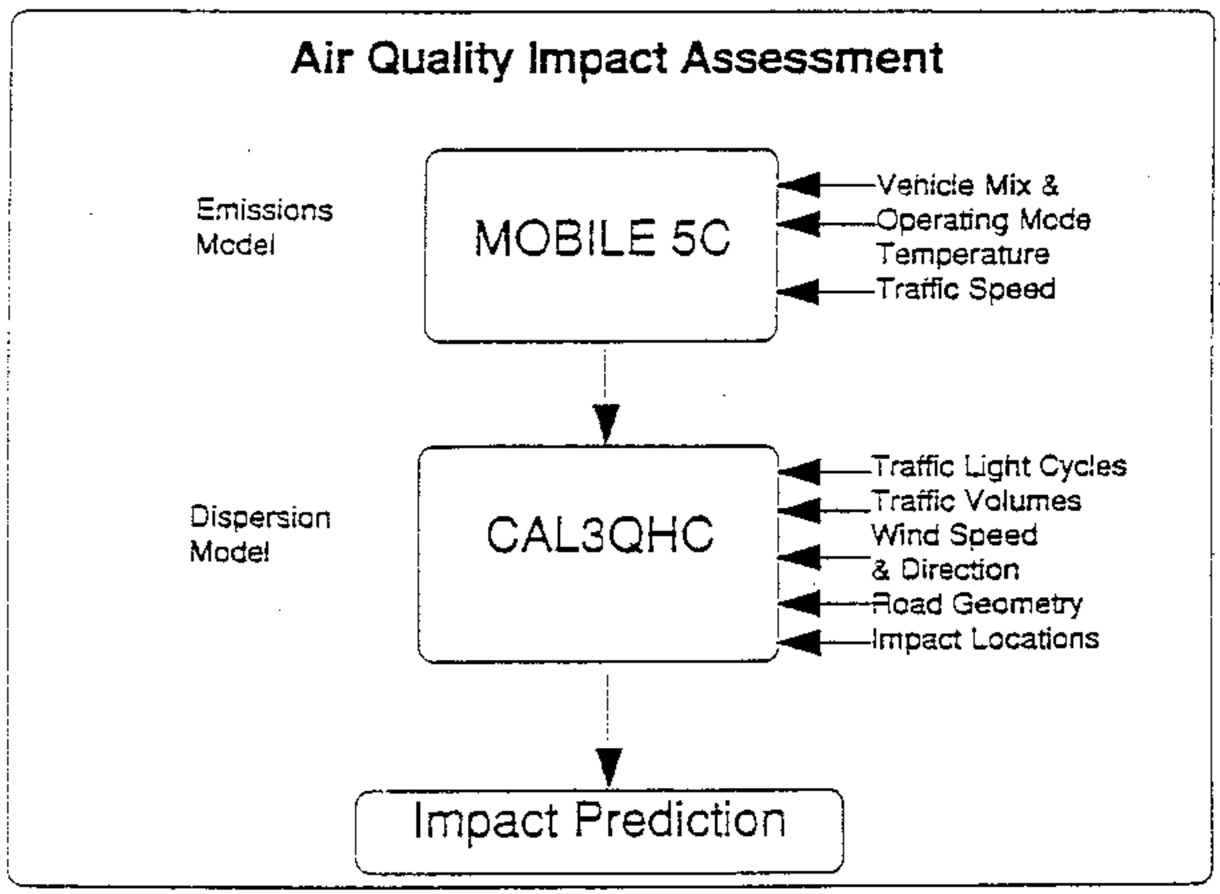

Figure 1: Numerical Modelling Methodology

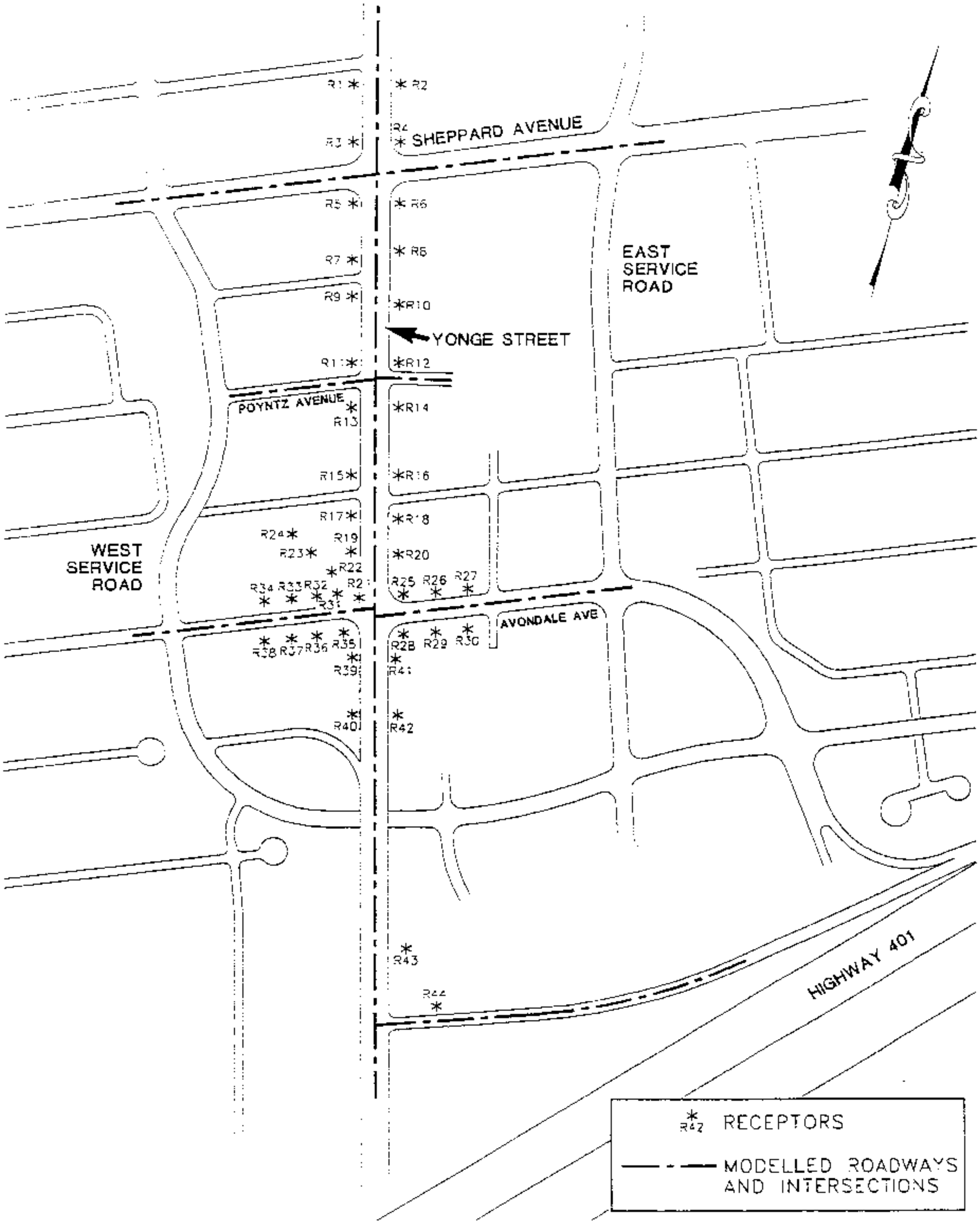

Figure 2: Modelled Roadways and Receptor Locations
Approximate Scale: 1:5000

APPENDIX A

January 24, 1995

Mr. Chris Ricketts, P.Eng.
Cole Sherman and Associates
75 Commerce Valley Drive East
Thornhill, Ontario
L3T 7N9

Re: North York South Downtown
Secondary Plan Review/Class EA
Air Quality Assessment
<u>RWDI Reference Number 95-199T</u>

Dear Chris:

We have reviewed the roadway alternatives for the proposed North York South Downtown Development and the following comments have been prepared. Our review has been qualitative and is based on the information supplied to us by Cole Sherman and included mapping for the three East Service Road alternatives: Numbers 1, 2 and 3A, and the two West Service Road alternatives: Numbers 1 and 2 and peak (AM and PM) traffic volumes. It was assumed that the AM/PM peak traffic volumes are applicable to all alternatives and that the optimum level of service (i.e., light cycle time, traffic speeds, design for traffic volumes, pedestrian crossings) at the intersections will be incorporated into the final project design for the preferred alternative. Our qualitative assessment considered the number of vehicle movements, the amount of traffic queuing and the number of residences impacted by the proposed roadways.

In general, the new service roads, when completed, are expected to divert traffic away from Yonge Street. From an air quality context, contaminant levels along Yonge Street are expected to decline due to a predicted reduction in the number of vehicle movements and in vehicular emissions, the latter as proposed by the federal government. The areas to the east and west of the downtown, where the service roads are planned, will experience a small increase in ambient levels of airborne contaminants (e.g., suspended particulate matter, oxides of nitrogen, carbon monoxide) related to vehicular emissions. Overall, the net effect of the proposed roadway development will be positive for the Yonge Street area and marginally worse for residents near the service roads.

With respect to the two West Service Road Alternatives, where the curvature of the road north of Florence Avenue varies, there are no substantive differences between the alternatives, which would improve or adversely impact the local air quality. The number of residences being impacted is similar and the traffic volumes and speeds would be the same.

With respect to the proposed East Service Road, Alternative Number 3A (Midblock) is deemed to be the most favorable of the three alternatives. In general terms, Alternative 3A (Midblock) includes a ramp that connects traffic from the westbound Highway 401 to the northbound East Service Road by going around the intersection at Avondale Avenue. This Alternative also has a reduced number of intersections along Avondale/Florence Avenues. When combined, these two factors offer potentially less queuing which, in turn, will reduce the amount of emissions from idling and accelerating vehicles.

It should be noted that these comments are qualitative in nature; a more detailed assessment of the impact on air quality from the preferred roadway alternative will be conducted using numerical models.

Please don't hesitate to contact me if you require additional information with respect to this letter.

Yours very truly,

ROWAN WILLIAMS DAVIES & IRWIN Inc.

David S. Chadder, Hon. B.Sc.
Principal

APPENDIX B

March 22, 1995

Mr. Chris Murray
Environmental Planner
Cole Sherman and Associates
75 Commerce Valley Drive Street
Thornhill, Ontario
L3T 7N9

Re: North York Class Environmental Assessment
Air Quality Assessment
RWDI Reference Number: 95-199T

Dear Chris:

We have completed our assessment of the air quality impact from roadways associated with the North York South Downtown Development. This letter report provides a brief outline of the methodology, results and conclusions. A more detailed report will follow at a later date.

The purpose of this assessment was to determine the worst-case impact of emissions from vehicles using roadways adjacent to the North York South Downtown Development for the build year 2021. The emissions examined were tailpipe emissions of carbon monoxide (CO) and nitrogen dioxide (NO_x) from both cars and trucks idling at nearby intersections and travelling along adjacent roadways. These pollutants both have readily available emissions data and provincial criteria. Our analysis concentrated on the roadways and intersections with the highest predicted traffic volumes, (i.e., pm rush-hour period).

Environment Canada's MOBILE5C vehicular emissions model was used to determine vehicular emission rates of NO_x and CO. The vehicular emissions obtained from the MOBILE5C model were used to predict worst-case concentrations of NO_2 and CO at selected pedestrian areas (receptors) using dispersion modelling techniques. A total of 44 receptors were selected for analysis. The dispersion simulation model used was CAL3QHC. This model, developed by the U.S. Environmental Protection Agency, was designed specifically for modelling the dispersion of emissions from motor vehicles travelling near roadway intersections. By including emissions from idling vehicles, CAL3QHC represents a reliable model for predicting pollutant concentrations near signalized intersections where idling vehicles interact with moving vehicles. The model has been accepted by the Ontario Ministry of the Environment and Energy (MOEE) for use in roadway environmental assessments.

March 22, 1995
Mr. Chris Murray
Cole Sherman and Associates

The results of the dispersion modelling indicate that the impact of vehicle emissions of CO and NO_2 are all below their applicable 1-hour Ambient Air Quality Criteria (AAQC) at all receptors. This is consistent with monitoring data collected by the MOEE in 1992 which showed that there were no readings in excess of the 1-hour CO and NO_2 criterion at any of their monitoring stations. This includes stations located next to heavily-used roadways such as Hendon Avenue (Yonge/Finch), 381 Yonge Street, and the Evans Street/Arnold Avenue station in Etobicoke, which is located next to the Queen Elizabeth Way.

In summary, it is unlikely that vehicular traffic in the proposed North York South Downtown Development will produce impacts of CO and NO_2 that exceed AAQC.

We would be happy to respond to any questions or comments that you might have - feel free to contact either of the undersigned.

Yours very truly,

ROWAN WILLIAMS DAVIES & IRWIN Inc.

David S. Chadder, Hon. B.Sc.
Principal

Brian Handy, B.Sc.
Project Co-ordinator

DSC/BH/jt

APPENDIX C

NORTH YORK SOUTH DOWNTOWN DEVELOPMENT

YONGE STREET NORTH/SOUTH THROUGH LINKS

	COORDINATES				TRAFFIC
	X1	Y1	X2	Y2	Veh/hr
NORTH OF SHEPPARD					
Northbound Link	10.0	1.0	7.0	175.0	2140
Southbound Link	-7.0	-1.0	-7.0	175.0	2590
SHEPPARD TO POYNTZ					
Northbound Link	7.0	1.0	7.0	-175.0	2500
Southbound Link	-7.0	-1.0	-7.0	-175.0	2780
POYNTZ TO AVONDALE					
Northbound Link	7.0	-175.0	7.0	-371.0	2580
Southbound Link	-7.0	-175.0	-7.0	-371.0	2870
AVONDALE TO NEW INTERSECTION					
First Northbound Link	17.0	-549.0	50.0	-718.0	2350
Second Northbound Link	7.0	-371.0	17.0	-549.0	3010
First Southbound Link	-7.0	-371.0	-3.0	-491.0	3440
Second Southbound Link	-3.0	-491.0	36.0	-725.0	2580
SOUTH OF NEW INTERSECTION					
Northbound Link	50.0	-718.0	50.0	-856.0	1400
Southbound Link	36.0	-725.0	36.0	-865.0	2580

YONGE STREET EAST/WEST THROUGH LINKS

	X1	Y1	X2	Y2	TRAFFIC Veh/hr
SHEPPARD AT YONGE					
East Link	0.0	0.0	207.0	24.0	3450
West Link	0.0	0.0	-178.0	-18.0	2950
POYNTZ AT YONGE					
East Link	0.0	175.0	80.0	-175.0	260
West Link	0.0	-175.0	-135.0	-191.0	270
AVONDALE AT YONGE					
East Link	0.0	-371.0	216.0	-353.0	770
West Link	0.0	-371.0	-164.0	-368.0	960
NEW INTERSECTION AT YONGE					
East Link	50.0	-718 0	200.0	-710.0	1600

YONGE STREET NORTH/SOUTH QUEUE LANES

	Total		COORDINATES			TRAFFIC
	Width (m)	X1	Y1	X2	Y2	Veh/hr
YONGE AND SHEPPARD						
Northbound Through and Right Turn Lane (3)	11.1	5.6	-20	5.6	-155	2090
Northbound Left Turn Lane (1)	3.7	0	-20	0	-60	410
Southbound Right Turn Lane (1)	3.7	-10	20	-11	81	290
Southbound Through Lanes (3)	11.1	-3	20	-3	155	2220
Southbound Left Turn Lane (1)	3.7	4	21	6	81	80
YONGE AND POYNTZ						
Northbound Through and Right Turn Lanes (3)	11.4	8.5	-186	8.5	-371	2460
Northbound Left Turn Lane (1)	3	1.5	-186	0	-228	120
Southbound Through and Right Turn Lane (3)	11.4	-7	-166	-7	-1	2680
Southbound Left Turn Lane (1)	3	-1.5	-166	0	-106	20
YONGE AND AVONDALE						
Northbound Through Lanes (3)	11.1	8.5	-394	8.5	-718	2560
Northbound Left Turn Lane (1)	3.7	1 5	-395	0	-455	200
Northbound Right Turn Lane (1)	3.7	16	-394	15	-482	250
Southbound Through and Right Turn Lane (3)	11.1	-8.5	-354	-7	-175	2850
Southbound Left Turn Lane (1)	3.7	-1.5	-352	0	-293	150
YONGE AND NEW INTERSECTION						
Northbound Through Lanes (2)	7.4	49	-735	50	-856	1400
Southbound Through Lanes (2)	7.4	35	-717	-4	-482	2580

YONGE STREET EAST/WEST QUEUE LANES

	Total Width (m)	X1	Y1	X2	Y2	TRAFFIC Veh/hr
YONGE AND SHEPPARD						
Eastbound Through and Right Turn Lanes (3)	11.1	-16	-11	-162	-24.5	1450
Eastbound Left Turn Lane (1)	3.7	-16.5	-3.5	-76.5	-8	150
Westbound Through and Right Turn Lanes (3)	11.1	21	12	213	32	1280
Westbound Left Turn Lane (1)	3.7	21 5	4	80	8.5	120
YONGE AND POYNTZ						
Eastbound Left Turn Lane (1)	3.7	-15	-178.5	-123.5	-161	20
Eastbound Right Turn Lane (1)	3.7	-14.5	-182	-123	-162.5	120
Westbound Left and Right Turn Lane (1)	3.8	16	-172.5	81	-176.5	210
YONGE AND AVONDALE						
Eastbound Left Turn Lane (1)	3.7	-25	-375.5	-146.5	-388.5	110
Eastbound Right Turn Lane (1)	3.7	-24	-379.5	-147	-391.5	340
Westbound Left Turn Lanes (2)	7.4	18	-372	89	-363	370
Westbound Right Turn Lane (1)	3.7	18	-366	89	-359	190
YONGE AND NEW INTERSECTION						
Westbound Left Turn Lanes (2)	7.4	58	-721	200	-710	650
Westbound Right Turn Lane (1)	3.7	58	-714	221	-602	950