APPENDIX 1

ORIGINAL ENVIRONMENTAL STUDY REPORT AND UPDATE



APPENDIX 1-1

1999 Environmental Study Report

The Corporation of the City of North Bay

CLASS ENVIRONMENTAL STUDY REPORT

MCKEOWN AVENUE

from Gormanville Road to Algonquin Avenue

draft

Prepared for the
City of North Bay

October 1999

The Corporation of the City of North Bay

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draft

CHAPTER 1 - INTRODUCTION AND BACKGROUND

1.1 THE ENVIRONMENTAL STUDY REPORT

The Class Environmental Assessment (Class EA) for Municipal Roads Projects (June 1993) is the approved planning procedure designed to ensure that social, economic, and natural environmental effects are considered in the planning of municipal roads projects. Provided that the conditions of the Class EA are met, projects require no further approvals under the Environmental Assessment Act unless the municipality considers the project to have sufficient environmental impact to warrant an individual environmental assessment or unless the Ministry of Environment orders a project to be "*bumped-up*"to follow an individual EA process. The Class EA planning process emphasizes project assessment and public involvement.

The types of projects subject to the Class EA are categorized according to "*Schedules*" as follows:

Schedule A are projects that are limited in scale and have minimal environmental impact. Regular road maintenance and operational improvements fall within this category (eg. resurfacing, signalization).

Schedule B are projects that have the potential for moderate environmental impact (eg. minor road construction). These projects are subject to screening process which requires public contact and discussions with affected agencies.

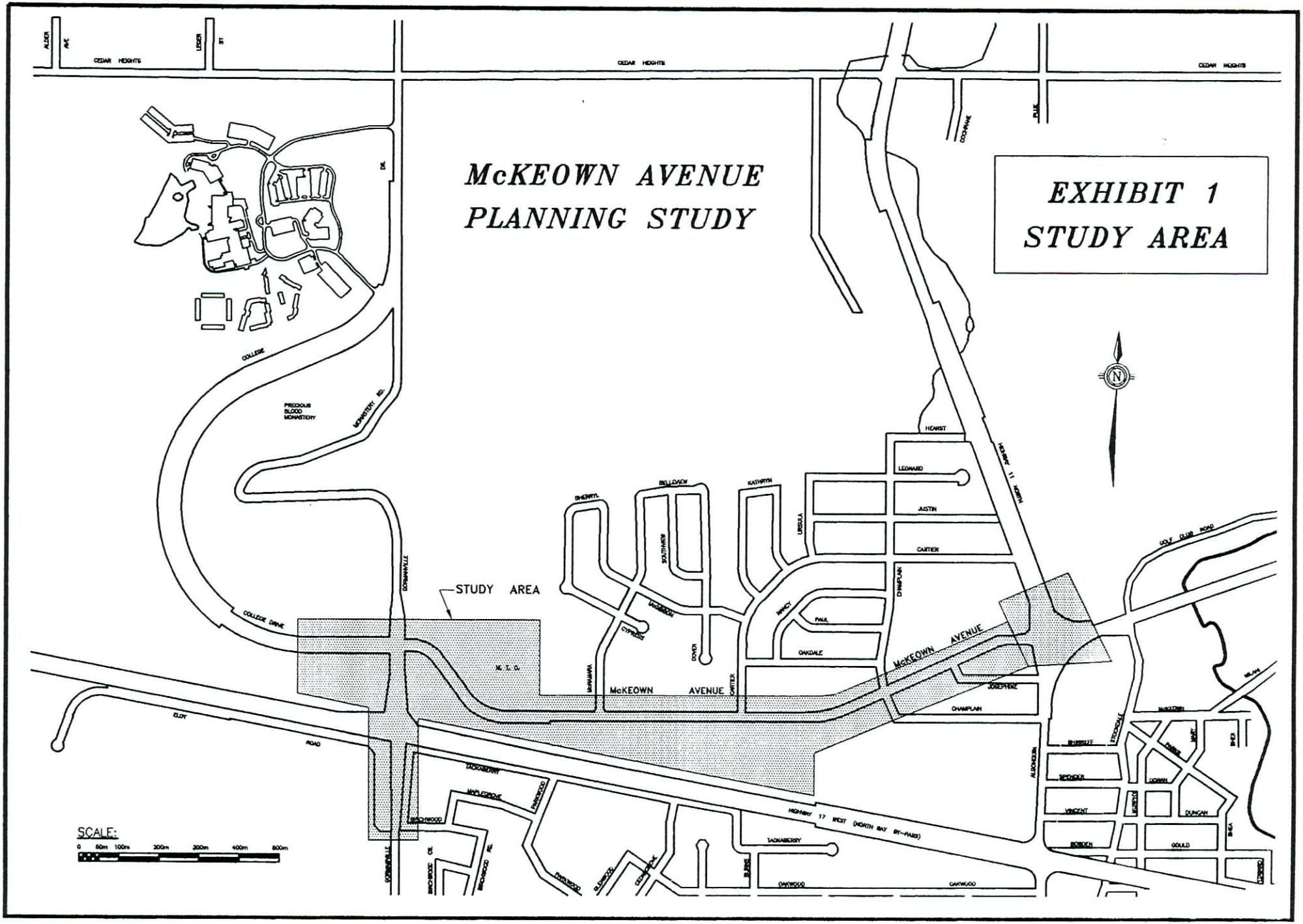
Schedule C are projects that have the potential for significant environmental impacts (eg. road widening additional lanes). These projects must follow the entire planning process set out in the Class EA which is documented in an Environmental Study Report.

An environmental assessment process, following the requirements for a Schedule "C" project, was conducted to evaluate alternative solutions to problems of the future road requirements for McKeown Avenue in the City of North Bay. The environmental assessment determined that the following improvements were the preferred solutions to the identified inadequacies:

ALTERNATIVE C

- Reconstruct McKeown Avenue to a five lane cross section. There will be 2 through lanes in each direction with a continuous centre fifth lane for left turns from Gormanville Road to Algonquin Avenue. New traffic signals are anticipated at Josephine Street and Gormanville Road. In the future signals may also be required at McNamara Street. The project also includes the reconstruction of the Gormanville intersection with additional turning lanes and channelization.

- This project also recommends improvements to Algonquin Avenue including: two left turn lanes for northbound Algonquin traffic to westbound McKeown Avenue, two northbound through lanes, and other intersection improvements such as turning lanes on the side streets.


McKEOWN AVENUE
PLANNING STUDY
EXHIBIT 1
STUDY AREA
STUDY AREA
McKEOWN AVENUE
McKEOWN AVENUE
CEDAR HEIGHTS
CEDAR HEIGHTS
CEDAR HEIGHTS
COLLEGE
COLLEGE DRIVE
MONASTERY RD.
PRECIOUS BLOOD MONASTERY
ELOY
ROAD
HIGHWAY 17 WEST (NORTH BAY BY-PASS)
HIGHWAY 11 NORTH
HEARST
LEONARD
JUSTIN
CARTIER
CHAMPLAIN
JOSEPHINE
OAKDALE
PAUL
NANCY
DOVER
CYPRESS
MCMANAMA
SOUTHVIEW
BELLEVIEW
SHERRY
KATHRYN
URSULA
GOLF CLUB ROAD
SPENCER
VINCENT
DUNCAN
GOULD
BOSWELL
TACKABERRY
OAKWOOD
SCALE:
0 50m 100m 200m 300m 400m 500m

The improvements to Algonquin Avenue are under the jurisdiction of the Ministry of Transportation and are not formally part of the undertaking for the selected municipal road improvements to McKeown Avenue described in this Class EA.

The improvements described above, and which are explained in detail in Chapters 4 and 5, constitute the undertaking for this Class EA.

In accordance with the requirements of the Class EA, this Environmental Study Report (ESR) was prepared to document the full Class EA planning process that led to the selection of the preferred solution. The ESR includes a discussion of the problem, the project approach and the existing environmental conditions in the study area. It further describes the alternative solutions and designs considered as well as the evaluation method that was followed to select the preferred alternative.

When completed, the ESR is placed on the public record by filing a copy with the City Clerk who makes it available to public review for a minimum 30 calendar day period. If no unresolved concerns or "*bump-up*" requests are received during the review period, the municipality may complete the planning process, prepare contract documents, issue tenders and proceed to construction.

During the minimum 30 day review period any person or party may request that the Minster of Environment "*bump-up*" this project to an individual environmental assessment. "*Bump-up*" requests must be filed within the specified review period after the proponent has placed the ESR on the Public Record and has given a Notice of Completion of the ESR. The procedure for filing a "*bump-up*" is set out in the Notice of Completion at the front of this ESR.

1.2 STUDY AREA

The primary study area for this class environmental assessment includes McKeown Avenue from Gormanville Road easterly to Algonquin Avenue, lands adjacent to the street and the intersections of streets connecting to McKeown Avenue. The study area also includes surrounding streets, neighbourhoods, commercial areas and institutional lands to the extent that was necessary to describe traffic conditions affecting McKeown Avenue and to inventory the natural, social and economic environment that might reasonably be affected by the undertaking. A key plan identifying the study area boundaries is shown in Exhibit 1.

1.3 BACKGROUND

The road network in the McKeown Avenue and Josephine Street area has undergone important changes in recent years with the realignment of McKeown Avenue to link with Airport Road and the recent extension of Josephine Street to intersect with McKeown Avenue. Since the realignment, significant new commercial development has taken place in both the McKeown Avenue and Algonquin Avenue corridors. This new commercial growth has occurred as development on vacant parcels and as expansions on existing developed properties. The shift of commercial activity to the McKeown Avenue corridor is expected to continue in the future. In addition, with the extension of lines, sewer new growth is expected at the College Education Centre main campus and on adjacent lands in the Cedar Heights area. The former Eloy Farm property, now referred to as the College

Education Centre Lowlands Site, is under consideration as a location for the new North Bay Hospital.

These recent and ongoing activities have and will continue to generate additional traffic on McKeown Avenue. In 1993, the Ministry of Transportation completed a reconstruction of Algonquin Avenue to 6 lanes with median barrier and intersection treatments including new traffic signals at Sherreff Avenue and at Airport Road/McKeown Avenue to accommodate increased traffic in the area. The Ministry of Transportation has also recently resurfaced Highway 17 with intersection improvements at Gormanville Road. It is expected that road improvements to McKeown Avenue west of Algonquin will be required in order to keep pace with traffic demands.

Northland Engineering (1987) Limited and Tranplan Associates were retained in 1998 to review the traffic demand on McKeown Avenue from Algonquin Avenue to Champlain Street and to identify recommended road improvements. A report that included a recommended traffic plan and lane configuration to accommodate expected traffic growth over the long term was completed in June 1998. The report and recommendations were available for use in completing this Class EA and are summarized in the following section.

In 1998, the City of North Bay released a Request for Proposals to complete a Traffic Planning and Design Study for McKeown Avenue from Champlain Street to Gormanville Road and to include in the work program a process to satisfy the appropriate environmental assessment requirements for any identified road improvements. Tranplan Associates in association with Northland Engineering (1987) Limited were retained to undertake the study on behalf of the City. Based on the expected size of the overall project, the Class EA was conducted in accordance with the full Schedule C planning and design process.

1.3.1 McKeown Avenue/Josephine Street Traffic Study (June 1998)

Tranplan Associates and Northland Engineering (1987) Limited completed this study to identify required roadway improvements within the McKeown Avenue corridor from Algonquin Avenue/ Highway 11 to Champlain Street. The study was designed to provide traffic solutions in response to current and future commercial development in the corridor. Existing road configurations, traffic volumes, intersection level of service and accident statistics were evaluated for the study area. Future traffic forecasts were developed for a five year and ten year planning horizon with detailed trip generation and trip distribution patterns for two commercial development proposals (Ontario Hydro and Algonquin Mall - Stage 2), as well as background traffic in the study area.

Recommendations from the McKeown Avenue/Josephine Street Traffic Study include the following items:

McKeown Avenue Lane Configuration

That a centre two-way left turn lane be developed along McKeown Avenue from Algonquin Avenue to Champlain Street. This would result in a five lane cross-section along this section of McKeown Avenue. Also, right turn lanes or tapers are recommended at the McDonald's Restaurant entrance, at Josephine Street and at the Wendy's entrance.

Traffic Signals at Josephine Street
That traffic signals be installed on McKeown Avenue at Josephine Street, when the new commercial developments are built.

Consolidation of Commercial Entrances
Coincident with the installation of the traffic signals at Josephine Street, the existing commercial entrances on both sides of the Tim Horton Donuts restaurant are to be consolidated as one entrance opposite Josephine Street.

Intersection of McKeown Avenue and Algonquin Avenue
That planning be initiated with a view to acquiring property, if needed, to widen McKeown Avenue and Airport Road on the approaches to Algonquin Avenue, and that the northbound left turn traffic volume on Algonquin Avenue be monitored with a view to implementing a double left turn using the existing lanes in the short term future and adding a lane in the longer term future.

Sidewalks
That as development and redevelopment takes place, a sidewalk should be installed along the south side of McKeown Avenue and that if a sidewalk is also built along Josephine Street, it should be located on the side adjacent to the major development.

1.3.2 The College Education Centre Traffic Study

Tranplan Associates and Northland Engineering (1987) Limited completed the study for Canadore College and Nipissing University Centre to identify possible improvements to the campus road network. Existing traffic conditions supplemented by a review of accident statistics and vehicle and pedestrian counts were evaluated. The study recommended against a one way access road, but suggested consideration of road closure options as well as campus road traffic calming measures, adding turning lanes and sidewalk extensions. The study generated morning peak arrival and afternoon peak departure volumes for the campus. These figures were utilized in this study to determine lane requirements at the College Drive / Gormanville Road intersection.

1.4 STUDY PURPOSE

The purpose of the study is to determine what improvements will be required to be made to McKeown Avenue between Algonquin Avenue/Highway 11 and Gormanville Road and adjacent sections of College Drive, Gormanville Road, Algonquin Avenue and Airport Road to meet the needs of the expected development within the corridor. It is intended to address the following problems:

- Deteriorating pavement conditions
- Safety concerns
- Roadway capacity, including intersection Level of Service (LOS)
- Other traffic and operational deficiencies
- Transit and pedestrian facilities

The study includes a review of a wide range of alternatives to address the above problems and, based on a systematic evaluation against a number of environmental factors, identifies the preferred road improvements for the study area.

The City of North Bay intends to use the results of this study along with the results of the previous McKeown Avenue/Josephine Street Traffic Study (June 1998), which will identify needed road improvement costs, to develop methods by which the costs of infrastructure improvements could be collected and apportioned against benefitting property owners. One method the City of North Bay has identified at this time is a special area charge that would assign appropriate costs to development as development proceeds with the City of North Bay bearing a portion of the cost of the improvements.

1.5 PROBLEM STATEMENT

A review was completed of the existing conditions and the following problems have been identified.

TRAFFIC / CAPACITY

- Existing conditions are generally acceptable (with the following exception)
- The westbound left turn at McKeown Avenue and Gormanville Road intersection is presently operating at a Level of Service (LOS) F which is unacceptable.
- With new development there will be a rapid deterioration in the Level of Service and insufficient capacity throughout the McKeown corridor

SAFETY / ACCIDENTS

- The intersection of McKeown Avenue at Champlain Street and at the commercial entrances serving Tim Horton Donuts exhibit high accident frequency
- Accident reports for the McKeown Avenue and Gormanville Road intersection show low accident frequency.

PAVEMENT CONDITIONS

- The existing pavement structure of McKeown Avenue at certain locations west of Cartier Street is in poor condition and will require replacement in the near future.
- Minor drainage deficiencies are present in the existing roadway.

TRANSIT / PEDESTRIAN FACILITIES

- With the expected growth in traffic there will need to be careful planning to avoid transit and pedestrian conflicts with vehicular traffic in the study corridor.

1.6 STATEMENT OF THE RATIONALE FOR THE PROJECT

The existing roadway between Cartier Street and Gormanville Road has deteriorated to a point where reconstruction is required to restore the structural integrity of the road base. In addition, the existing traffic volumes on this roadway are expected to grow beyond the capacity of the two lane section. As traffic volumes increase, it is also expected that accidents will increase in frequency.

The projected future traffic volumes, without improvements to the road network, will result in the following operational deficiencies.

- Through traffic volumes will be disrupted by left turning vehicles, resulting in driver frustration and delays.
- Road width discontinuity from 4 lanes to 2 lanes at Cartier Street.
- Long queues and delays on McKeown Avenue at Gormanville Road.
- Poor access to McKeown Avenue from Algonquin Mall and from new commercial development along Josephine Street (long queues and delays).
- More accidents, particularly at Champlain Street and at the Tim Horton Donuts, including personal injury accidents and possibly fatalities.

The existing pavement conditions, the existing accident history and the deteriorating levels of service warrant physical, safety and operational improvements to McKeown Avenue and its intersections with adjacent roads.

The proposed improvements are recommended after three alternatives and a number of design options at specific locations were identified, analyzed, reviewed by the public, and evaluated in detail. The conclusion was that the reconstruction of McKeown Avenue to four lanes plus a continuous left turn lane from Algonquin Avenue to Gormanville Road best meets future capacity requirements while reducing accidents on this major collector. These operational improvements will provide a good level of service and safety for road users in the future.

CHAPTER 2 - PROJECT APPROACH

2.1 STUDY APPROACH

The planning of this project followed the environmental assessment planning and design process as set out in the Class Environmental Assessment for Municipal Road Projects (June 1993). In support of the Class EA work, two traffic studies were completed to provide technical background information on traffic conditions in the study area.

The traffic planning studies included traffic data collection to establish existing traffic volumes and the projection of future traffic volumes in the study area. Future traffic was estimated for two planning horizon years 2004 and full development (possibly 2015). Future traffic estimates were analyzed to determine traffic impacts on the existing roadways and to provide an assessment of basic lane configuration requirements (e.g., two lane, four lane or five lane) for the study area roads. In addition, a capacity analysis for each intersection was performed assessing projected level of service and the need for turning lanes, channelization and signalization.

The traffic forecasting process was aimed at identifying roadway improvements designed to serve the full development of the study area along with expected demands from adjacent areas including the College Education Centre lands and the Cedar Heights area. The traffic planning work program was the basis for determining need and justification for road improvements, noise impact assessment and for preparing a functional transportation plan and preliminary engineering road designs as part of the Class EA work.

The study included the following components:

1. **McKeown Avenue**
   Alternatives for McKeown Avenue from Algonquin Avenue to Gormanville Road including intersection improvements at Gormanville Road/College Drive, McNamara Street, Cartier Street, Champlain Street and Josephine Street were developed and assessed as part of the scope of work for the undertaking. The Gormanville Road/Highway 17 intersection was recently reconstructed with the resurfacing of Highway 17 through te City of North Bay by the Province in 1997/1998. Approach improvements from the College Drive/Gormanville Road/McKeown Avenue intersection along Gormanville Road to Highway 17 were developed as a component of this undertaking.

2. **Algonquin Avenue**
   Alternative intersection improvements at Algonquin Avenue/Highway 11 North were developed to illustrate how the improvements to the McKeown Avenue approaches would match the improvements required for Algonquin Avenue. The improvements to the Algonquin Avenue intersection are under the jurisdiction of the Province and are not included in the undertaking for this Class EA. Any future proposals by the Province to proceed with improvements to the Algonquin Avenue intersection at McKeown Avenue would proceed in accordance with the Provincial Highways Class Environmental Assessment.

In considering the Class EA requirements to demonstrate need and justification for improvements, it was noted that key assumptions and projections related to the travel demand for this area of the City had to be updated. Some of the key activities taking place in the study area and having an impact on traffic volumes include:

- shift in commercial activity to the McKeown Avenue/Algonquin Avenue corridors,
- redevelopment and expansion of existing district commercial properties,
- new development of large footprint retail stores, and
- use of McKeown Avenue as a route to and from an expanding College Education Centre.

These factors were taken into account in the preparation of land use and traffic forecasts for the study.

2.2 STUDY PHASES

In order to ensure that environmental assessment requirements were met, the study was conducted with the following study phases. The study process is illustrated in Exhibits 2 and 3.

Study Phase
Phase 1 Notice of Commencement of Study & Problem Identification
Phase 2 Identify and Evaluate Alternative Solutions & Public Review
Phase 3 Identify and Evaluate Alternative Designs & Public Review
Phase 4 Environmental Study Report

The Class Environmental Assessment was completed to Phase 4 with the filing of the Environmental Study Report. With the completion of Phase 4, the City of North Bay may proceed to Phase 5 with the preparation of contract drawings and tender documents for construction of road improvements. It is expected that construction would proceed at such time that road improvements are needed and can be scheduled. A recommended timing for the phasing of improvements based on identified capacity deficiencies and the sequence in which capacity shortfalls are expected to occur is included in Chapter 6.

The study findings and cost estimates were used to produce cost estimates for construction and for the purposes of the City developing an equitable means of assessing costs as development proceeds.

2.3 STUDY TEAM

The study was carried out under the direction of Tranplan Associates in conjunction with Northland Engineering (1987) Limited. Northland Engineering was responsible for the engineering, land use, environmental and noise components of the study. Overall direction of the project was provided by the Engineering and Environmental Services Department of the City of North Bay.

City of North Bay Planning Department Staff:

John Simmonds	- City of North Bay, City Engineer
Brian Watters	- City of North Bay, Manager of Designs and Approvals

The consultant staff on the project team included:

Tranplan Associates:

Toivo Rukholm,	- Transportation Planner, Project Director
John Van Loon	- Senior Analyst

Northland Engineering (1987) Limited:

Dave Richards	- Special Advisor, Study Coordinator
Shiu-Kee Poon	- Senior Design Engineer
Mark Head	- Planner
Bruce Roberts	- Project Planner

Merlex Engineering Limited

Mike Merleau	- Geotechnical Consultant

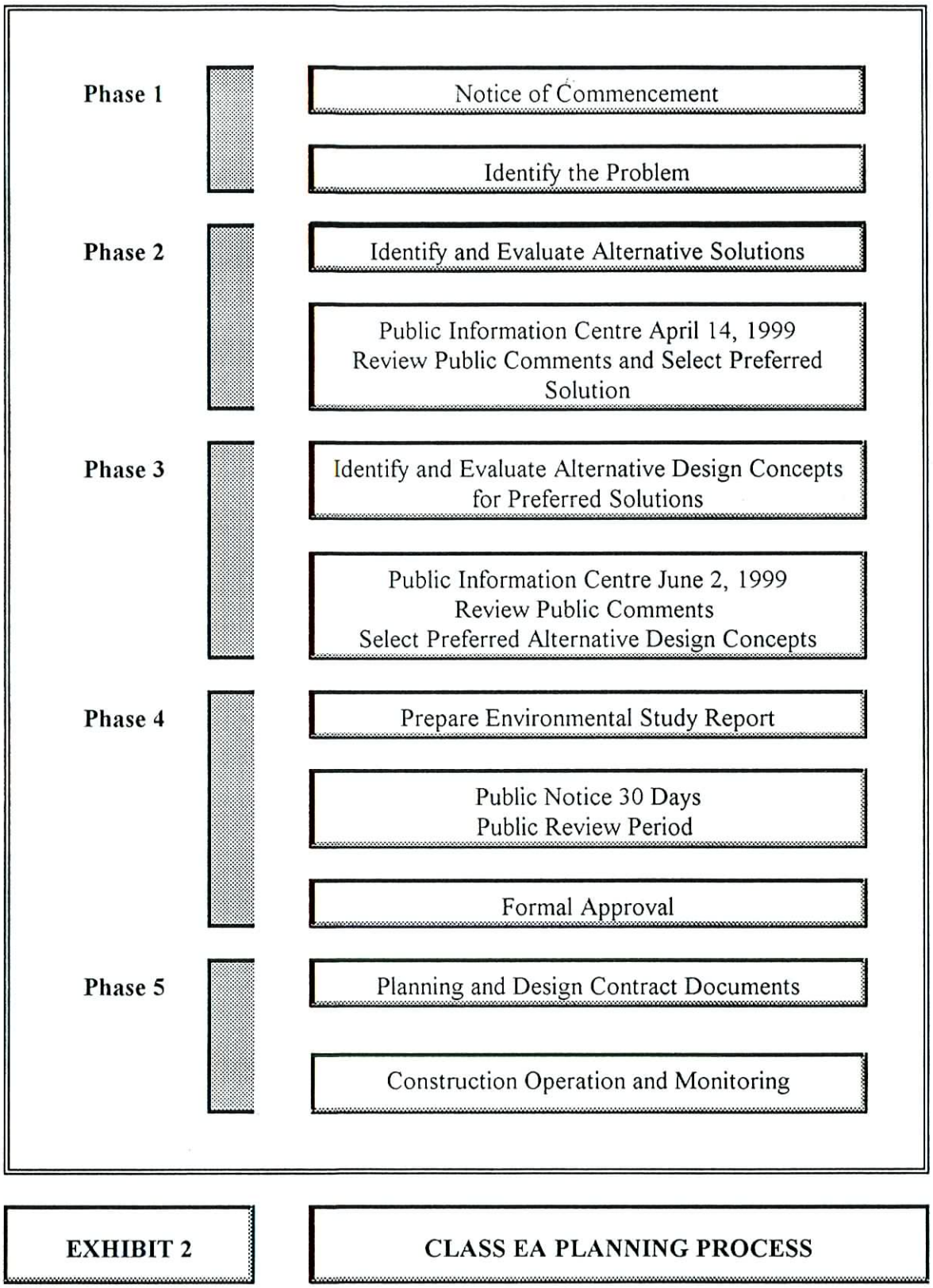


EXHIBIT 2 **CLASS EA PLANNING PROCESS**

PLANNING AND DESIGN PROCESS FOR MUNICIPAL ROADS PROJECTS

PHASE 1

1. IDENTIFY PROBLEM
2. DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PROBLEM

PHASE 2

1. IDENTIFY ALTERNATIVE SOLUTIONS TO THE PROBLEM
2. SELECT SCHEDULE (APPENDIX 1)
3. INVENTORY NATURAL, SOCIAL ECONOMIC ENVIRONMENT
4. INDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES
5. EVALUATE ALTERNATIVE SOLUTIONS; IDENTIFY RECOMMENDED SOUTIONS
6. CONSULT REVIEW AGENCIES & PUBLIC RE PROBLEMS AND ALTERNATIVE SOLUTIONS
7. SELECT PREFERRED SOLUTION
8. REVIEW & CONFIRM CHOICE OF SCHEDULE

MAY OPTION LAND

SCHEDULE A

APPROVED MAY PROCEED

IF NO BUMP-UP MAY PROCEED

FIRST ** OPPORTUNITY FOR LAND ACQUISITION (SCHEDULE B)

OPPORTUNITY FOR BUMP-UP REQUEST TO MINISTER WITHIN 30 DAYS OF NOTIFICATION

BUMP-UP GRANTED PROCEED WITH INDIVIDUAL E.A. OR ABANDON PROJECT

NOTICE OF COMPLETION TO REVIEW AGENCIES AND PUBLIC

SCHEDULE B

SCHEDULE C

INDIVIDUAL E.A.

PHASE 3

1. IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
2. DETAIL INVENTORY OF NATURAL, SOCIAL AND ECONOMIC ENVIRONMENT
3. IDENTIFY IMPACTOF ALTERNATIVE DESIGNS ON MITIGATION MEASURES
4. EVALUATE ALTERNATIVE DESIGNS, IDENTIFY RECOMMENDED DESIGN
5. CONSULT REVIEW AGENCIES & PREVIOUSLY INTERESTED & DIRECTLY AFFECTED PUBLIC
6. SELECT PREFERRED DESIGN
7. REVIEW ENVIRONMENTAL SIGNIFICANCE & CHOICE OF SCHEDULE
8. PRELIMINARY FINALIZATION OF PREFERRED DESIGN

FIRST ** OPPORTUNITY FOR LAND ACQUISITION (OR EXPROPRIATION) FOR SCHEDULE C PROJECTS

DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PREFERRED DESIGN

PHASE 4

1. COMPLETE ENVIRONMENTAL STUDY REPORT (ESR)
2. ENVIRONMENTAL STUDY REPORT PUT ON PUBLIC RECORD FOR 30 DAYS
3. NOTICE OF COMPLETION TO REVIEW AGENCIES & PUBLIC
4. 3 OPPORTUNITY FOR BUMP-UP REQUESTS TO MINISTER WITHIN 30 DAYS OF NOTIFICTION

BUMP-UP GRANTED PROCEED WITH INDIVIDUAL EA OR ABANDON PROJECT

BUMP-UP DENIED WITH OR WITHOUT CONDITIONS

PHASE 5

1. COMPLETE CONTRACT DRAWINGS AND TENDER DOCUMENTS
2. PROCEED TO CONSTRUCTION
3. MONITOR FOR ENVIRONMENTAL PROVISIONS AND COMMITTMENTS

indicates mandatory event

indicates probable event

mandatory public contact

decision point

NOTE; FLOW CHART REPRODUCED FROM FLOWCHART 2.1 MUNICIPAL CLASS E.A. FOR MUNICIPAL ROADS PROJECTS

****NOTE** Proponenents must recognize that acquisition at this stage carries the risk that a bump-up could occur and the project may subsequently not be approved.

Exhibit 3 - ENVIRONMENTAL ASSESSMENT PROCESS FOR MUNICIPAL PROJECTS

2.4 EXTERNAL PARTICIPATION

On a project of this nature the participation of external agencies and organizations are an important part of the study. They provide input to the study, comment on the evaluation of solutions and design alternatives and on the study's recommendations. The following individuals and organizations participated in the study.

Table 1: List of Participating Agencies

Agency	Contact
Ministry of the Environment	Regional Office -Mark Delmonte District Office - Harvey Nelson
Ministry of Transportation of Ontario	Head of Planning & Design - Steve Cripps Area Engineer - Paul Lecoarer Corridor Control Officer - Derek Barkley Head of Traffic Office - Rick Geisler Head of Property Office - Dave Vail
Ministry of Natural Resources	North Bay District - Rick Calhoun
Ministry of Citizenship, Tourism & Recreation	Winston Wong
North Bay Mattawa Conservation Authority	Paula Scott
North Bay Hydro	Brian McMillan
Bell Canada - AN Facilities	Calvin Kohlsmith
Ontario Hydro	Jim Krats
Union Gas	Jeff Peroff
Cogeco Cable - Burlington	Ben Lawrence
City of North Bay Fire Department	Ted McCulloch
City of North Bay Police Department	Constable M. Lahaie
City of North Bay Transit	Terry Brent
North Bay General Hospital	Glen Scanlan
City of North Bay Tourism Leisure Services	Jamie Houston
North Bay and District Ambulance Service	J. Botherston
College Education Centre	Ken Brown
Near North District School Board	Dan Alexander

Agency	Contact
Nipissing Parry Sound Catholic District School Board	Richard Shank
Conseil Scolaire du District Catholique Français Nipissing	Richard Shank
Conseil Scolaire Publique du Nord-Est de l'Ontario	Denis Boyer
Nipissing Naturalist Club	Dick Tafel
Northwatch	Brennain Lloyd

2.5 PUBLIC INVOLVEMENT

The following section describes the public consultation undertaken for this project.

2.5.1 Notice of Commencement of Project.

The Notice of Commencement for the study was published in the North Bay Nugget on February 20, 1999. This Notice informed the public that the study was commencing, indicated the study's purpose and provided contact names and phone numbers for individuals interested in participating. In addition, all property owners and tenants of buildings abutting McKeown Avenue were informed by letter of the commencement of the study. The letter explained the nature of the study, the proposed study schedule and the results that were expected. The letter to property owners also included a key map identifying their property interests along McKeown Avenue and explained how to obtain additional information if required.

2.5.2 First Public Information Centre

The first Public Information Centre (PIC) was held on Wednesday, April 14, 1999 in the Main Foyer of City Hall from 4:30p.m. to 8:00 p.m. Notices for the PIC appeared in the North Bay Nugget on April 3rd and April 10th, 1999. The notice explained that the purpose of the study was to examine the development potential of the study area and to determine the traffic impacts that future development is expected to have on the capacity of the existing road system. Copies of the notice in the paper are included in Appendix 1.

The property owners fronting on McKeown Avenue were all informed by letter of the meeting and were provided with a copy of the ad. Tenants in apartments and housing complexes adjacent to McKeown Avenue were informed by notices dropped off at their mailbox facilities.

A number of adjacent property owners contacted the study team by letter and telephone to discuss aspects of the project with the planners and were provided with the information that was requested.

The Public Information Centre was staffed by members of the study team from Tranplan Associates and Northland Engineering (1987) Limited and by staff from the City of North Bay Department of Engineering and Environmental Services. A representative from the Ministry of Transportation also attended.

The purpose of the first PIC was to present the results of the Phase 1 - Problem Identification and Phase 2 - Identification and Evaluation of Solutions. Displays at the PIC included background information on land use, property ownership and the natural and social environment. A number of traffic displays were available which provided the basis for defining future roadway improvements. The Phase 1 study results indicated that the existing McKeown Avenue was inadequate to accommodate future traffic requirements. Other displays included large size plans of the study area, three proposals for the reconfiguring McKeown Avenue at Gormanville Road and typical cross section examples of road widening options that were to be examined in the next study phases.

Signed in attendance in the visitor register totaled 20 people. Total attendance was estimated at 20 to 30 people. A majority of the verbal and written comments received indicated an understanding of the need to provide road improvements to accommodate future traffic. Some individuals brought forward questions about the development charges the City of North Bay intends to prepare and apply to new development to recover road improvement costs.

2.5.3 Second Public Information Centre

The second Public Information Centre was held on June 2,1999 at the same location as the previous PIC in the Main Foyer at City Hall. Two successive notices were published in the North Bay Nugget on May 22nd and May 29th, 1999. A copy of the notice is contained in Appendix 1.

The purpose of the second PIC was to present the results of Phase 3 which included the identification and evaluation of alternative road improvement designs. Three alternative designs were displayed including the alternative to reconstruct McKeown Avenue to its current 2 lane and 4 lane configuration (Alternative A); the alternative to widen McKeown Avenue to 4 lanes throughout (Alternative B) and the alternative to widen McKeown Avenue to 5 lanes throughout (Alternative C). The Alternative C, which consists of 4 traffic lanes for through traffic and a centre left turn lane throughout, was identified as the recommended design solution.

Signed in attendance at the second PIC totaled 10 individuals. Total attendance was estimated at 15 people. Staff from Tranplan Associates, Northland Engineering (1987) Limited, the City of North Bay Department of Engineering and Environmental Services and the Ministry of Transportation attended . The results from the previous study phases were also available.

Overall, verbal and written comments were similar to those received at the first PIC with individuals indicating an understanding and support of the need to provide road improvements to accommodate future traffic. Site specific property concerns related to access and commercial entrances, the development potential of properties, development charges and private property acquisition needed to accommodate the recommended alternative were brought forward by individual property owners. All concerns were addressed with follow up meetings and correspondence with the property owners.

2.5.4 Mailing List

External team contacts, property owners and individuals who requested to be kept informed of the study were placed on a mailing list which was maintained throughout the study. Copies of notices and requests to provide input were mailed or hand delivered to contact names on the mailing list prior to each study phase. A total of 50 names and contacts were included on the mailing list for the study.

CHAPTER 3 - STUDY AREA CONDITIONS

3.1 EXISTING CONDITIONS

This section highlights the natural and socio-economic environment of the study area and includes a description of existing and future land use, the physical condition of study area streets, transportation conditions, underground infrastructure and utilities. The inventory is provided as a basis for understanding and identifying how the environment might be affected with and without the proposed road improvements.

3.2 NATURAL ENVIRONMENT

The study area's natural environment can be described as typical of a highly urbanized environment. Adjacent properties include a mix of developed and vacant commercial, industrial, institutional and residential land uses.

3.2.1 Vegetation

Vegetation along the McKeown Avenue corridor is typical of a developed urban street with maintained and unmaintained grassed boulevards and open ditches, ornamental plantings associated with developed commercial properties and early successional grasses, shrubs and low trees on vacant undeveloped lands.

3.2.2 Watercourses and Drainage

Stormwater within the study area is handled by three separate and distinct drainage systems. These systems are:

McKeown Avenue / Algonquin Avenue

Area immediately adjacent to the McKeown Avenue/Highway 11 intersection that discharges to Chippewa Creek via a municipally owned storm sewer. This storm sewer system was recently constructed by the Ontario Government to handle the increased flow due to major improvements along Algonquin Avenue and the McKeown/Algonquin intersection.

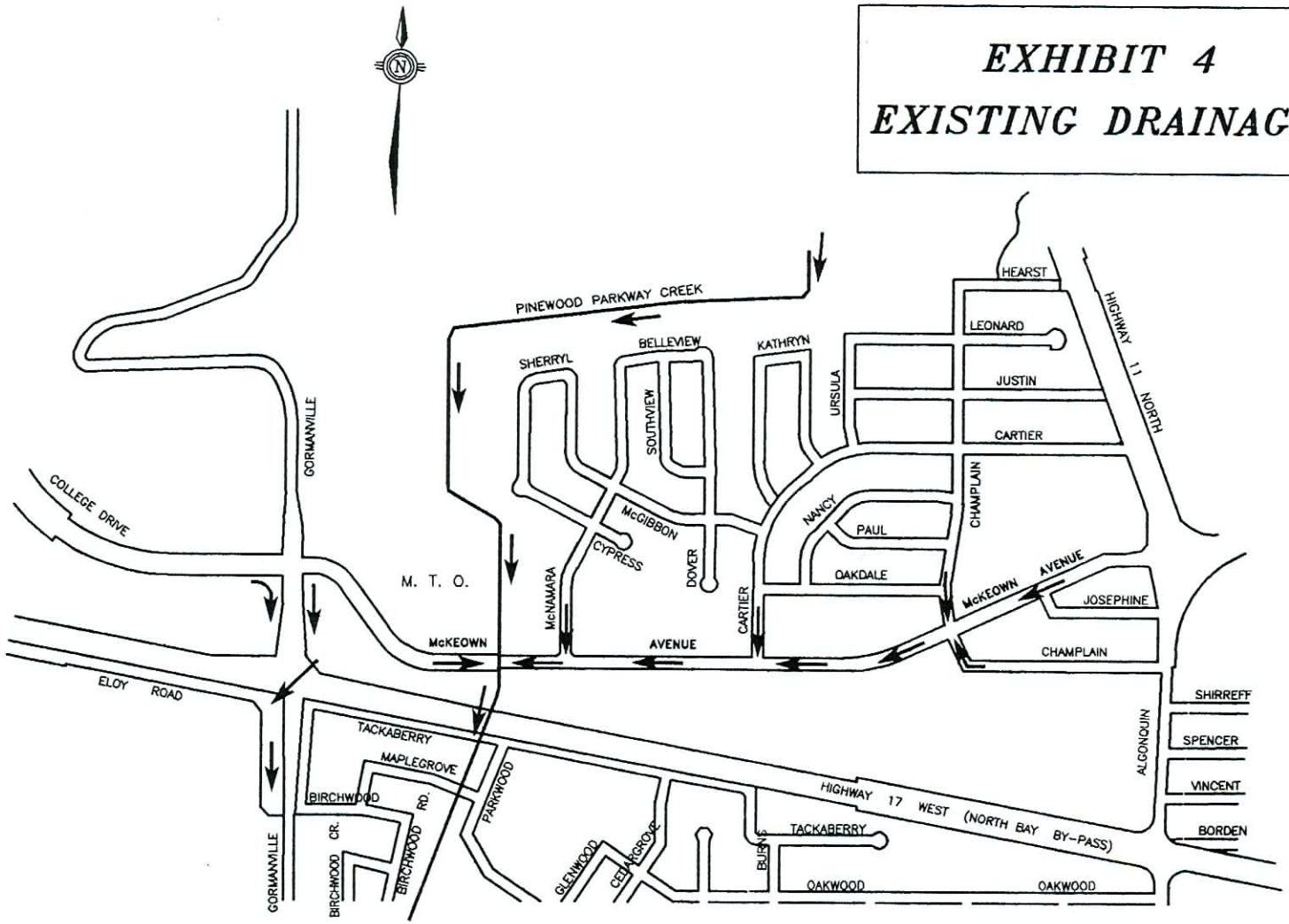
McKeown Avenue - Algonquin Mall to Ontario Government Office Complex

That area from approximately Algonquin Mall to just west of the Ontario Government Office Complex stormwater is collected via a system of storm sewers, catchbasins and some open ditch sections that discharge immediately west of the Hopper Pontiac Buick GMC dealership to the Pinewood Parkway Creek.

The storm sewer collection system that includes a 66 inch outlet has been sized to accommodate a high frequency storm event and at times experiences surcharging especially at its outlet to Pinewood Creek.

Pinewood Creek which outlets to Lake Nipissing has experienced substantial alteration due to the neighbourhood development and there are a number of structures as well as conveyance systems that limit is capacity.

EXHIBIT 4
EXISTING DRAINAGE



SCALE:

0 50m 100m 200m 300m 400m 500m

Although the section of creek at McKeown Avenue does not contain critical fish habitat, it is a highly altered open natural channel. The outlet of the creek at Lake Nipissing is known to support pickerel spawning which could be affected by sedimentation generated by upstream construction activities.

McKeown Avenue / Gormanville Road
That area from just west of the Ontario Government Office Complex that is collected via catchbasins and open ditches that discharges to an open ditch at the intersection of Gormanville Road and McKeown Avenue. Form here, it travels south through road side ditches, culverts, a highly altered drainage course and under the railways to outlet to Lake Nipissing.

3.3 SOCIAL ENVIRONMENT

3.3.1 Existing Land Use

The pattern and type of land use in the study area has a significant bearing on whether future transportation improvements are needed. The existing pattern of land use within the study corridor includes a variety of district commercial, light industrial, residential, institutional (government office) and vacant land types. Existing light industrial uses predominate mid-corridor along the south side of McKeown Avenue. At the east end of the study area, larger retail, restaurants, and strip plaza district commercial development is now well established. Government office and large vacant land holdings predominate at the study corridor's west limits. Vacant lands also occur at several locations distributed along McKeown Avenue from Gormanville Road to Algonquin Avenue. Residential lands include medium density blocks from McNamara Street to Cartier Street, and low density uses forming the Belleview, Thibeault Terrace and Oakdale Highlands subdivisions.

The growth in traffic along McKeown Avenue has increased recently due in part to the commercial growth in the study area and its use as a route to and from the expanding College Education Centre.

3.3.2 Future Land Use

The shift of commercial activity to the McKeown Avenue corridor is expected to continue in the future as other property owners have expressed similar interests to develop or expand commercial properties along the north and south sides of McKeown Avenue from Algonquin Avenue to Cartier Street and to convert existing light industrial properties to district commercial uses. In response to the recent and expected future growth, the City of North Bay completed the McKeown Avenue Corridor Land Use Review and, based on the recommendations of that review, has updated the Official Plan with new policies and designations in order to support the further expansion of district commercial uses from the Algonquin Avenue area and to set the long term land use direction for highway commercial development on several small and large vacant properties at the west end of the study area.

Future development supported partly by the new Official Plan policies and growth in the Cedar Heights Planning District will continue to generate more traffic in the near future and over the long term. Traffic increases are forecasted as a result of new growth which will take the form of:

- vacant land development;
- expansion of the district commercial node at McKeown Avenue and Algonquin Avenue by conversion of industrial to commercial uses along the south side of McKeown Avenue;

- new development of the College Education Centre Lowlands (former Eloy Farm site) with major institutional, district commercial and residential development;
- expanding enrollment and new student residences at the College Education Centre main campus; and
- future residential growth in the Cedar Heights Planning District.

It is therefore important that long range planning is undertaken to identify the short and long term transportation improvements needed to accommodate traffic as this study corridor builds out to full development.

Plans of the study area showing existing and future land use is included as Exhibit 5.

3.3.3 Property Ownership

A property ownership inventory of the study area was prepared using current assessment mapping and detailed street plan and profile drawings obtained from the City of North Bay. The property inventory was used to identify ownership and property requirements for the road improvement options considered in the study. A copy of the inventory is included as Exhibit 6.

3.3.4 Noise Levels

Northland Engineering carried out a Noise Impact Assessment for this project. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing and future forecasted traffic volumes in the corridor and side streets.

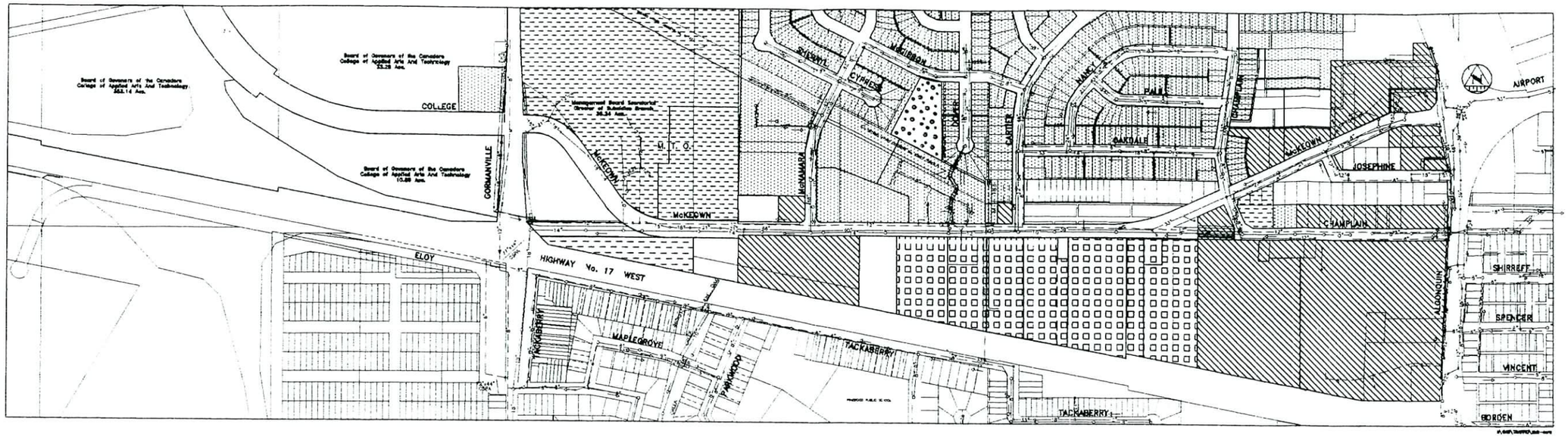
The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less than the Ministry of Environment (MOE) maximum desirable criterion of $L_{eq\ (16)}$ 55 dBA for outdoor sound levels. Traffic volumes in the future are expected to increase sound levels by about 4 dBA. These levels are above the desirable criterion of 55 dBA but below the acceptable criterion of 60 dBA set by the MOE. The Ministry of the Environment considers that a noise increase of less than 10 dBA is acceptable and that a level of 55 dBA or less is desirable.

The use of noise barriers and other on roadway measures to mitigate sound level increases were investigated and were determined not to be possible or feasible. Noise barriers would be broken at numerous locations for entrances and would not achieve a 5 dBA reduction required to result in a perceptible reduction in sound levels.

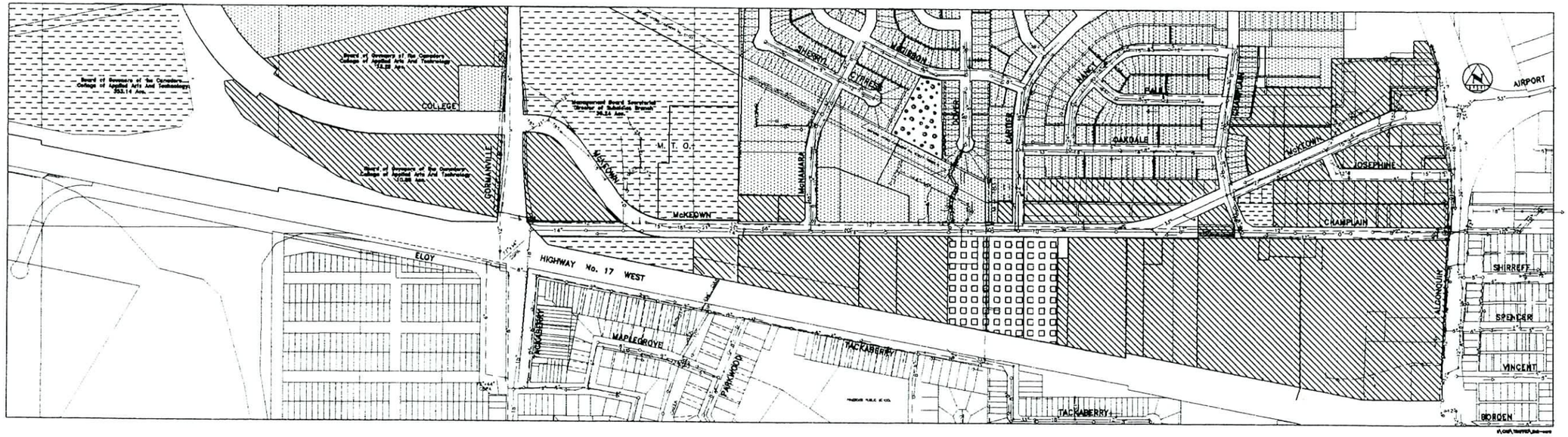
Exhibit 7 shows the predicted sound levels for the selection for existing and predicted future traffic volumes in the study area. The main part of the report is in the appendix.

The noise study concludes that sound levels will increase as a result of traffic increases but will remain within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible. The full report is included in Appendix 2.

EXISTING LAND USE



FUTURE LAND USE



LEGEND LAND USE

- RESIDENTAL
- COMMERCIAL
- INDUSTRIAL
- INSTITUTIONAL
- OPEN SPACE
- VACANT

Exhibit 5 - EXISTING AND FUTURE LAND USE

EXISTING CONDITIONS – PROPERTY OWNERSHIP

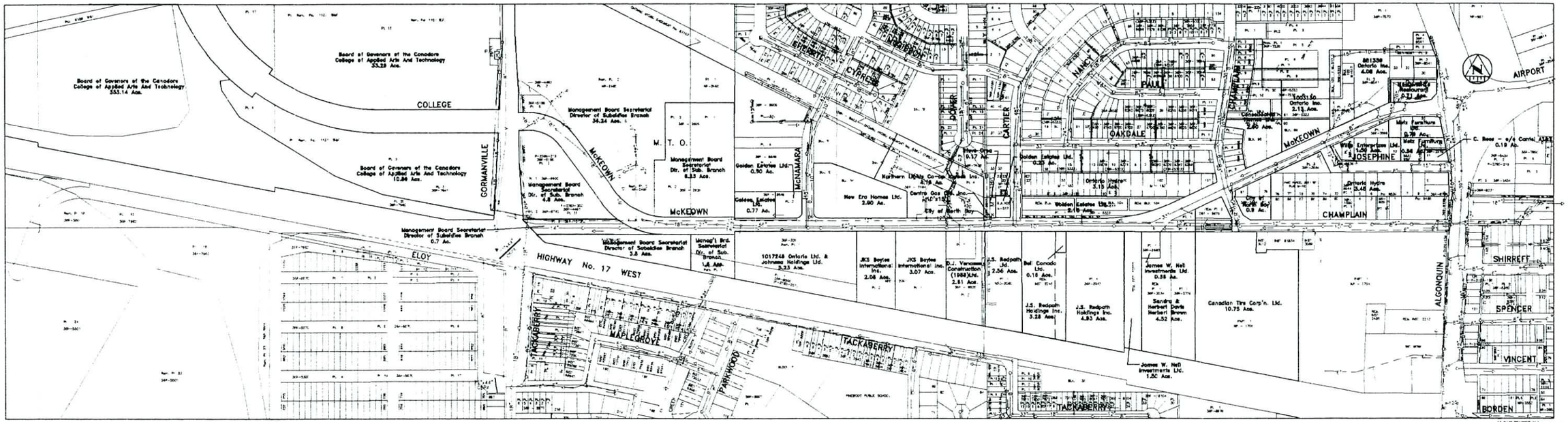


Exhibit 6 - EXISTING CONDITIONS PROPERTY OWNERSHIP

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA (DHV)

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates. The predictions were made using the Ministry of Environment STAMSON* prediction program. These predictions are based on Design Hour Volume which is the heaviest traffic hour in the day.

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	55.44	59.04	3.6
2	centre of courtyard on New Era townhouses	42.76	46.39	3.63
3	rear of parking lot of New Era townhouses	57.31	61.48	4.17
4	centre of play/common area in backyards of Northern Lights co-op	56.72	60.89	4.17
5	backyards of the homes on south side of Oakdale Road	50.54	54.71	4.17
6	backyards of homes on east side of Champlain	54.97	58.11	3.14

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Exhibit 7 - NOSE PREDICTIONS present/future

3.3.4 Heritage Resources

The Ministry of Citizenship, Culture, and Recreation advised that the study area does not contain designated heritage resources or properties and, as a result of the study area being located away from major watercourses that a low potential for archaeological discoveries exist.

3.4 TRANSPORTATION

3.4.1 Study Area Streets

The Official Plan for the City of North Bay designates McKeown Avenue as a collector road. The major collector and arterial street system provides road links that connect the principal activity areas in the City. The street system at the north end of the City particular to this study includes Highway 17, Highway 11 North, Algonquin Avenue, McKeown Avenue, Gormanville Road and College Drive. Within this street system, McKeown Avenue is intended to carry traffic to and from the Belleview, Thibeault Terrace and Oakdale Highlands neighbourhoods of the Cedar Heights Planning District and to serve adjacent commercial, industrial and institutional lands in the corridor. It provides an east-west connection from Algonquin Avenue to Gormanville Road and also functions to carry through traffic to and from the College Education Centre north of the North Bay Escarpment. This roadway is presently four lanes from Algonquin Avenue to Cartier Street and two lanes from Cartier Street to Gormanville Road.

3.4.2 Structural Condition

A preliminary visual assessment of the structural and drainage condition of the pavement was undertaken by Merlex Engineering Ltd. in 1999. In addition, Merlex Engineering included a summary of geotechnical investigations performed by the firm on lands adjacent to McKeown Avenue to provide a preliminary characterization of subgrade and groundwater table conditions for the study area. The pavement inspection with geotechnical review was included in this study to identify a preliminary pavement structure and repair program as information for refining construction cost estimates.

The following is a summary of the investigation for four sections of McKeown Avenue from Algonquin Avenue to Gormanville Road.

Section 1 - Algonquin Avenue to Cartier Street

- the road section is four lanes (undivided) with curb and gutter
- reconstructed in 1992
- observed pavement conditions included longitudinal cracks in each inside lane, moderate intermittent cracks, a moderate frost heave in the eastbound lane over a sewer lateral (east of Champlain Street) and a few slight longitudinal meander and mid-lane cracking

Overall, this section of road has responded well over the last seven years.

Section 2 - Cartier Street to McNamara

- the road section is two lanes with curb and gutter
- constructed in 1979

- the visual review indicated moderate transverse cracking of an intermittent nature. Cracking included a few slight alligator cracks and slight wheel track rutting

Overall, this section of roadway has responded well over the last twenty years with selective resurfacing.

Section 3 - McNamara to 50 m West of West Entrance Into Ontario Government Office Building

- the road section is two lanes with curb and gutter
- constructed in 1978
- this section exhibits moderate wheel track rutting in front of the Lucky 13 store with moderate surface distortions and poor drainage between Lucky 13 and the west entrance to the Ontario Government Office Building

A preliminary geotechnical assessment of this short section suggests that due to the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to traffic load.

Section 4 - McNamara (50m west of Ont. Government Building) to Gormanville Road

- the road section is two lanes with curb and gutter
- constructed in 1978
- pavement conditions included slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking. Moderate intermittent centreline cracking was also observed

The detailed report of the preliminary geotechnical review with recommendations for further investigations to confirm a pavement design is included as Appendix 3.

3.4.3 Existing Traffic Conditions

At the present time, the traffic volumes along McKeown Avenue vary from approximately 14,000 vehicles daily at the east end (at Algonquin Avenue) to approximately 7,000 vehicles daily at the west end (at Gormanville Road). McKeown Avenue is currently operating at an acceptable Level of Service through the study area, except for the McKeown Avenue/Gormanville Road intersection where the left turns from McKeown to go south on Gormanville Road are facing unacceptably long queues and delays at peak hours. This intersection is getting close to warranting the installation of traffic signals; with signals, it would operate at a good level of service.

An analysis of the existing traffic volumes indicated the current need for left turn storage lanes on McKeown Avenue at McNamara Street, at Cartier Street, at Champlain Street, at the Algonquin Mall entrances and at the Provincial Government Building entrance.

3.4.4 Future Traffic Conditions

Future traffic volumes along McKeown Avenue are expected to increase dramatically based on the projected new development/redevelopment in the corridor over the next twenty years. Major growth is expected in the first five years (by 2004) but significant growth is expected to continue through to 2015 - 2020.

Daily traffic volumes at the east end (adjacent to Algonquin Avenue) are expected to increase from 14,000 vehicles to 22,000 vehicles by 2004, and to 28,000 vehicles by full development. At the west end (adjacent to Gormanville Road), daily traffic volumes are expected to increase from 7,000 vehicles to 14,000 vehicles by 2004, and to 20,000 vehicles by full development.

To meet the future needs, McKeown Avenue will need two through lanes in each direction, a continuous centre fifth lane for two-way left turns, right turn tapers or channelization at key locations and new traffic signals at its intersection with Gormanville Road and Josephine Street. Traffic signals may also be required at an additional location, possibly at McNamara Street, in the long term future.

3.4.5 Accidents

A review of accident statistics within the study area identified two major problem areas:

- intersection of McKeown Avenue and Champlain Street
- McKeown Avenue at the Tim Horton Donuts driveway

A high accident frequency was also found at the Highway 17/Gormanville Road intersection, but this intersection has been rebuilt recently and it is expected that the situation has improved.

At Champlain Street, a high number of accidents have occurred involving left turns, including a high proportion of personal injury accidents. These statistics indicate a need for left turn storage lanes and special left turn phasing in the signal timing.

At the Tim Horton Donuts entrance, all the accidents involve left turning vehicles exiting the site. It is expected that these accidents could be significantly reduced by consolidating the existing entrances to a signalized intersection opposite Josephine Street with left turn storage lanes.

Apart from the above locations, there are relatively few accidents occurring within the study area. Some locations, such as the McKeown/Gormanville intersection, are noteworthy for the unexpectedly small number of accidents recorded over the past three years.

The transportation conditions of the study area are described in detail in the McKeown Avenue Traffic Study: Algonquin Avenue to Gormanville Road appended to this report (see Appendix 4).

3.5 UTILITIES

Bell Telephone - Extensive aerial and underground Bell cable facilities are found within the McKeown Avenue right-of-way. Plans identifying Bell facilities were provided to the Study Team as background material. Bell facilities include underground duct conduit (some with fibre optics), buried road crossings, direct buried cable and aerial cable. The plant included a remote switching station on a small parcel owned by Bell Canada on the south side of McKeown Avenue at Cartier Street.

Union Gas - Plans identifying the location of Union Gas gas mains and service lines were provided to the study. Gas lines are present throughout the study area rights-of-way.

North Bay Hydro - North Bay Hydro provided distribution maps of the study area showing existing North Bay Hydro overhead and underground plant and the City of North Bay owned street lights. The overhead plant on McKeown Avenue includes an aerial pole line along the north side of McKeown Avenue extending from the Ontario Government Building easterly to the new realignment of McKeown Avenue where it crosses the road and follows the original McKeown Avenue road allowance to Champlain Street.

Ontario Hydro - Ontario Hydro owns a utility corridor that extends through the study area crossing McKeown Avenue at Champlain Street. The utility corridor contains a L5H Circuit 115 kV high tension line and is currently the only route for the facility through the City of North Bay. Parts of the facility where it crosses McKeown Avenue were recently relocated when the new McKeown Avenue re-alignment with Airport Road was built. Poles at this location are anchored with guys which are now located close to the street. These locations may be affected with a road widening alternative.

3.6 UNDERGROUND INFRASTRUCTURE

McKeown Avenue from Algonquin Avenue to Cartier Street – 16" watermain not replaced - needs to be protected?
New sanitary sewer, storm sewer and watermain services were installed with the re-alignment of McKeown Avenue in 1992. It is not expected that the new infrastructure within this section of roadway would require upgrading or replacement when road improvements recommended in this study are scheduled for construction. ?

McKeown Avenue from Cartier Street to Gormanville Road
Camera and visual inspection reports on the underground services in this section of McKeown Avenue are not available. New storm sewer was installed in 1978 with the reconstruction and re-alignment of McKeown Avenue with College Drive. The sanitary sewer, which was constructed in 1970, and watermain, which was installed in 1963, were not replaced with the 1979 McKeown Avenue reconstruction. A camera inspection of underground infrastructure in this section is recommended in order to determine replacement and upgrading priorities to coincide with any future improvements to the road. OK!

It should be noted that the storm sewer system has been designed for the standards current at the time of installation of the sewer. The Municipality has reviewed the design standard since that time and under this review the storm sewer may have inadequate capacity.

CHAPTER 4 - EVALUATION OF ALTERNATIVES

4.1 ALTERNATIVES AND EVALUATION

This chapter describes the evaluation of the planning solutions and design alternatives that were developed to address the needs along McKeown Avenue in terms of existing and future traffic capacity, level of service and safety.

4.2 EVALUATION OF ALTERNATIVES

Under the Class Environmental Assessment for Municipal Road Projects, road improvements are developed in accordance with an approved environmental assessment procedure, which requires the systematic identification and evaluation of alternatives. The environmental assessment of alternatives in the study was carried out on a staged basis with the initial screening of alternative solutions (Phase 2) followed by a detailed evaluation of the design alternatives carried forward (Phase 3).

4.3 PHASE 2 INITIAL SCREENING OF SOLUTIONS

The Class Environmental Assessment process identifies a first step in Phase 2 as the identification of alternative solutions to the problem. Alternative solutions are defined as functionally different ways of addressing transportation problems and may include the consideration of alternate routes, operational adjustments, transit improvements and roadway improvements such as road widenings.

In the initial screening, alternatives that would not resolve identified transportation problems or future requirements of the roadway were screened out from further investigation. Solutions expected to partly or fully address the study area's transportation requirements were carried forward for detailed evaluation. The following solutions were evaluated in this study in the initial screening at a general level of detail:

- Do Nothing
- Improve Transit
- Improve Other Roadways
- Rehabilitate Existing Road
- Operational Improvements
- Widen Existing Roadway to 3, 4, or 5 lanes

The above solutions were initially presented at the first Phase 2 - Public Information Centre along with reasons for selecting the preferred solution for detailed evaluation.

4.3.1 Do Nothing

The do nothing alternative maintains the existing pavement, traffic capacity, operational and safety conditions which are unacceptable. This alternative does not accommodate the requirements for alleviating traffic capacity deficiencies and would result in unacceptable levels of service over the long term. This alternative would not accommodate future planned development in the study area.

The do nothing alternative was not carried forward.

4.3.3 Improve Transit

The City of North Bay is well served by urban transit services which currently operates three bus routes through the study corridor. North Bay Transit will play an important role as an alternative mode of travel especially to the College Education Centre (CEC) main campus and student residences. These routes now exhibit amongst the highest ridership levels in the City of North Bay. Transit service is also important for the adjacent residential areas. Although transit will continue to provide an important alternate mode of travel, a transit solution alone could not replace the auto mode in serving the existing and future large retail businesses along McKeown Avenue.

The transit alternative was not carried forward for detailed evaluation, but should be implemented as part of the overall transportation system.

4.3.3 Improve Other Roadways

The existing and particularly the future traffic on McKeown Avenue is predominantly destination traffic to locations along the corridor and neighbouring areas. Destination traffic does not have route choices and would therefore continue to use McKeown Avenue in the future. Through traffic to and from the College Education Centre and future development in the Cedar Heights area does have route choices including Highway 17, Highway 11, Algonquin Avenue and Cedar Heights Road. Future improvements to these alternate routes may attract some traffic from McKeown Avenue but would not be expected to solve the biggest part of the identified traffic capacity and operational deficiencies.

This solution was not recommended to be carried forward for detailed evaluation, but it should be implemented as part of the overall transportation system.

4.3.4 Rehabilitate Existing Road

This alternative does not accommodate projected traffic volumes and would result in an unacceptable level of service over the long term. Although this alternative would improve existing pavement conditions which are deficient at some locations, the alternative would not accommodate future planned development in the study area.

Pavement and road structure rehabilitation was carried forward for detailed evaluation as part of the preferred solution.

4.3.5 Operational Improvements

Non-structural improvements such as optimizing signals, operational adjustments and minor road improvements lack the ability to relieve the present and future traffic congestion of the road system. This solution can improve the effectiveness of other road improvement alternatives.

Operational improvements were carried forward to be incorporated in the design of road widening alternatives.

4.3.6 Widen Existing Roadway to 3, 4, or 5 lanes

The reconstruction and widening of the existing roadway offers the potential to solve projected capacity, operational and structural deficiencies. Road widening options either individually or in combination would improve traffic conditions and support future planned and expected development.

Road widening options were carried forward for detailed evaluation.

4.4 PHASE 3 DETAILED EVALUATION OF DESIGN ALTERNATIVES

Based on the results of the Phase 2 initial screening, the following road design alternatives were developed:

Alternative A -Reconstruct McKeown Avenue to its Existing 2 Lane and 4 Lane Configuration (See Exhibit 8 - Drawings 1, 2 and 3)

Alternative B - 4 Traffic Lanes (See Exhibit 9 - Drawings 1, 2 and 3)

Alternative C - 5 Traffic Lanes (See Exhibit 10 - Drawings 1, 2 and 3)

The detailed evaluation was carried out with seven environmental factors representing the environment affected or most likely affected by the project alternatives. Sub-factors for each factor were developed to provide detail in the accounting of expected positive and negative environmental impacts. The seven factors were:

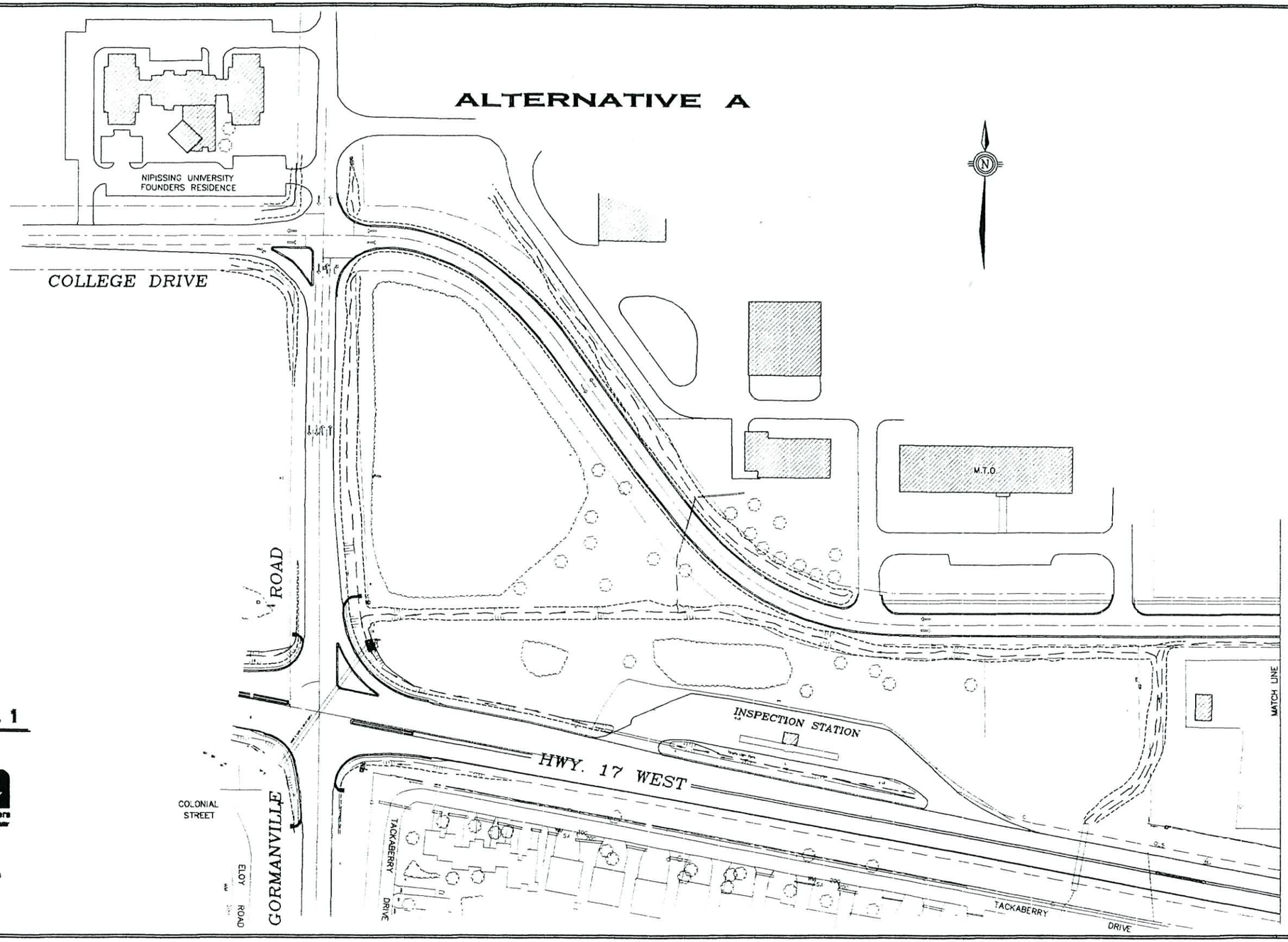
- Transportation
- Safety
- Land Use
- Social Environment
- Natural Environment
- Cost
- Public Preference

Descriptions of sub-factors used in the evaluation are presented in Exhibit 11.

The different road design alternatives were comparatively ranked against each detailed evaluation factor using a five point rating scale from most preferred to least preferred. A rank of most preferred indicated an alternative that provided the most benefit (e.g., met traffic capacity requirements) or least impact (e.g., minimized property requirements). Least preferred ratings were assigned to options that provided no or minimal benefits or which had the greatest negative impact. Ratings varied according to the alternative and sub-factor used. Exhibit 12 is an illustration of the rating scale used.

The results of the evaluation are presented in detail in Exhibit 13. The inventory of impacts as presented in the detailed evaluation table together with the following description of ranking results represents the rationale and documentation for the selection of the preferred alternative.

ALTERNATIVE A



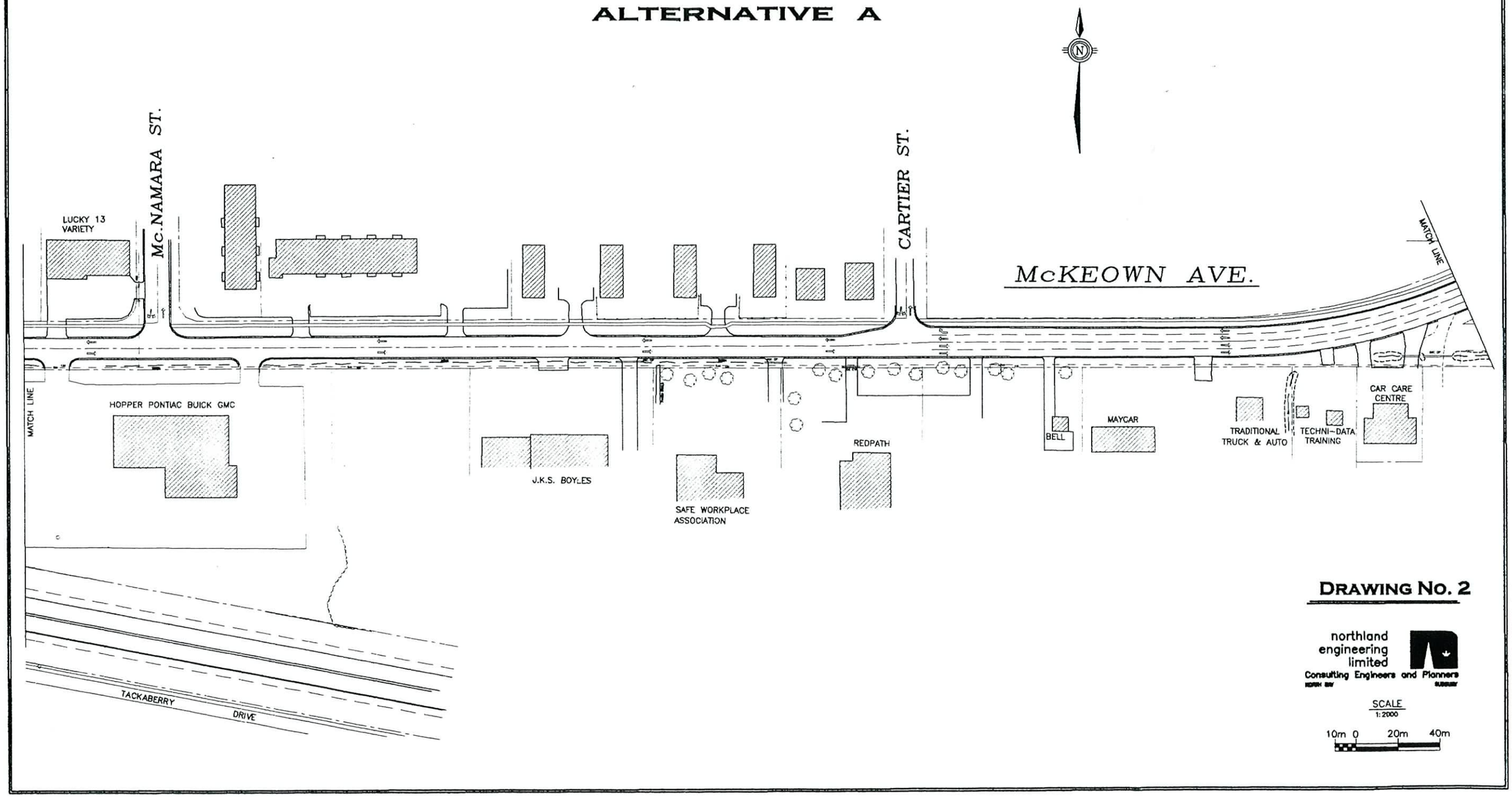
DRAWING No. 1

northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

SCALE
1:2000
10m 0 20m 40m

Exhibit 8 - ALTERNATIVE "A" - page 1

ALTERNATIVE A



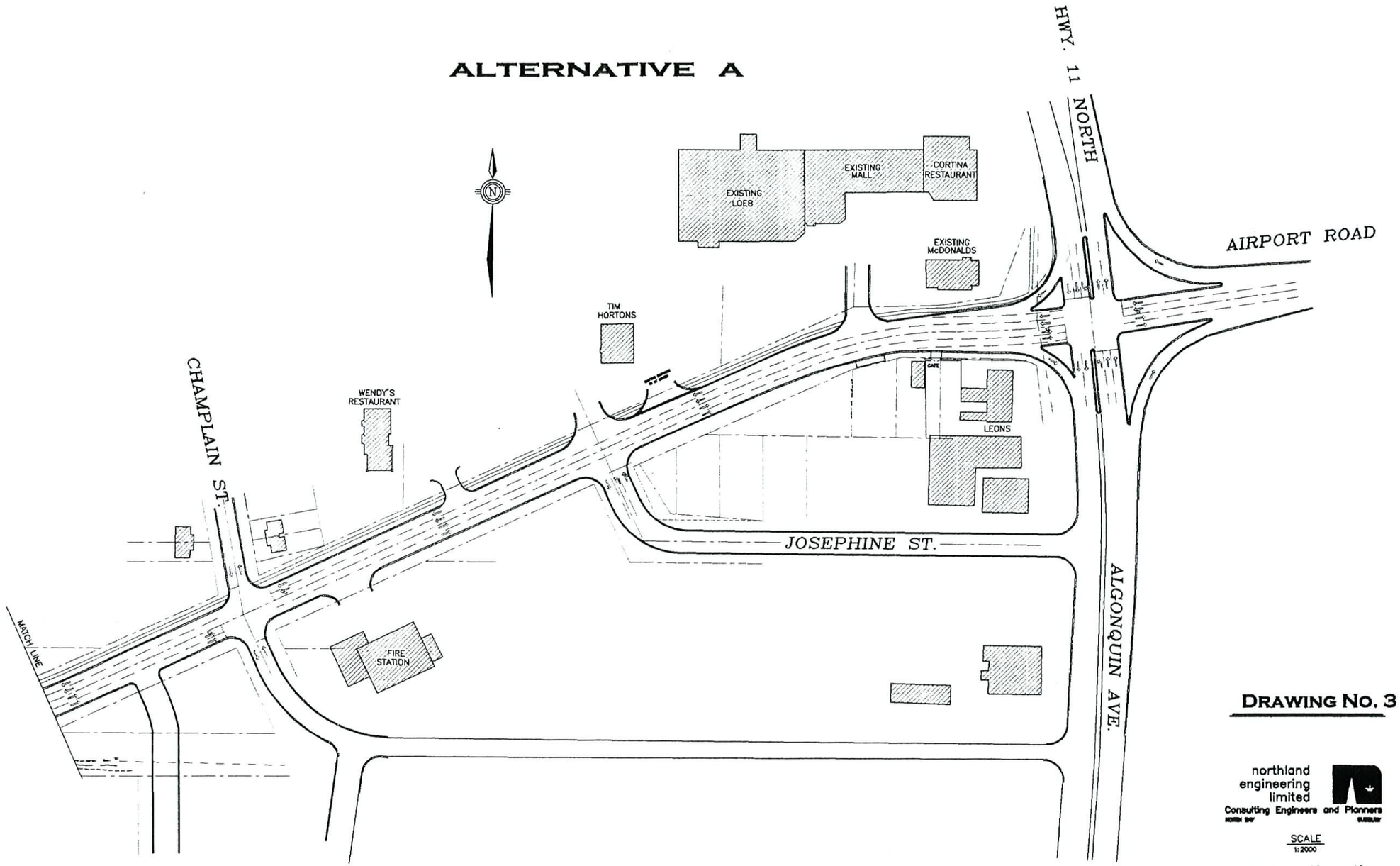
DRAWING No. 2

northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

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Exhibit 8 - ALTERNATIVE "A" - page 2

ALTERNATIVE A



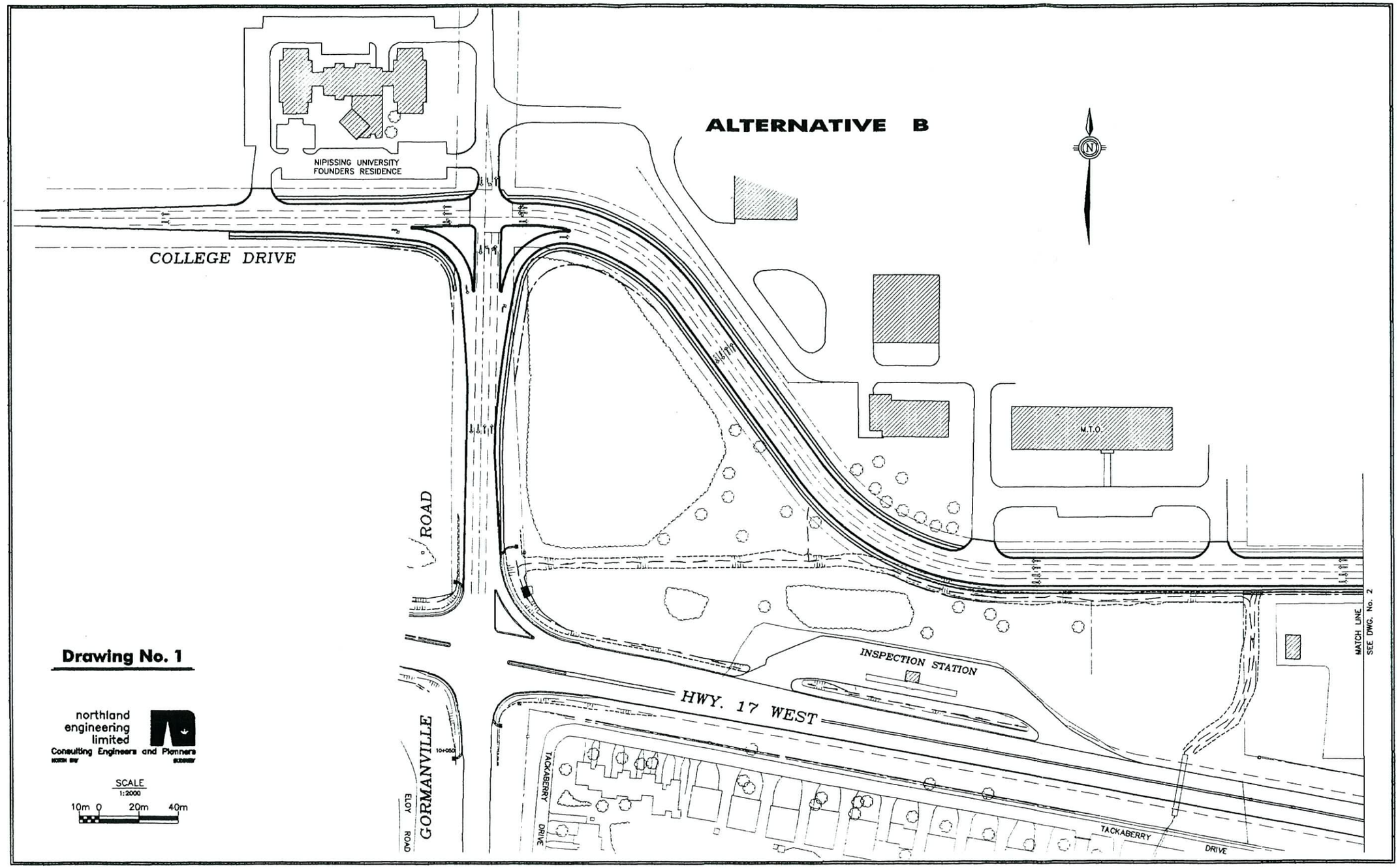
DRAWING No. 3

northland engineering limited
Consulting Engineers and Planners

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Exhibit 8 - ALTERNATIVE "A" - page 3



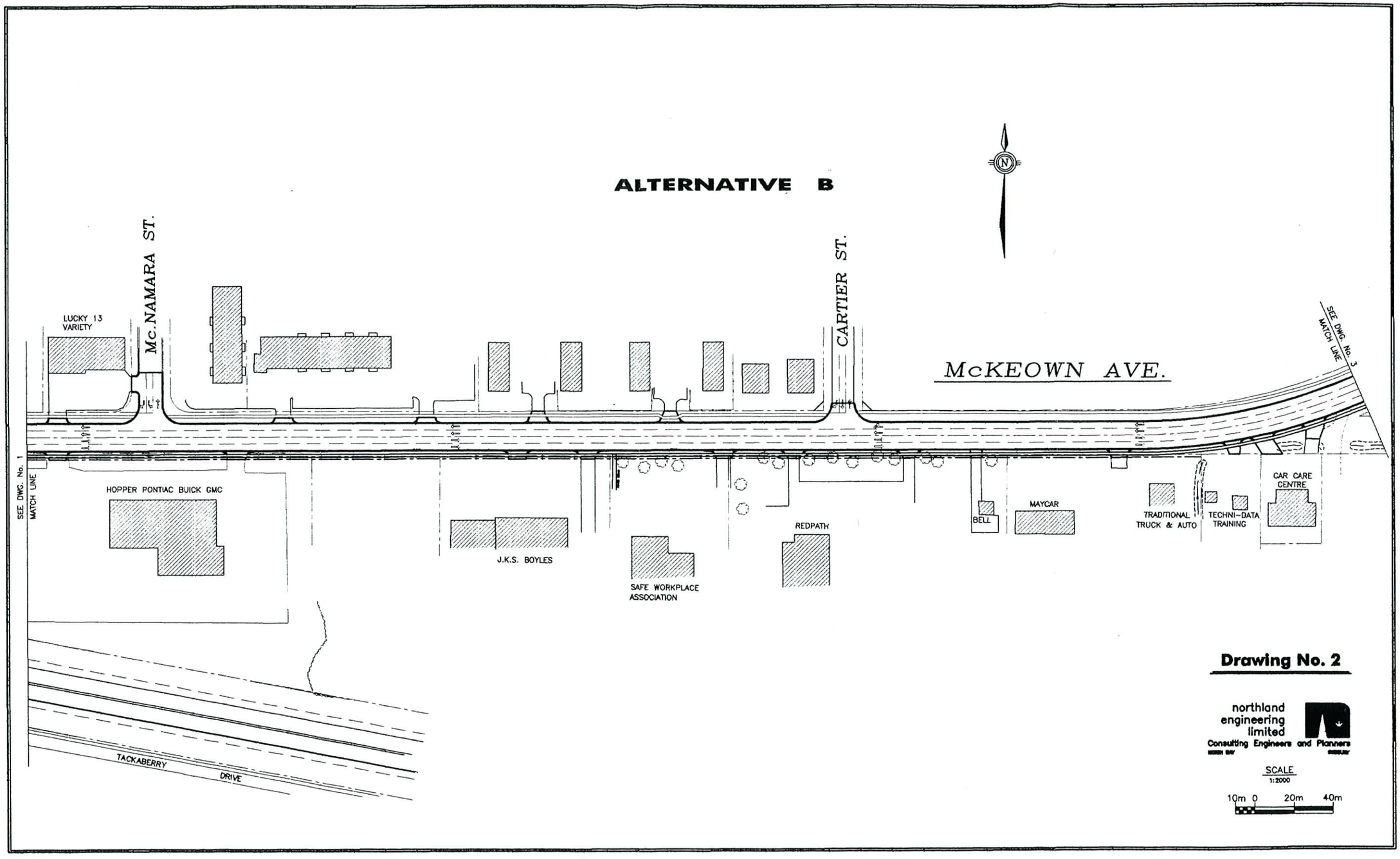
Drawing No. 1

northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

SCALE
1:2000
10m 0 20m 40m

Exhibit 9 - ALTERNATIVE "B" - page 1

ALTERNATIVE B



Drawing No. 2

northland engineering limited
Consulting Engineers and Planners

SCALE
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10m 0 20m 40m

Exhibit 9 - ALTERNATIVE "B" - page 2

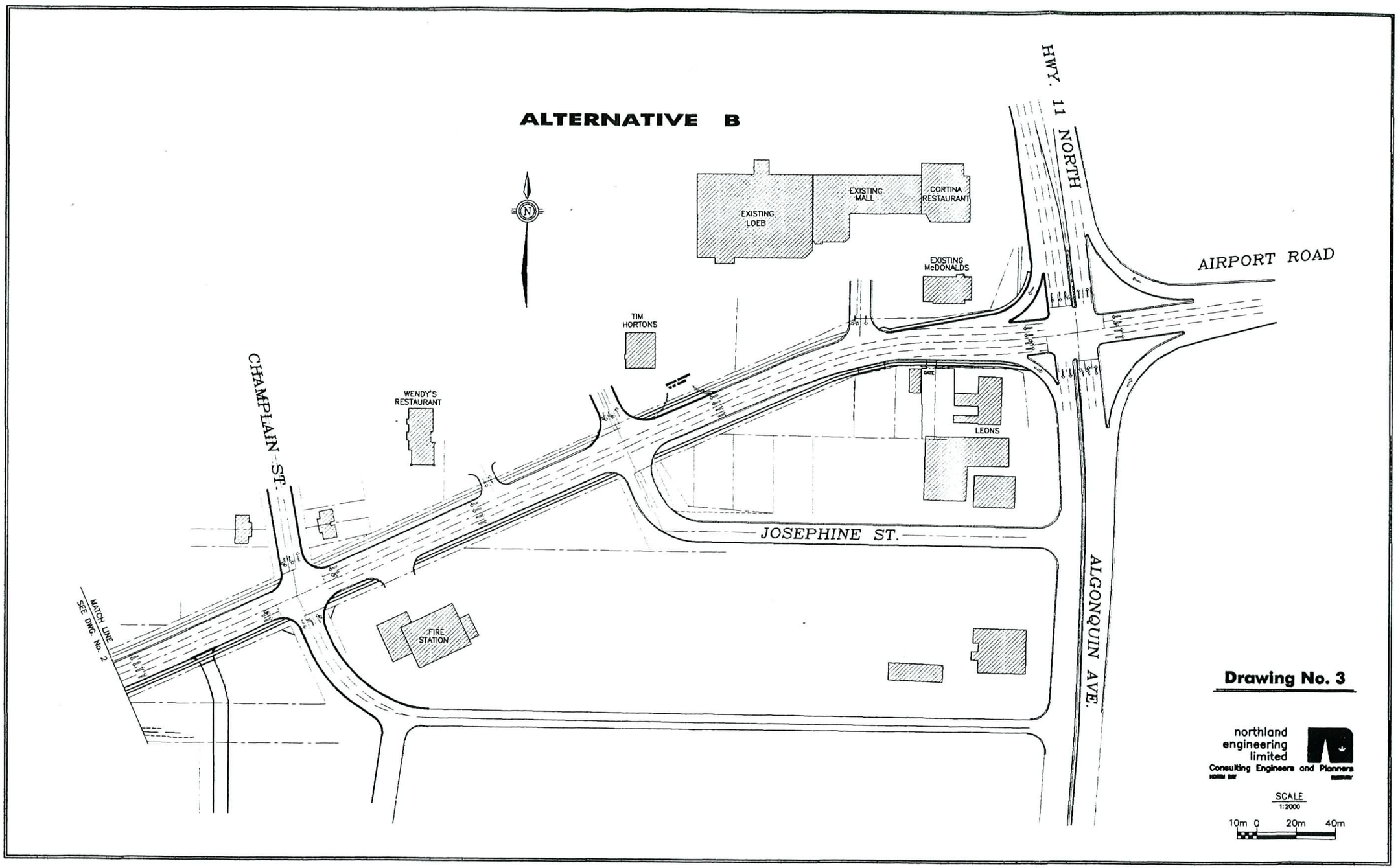


Exhibit 9 - ALTERNATIVE "B" - page 3

ALTERNATIVE C

NIPISSING UNIVERSITY
FOUNDERS RESIDENCE

COLLEGE DRIVE

GORMANVILLE ROAD

COLONIAL STREET

HWY. 17 WEST

INSPECTION STATION

M.T.O.

TACKABERRY DRIVE

RESERVE TACKABERRY DRIVE

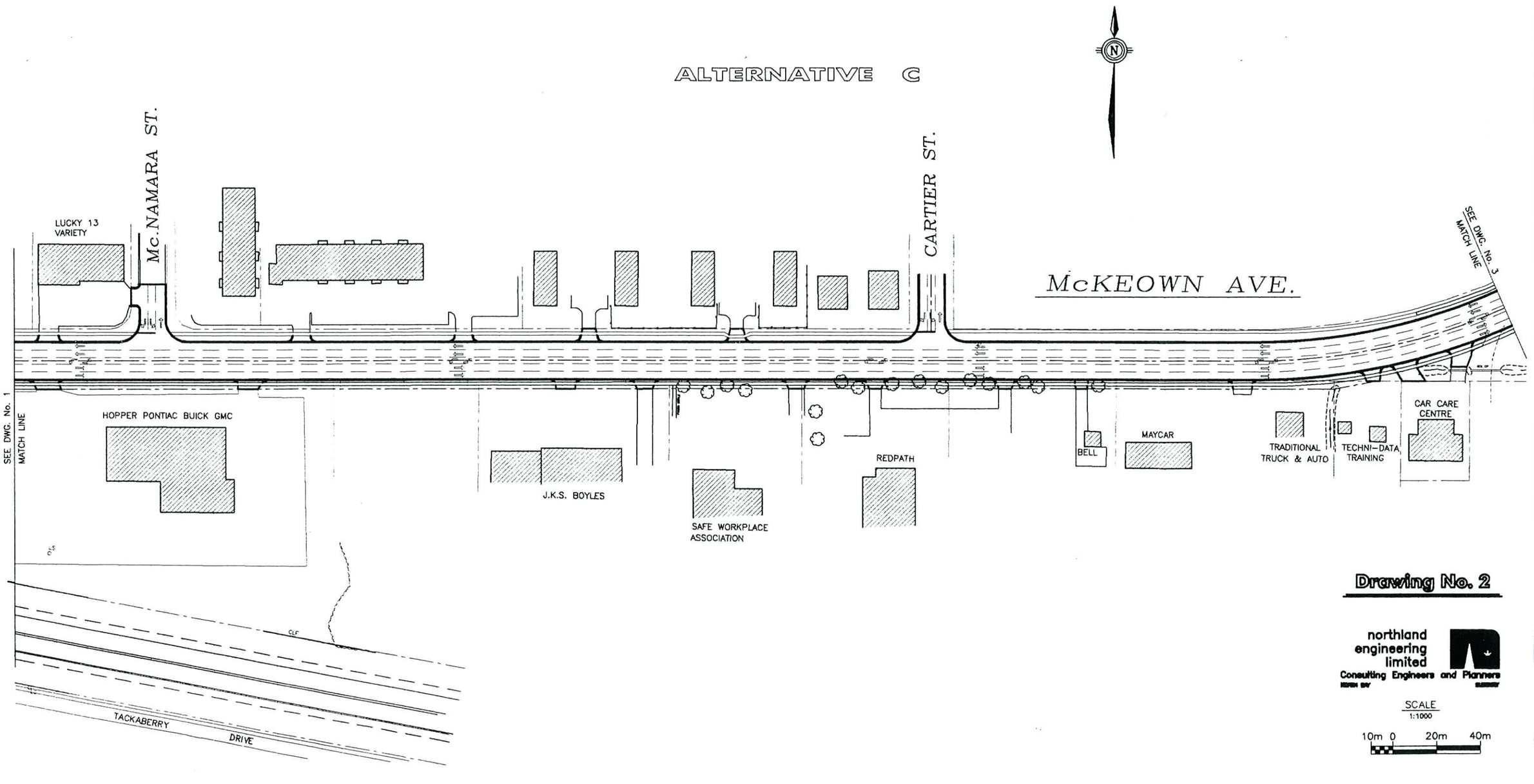
MATCH LINE
SEE DWG. No. 2

Drawing No. 1

northland engineering limited
Consulting Engineers and Planners

SCALE
1:1000
10m 0 20m 40m

ALTERNATIVE C

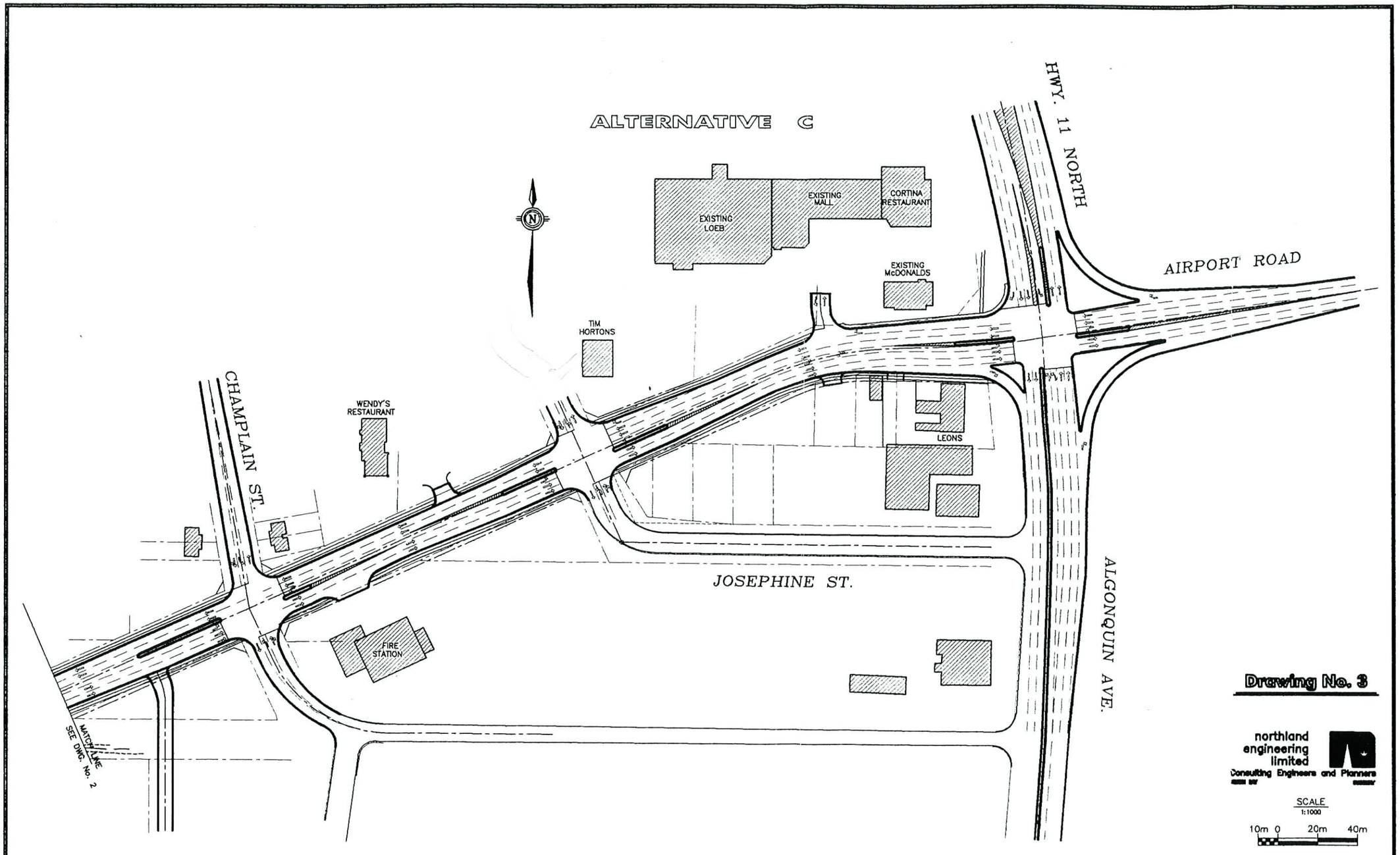


Drawing No. 2

northland engineering limited
Consulting Engineers and Planners

SCALE
1:1000

10m 0 20m 40m



Drawing No. 3

northland engineering limited
Consulting Engineers and Planners

SCALE
1:1000

10m 0 20m 40m

Exhibit 11 - DETAILED EVALUATION FACTORS

Detailed Evaluation Factors		
Factor	**Sub-Factor**	**Description**
TRANSPORTATION	Capacity/Flow	Identification of whether an option improves or reduces the capacity of flow.
	Intersection Level of Service	Identification of whether an option improves or reduces the ability of an intersection to move vehicles.
SAFETY	Traffic Operations	Subjective measure of how traffic will operate and affect safety.
	Safety of Access	Subjective measure of whether access to and from McKeown Avenue will be good or poor.
	Pedestrian Safety	Indication of the safety and convenience of pedestrian movements.
LAND USE	Impact on Existing or Future Land Uses	Indication of the compatibility of an option with existing or future land uses.
SOCIAL ENVIRONMENT	Property Acquisition	Identification of the amount of property required to accommodate option.
	Noise	Quantitative measure of the predicted change in noise levels.
	Aesthetics/Visual Impacts	Subjective identification of whether aesthetics of the roadway is improved or reduced.
NATURAL ENVIRONMENT	Water Management	A statement of the proposed stormwater management system.
	Air Quality/Fuel Consumption	Subjective measure on the effects of air quality and fuel consumption.
COST	Annual Maintenance	Subjective measure of the effects on annual maintenance costs.
	Construction	Quantitative statement of construction costs.
PUBLIC PREFERENCE		Indication of general public preferences.

DETAILED EVALUATION TABLE - McKeown Avenue Class Environment Assessment from Gormanville Road to Algonquin Avenue						
Factor/Alternative	**Reconstruct Existing 2 Lanes / 4 Lanes**	**A**	**4 Traffic Lanes**	**B**	**5 Traffic Lanes**	**C**
TRANSPORTATION						
Capacity / Flow	• will not meet future capacity requirements • existing 2 lane/4 lane roadway will be at capacity in 5 years	○	• will meet basic capacity requirements in the study area during the initial planning period, but will not meet capacity requirements with full development	◕	• will meet future capacity requirements from Algonquin Avenue to Gormanville Road	●
Intersection Level of Service	• does not presently meet acceptable level of service at Gormanville Road (LOS F) • all other intersections presently operate at acceptable Level of Service (LOS B and C) • intersection capacity for McNamara Street and Cartier Street will diminish to unacceptable Level of Service within 5 years • intersection capacity for all intersections will diminish to unacceptable Level of Service (LOS E and F) under full development	○	• intersection Level of Service at all intersections will be unacceptable under full development without traffic signals • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	◑	• will provide acceptable Level of Service at all intersections under full development • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes and left turn lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	●
Traffic Operations	• existing traffic experiences some stoppages and interruptions to flow especially at McNamara Street and major driveways • stoppages and interruptions will increase notably over next 5 years	○	• flow of traffic from Algonquin Avenue to Cartier Street will continue to deteriorate with increasing conflicts between through traffic and left turning vehicles • flow of traffic from Cartier Street to Gormanville Road will improve but traffic flow will be delayed at intersections and driveway entrances by left turning vehicles in the inside through lane	◑	• flow of traffic will improve as conflicts between left turning vehicles and through traffic are reduced with a fifth centre turn lane	●
Summary Evaluation		○		◑		●
SAFETY						
Accidents	• existing high accident locations will continue to worsen at Champlain Street, Tim Horton's and McNamara Street over time as traffic increases	○	• existing high accident locations will continue to worsen at Champlain Street and Tim Horton's • no improvement would occur at McNamara Street	◔	• left turn lanes at intersections and the continuous two-way left turn lane will improve safety, eliminating high accident intersections	●
Safety of Access	• ease of access to and from entrances and side streets will continue to deteriorate over time and will result in greater risk of accidents	○	• ease of access to and from entrances and side streets from Algonquin Avenue to Cartier Street will continue to deteriorate over time in terms of delays and safety	◔	• ease of access to entrances and side streets is improved over 4 lane alternative by providing safe storage for left turning vehicles • traffic signals will ensure left turn access to McKeown Avenue from side streets and driveways	●

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
Pedestrian Safety	• existing sidewalk on north side from Ontario Government Building to Algonquin Avenue accommodates existing pedestrian movements • as development proceeds pedestrian access to and from the south side will be difficult at unsignalized intersections • does not provide sidewalk access along the south side of McKeown Avenue; this will become more important as retail development occurs on south side	○	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along the street • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along McKeown Avenue • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●
Summary Evaluation		○		◑		●
LAND USE						
Conformity with Existing and Future Planned Land Uses	• will maintain existing conditions which would not support higher traffic generation by new uses as approved by City	○	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • supports Official Plan direction for future development of the study area	◕	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • most supportive of Official Plan direction for future development of the study area	●
Summary Evaluation		○		◕		●
SOCIO-ECONOMIC ENVIRONMENT						
Property	• no property acquisition required • no change to existing business entrances are required	●	• additional right-of-way will be required to provide for daylighting at the Gormanville Road and Champlain Street intersections • additional right-of-way width will be required along the south side of McKeown Avenue • property requirements affect 11 properties • no changes to existing business entrances are required	◕	• additional right-of-way will be required to accommodate the proposed widening and intersection improvements • property requirements range from approximately 1 m to 4.5 m in width affecting 19 properties • affects 3 existing entrances at Tim Horton's, Leon's and Canadian Tire	◑
Noise	• no sound level changes as a result of reconstructed roadway (road lane configuration remains unchanged) • predicted changes in sound levels of 4 dBA over existing ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑
Aesthetics / Visual Impact	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑
Summary Evaluation		◕		◑		◑

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
NATURAL ENVIRONMENT						
Water Management	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●
Air Quality / Fuel Consumption	• projected increase in congestion will increase air pollution, however, not significantly	◑	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	◕	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	●
Summary Evaluation		◕		◕		●
COST						
Annual Maintenance	this alternative has the lowest annual maintenance costs	●	this alternative would cost more to maintain than alternative A and would cost less than alternative C to maintain.	◔	this alternative has the highest annual maintenance costs	○
Construction	$ 1,060,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	●	$ 2,780,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	◔	$ 3,400,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	○
Utility Relocation	• not required	●	• not required	◔	• minor relocation of North Bay Hydro and Ontario Hydro pole line and shared Bell and Cable TV plant on the south side of McKeown Avenue.	○
Summary Evaluation		●		◔		○
PUBLIC PREFERENCE						
Public Preference	see comments - Alternative "C"	◑	see comments - Alternative "C"	◕	Overall comments received at the two Public Information Centres indicated an understanding that the recommended improvements were needed. (Alternative C)	●
Summary Evaluation		◑		◕		●
Overall Evaluation	Least Preferred	◑		◕	Most Preferred	●

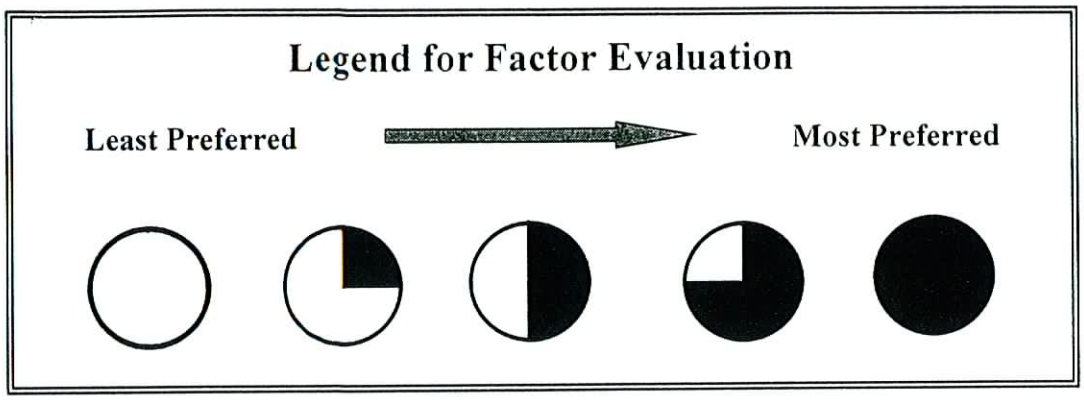


Exhibit 12 - RATING SCALE

4.4.1 Transportation

Alternatives C and B provided significantly greater roadway capacity, intersection level of service and traffic operations benefits over Alternative A. The existing 4 lane roadway from Algonquin Avenue to Champlain Street is currently at capacity and the existing 2 lane roadway from Champlain to Gormanville will be at capacity in 5 years. The operation of all intersections would diminish to an unacceptable Level of Service (LOS E and F) under full development conditions. Alternative A was rated least preferred.

The projected future traffic volumes require McKeown Avenue to be a five lane roadway from Algonquin Avenue to the Ontario Government Building. From the Ontario Government Building to Gormanville Road the need for five lanes is less definite, but since the required tapers would reduce the four lane section to minimal length and provide minimal cost savings, it is proposed that the five lane section be continued through to Gormanville Road.

The added capacity of 5 lanes throughout would provide better traffic flow and result in fewer conflicts than 4 lanes. Traffic flow with Alternative B would tend to deteriorate with increasing conflicts between through traffic and left turning vehicles. Overall, Alternative C is preferred over Alternative B.

4.4.2 Safety

Alternative C provides the most preferred design in terms of transportation safety. Alternatives A and B maintain the existing high accident locations which would tend to worsen as traffic increases in the future. The added centre left turn lane in Alternative C would improve safety for left turning vehicles at intersections and at mid-block locations where conflicts between through traffic and left turning vehicles would occur without the centre left turn lane (Alternative B).

4.4.3 Land Use

Alternative C provides the most support for the desired future land use in the study corridor. The five lane roadway would be attractive for new development/redevelopment in the form of new district commercial and highway commercial along McKeown Avenue.

4.4.4 Socio-Economic Environment

Overall, Alternatives A, B and C were similar in the evaluation of socio-economic factors. Sound level changes were predicted to be similar for all alternatives and no differences in the aesthetics of the alternatives were identified. Alternative A was slightly more favoured over Alternatives B and C as the design would involve no property requirements.

Property requirements were greatest with Alternative C; however, the impact of property required for the road widening is minor overall and does not compromise the development potential of affected properties. The amount of property required generally involves narrow strips (not exceeding a width of 4.5 metres) along the south side of the street and small daylighting triangles at intersections. The inventory of property requirements for Alternatives B and C is included in Appendix 5.

4.4.5 Natural Environment

All alternatives were similar in the evaluation of the natural environment factor. Impacts that were identified for the road widening and culvert extension into Pinewood Parkway Creek associated with Alternative C were minor and could be mitigated. Overall, Alternative C was slightly more preferred over Alternatives A and B as this alternative would reduce traffic congestion, result in lower fuel consumption and provide marginal air quality benefits.

4.4.6 Cost

Alternative A was most preferred, having the lowest construction and maintenance costs. Alternative C was the most costly option in terms of its construction and maintenance costs. However, Alternative B only ranked slightly ahead of Alternative C, with the difference being the $620,000 cost to construct the centre left turn lane.

4.4.7 Public Preference

Overall, public comments received at the two Public Information Centres indicated support for the recommended improvements (Alternative C) to McKeown Avenue in the Study Area. There were, however, insufficient comments received to indicate if one alternative was strongly preferred over the others. Alternative C was rated as only slightly more favoured than Alternatives A and B.

4.4.8 Overall Evaluation

Overall, in considering the detailed evaluation and taking into account ratings for the individual environmental factors, Alternative C was preferred over Alternatives A and B. The technical assessment and evaluation shows that the benefits of Alternative C outweigh its disadvantages to the environment which are minor and can be mitigated. Alternative C is the Study Team's recommended solution.

4.4.9 Proponent's Selection of Preferred Solution

The Study Team's recommended solution was endorsed by Council as the preferred solution by Resolution No. _____ on _____, 1999.

CHAPTER 5 - RECOMMENDED DESIGN AND CONSTRUCTION REQUIREMENTS

5.1 RECOMMENDED DESIGN

The following sections provide information on the recommended design alternative for McKeown Avenue. It provides preliminary engineering recommendations on the design plan, alignment, cross-section and intersection details.

5.1.1 Recommended - Plan

The recommended design is Alternative C. The plans for the alternative are illustrated in the three Exhibits 8, 9 and 10 (see Chapter 4) and on larger scale plans enclosed in the rear pocket of this report.

- Alternative C - Drawing No.1 - McKeown Avenue from Gormanville Road easterly to west of McNamara Street
- Alternative C - Drawing No.2 - McKeown Avenue from west of McNamara Street easterly to west of Champlain Street
- Alternative C - Drawing No.3 - McKeown Avenue from east of Cartier easterly to Algonquin Avenue

The recommended alternative provides for two lanes of travel in both directions, as well as a centre left turn lane. The design will provide an acceptable level of service for the anticipated future growth in traffic on McKeown Avenue.

McKeown Avenue from Gormanville Road easterly to west of McNamara Street (Alternative C, Exhibit 8, Drawing No. 1)

This section of roadway is presently a two lane roadway with curb and gutter. There are no additional lanes at intersections or at property entrances. The roadway drainage is by open ditches and by curb and gutter which is collected to a short section of 21 inch diameter storm sewer which discharges to an open ditch along Gormanville Road.

McKeown Avenue will be reconstructed in this section to a five lane urban cross-section. The cross-section provides two lanes in both directions of travel as well as additional turning lanes at Gormanville Road. A continuous centre fifth lane for left turns will accommodate left turning vehicles at the Ontario Government Building and will provide capacity in the roadway in the event that adjacent vacant lands are developed which would add additional traffic and new turning movements to commercial entrances on the street.

McKeown Avenue from West of McNamara Street easterly to west of Champlain Street (Alternative C, Exhibit 9, Drawing No. 2)

This section of roadway is presently a two lane roadway with an urban curb and gutter cross-section. Two side streets, McNamara Street and Cartier Street, intersect McKeown Avenue on its north side at "T" intersections. There are presently four entrances on the north side of the street serving apartment building/townhouse complexes and twelve commercial entrances on the south side which

serve a variety of industrial and commercial establishments. Drainage is by curb and gutter and storm sewer which outlet to Pinewood Parkway Creek on the west side of the Hopper Pontiac Buick GMC dealership.

McKeown Avenue in this section will be reconstructed from a two lane cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a continuous centre left turn lane to accommodate left turning vehicles at street intersections, existing apartment/townhouse complexes, commercial and industrial properties. Drainage will be by curb and gutter to storm sewers which outlet to an existing outlet at Pinewood Parkway Creek.

McKeown Avenue West of Champlain Street to Algonquin Avenue
(Alternative C, Exhibit 10, Drawing No. 3)

This section of roadway is presently a four lane roadway with an urban cross-section that was constructed in 1992. There are two side roads in this section, Champlain Street, which is a cross street, and Josephine Street, which connects to McKeown Avenue at a "T" intersection from the south. There are presently four commercial entrances on the north side serving the Wendy's Restaurant, the west and east entrances to Tim Horton's, which also serve as the Algonquin Square Mall west entrances, and the east entrance to the shopping mall and McDonald's Restaurant. Four entrances exist on the south side including the entrance west of Champlain Street to the Canadian Tire store, the McKeown Avenue entrance to the City of North Bay Fire Hall, and the entrance to the rear of Leon's Furniture Store between Josephine Street and Algonquin Avenue. Drainage is by curb and gutter and storm sewers which flow west along McKeown Avenue to Pinewood Parkway Creek at McKeown Avenue except for the area immediately adjacent to the McKeown Avenue/Algonquin intersection which flows to Chippewa Creek.

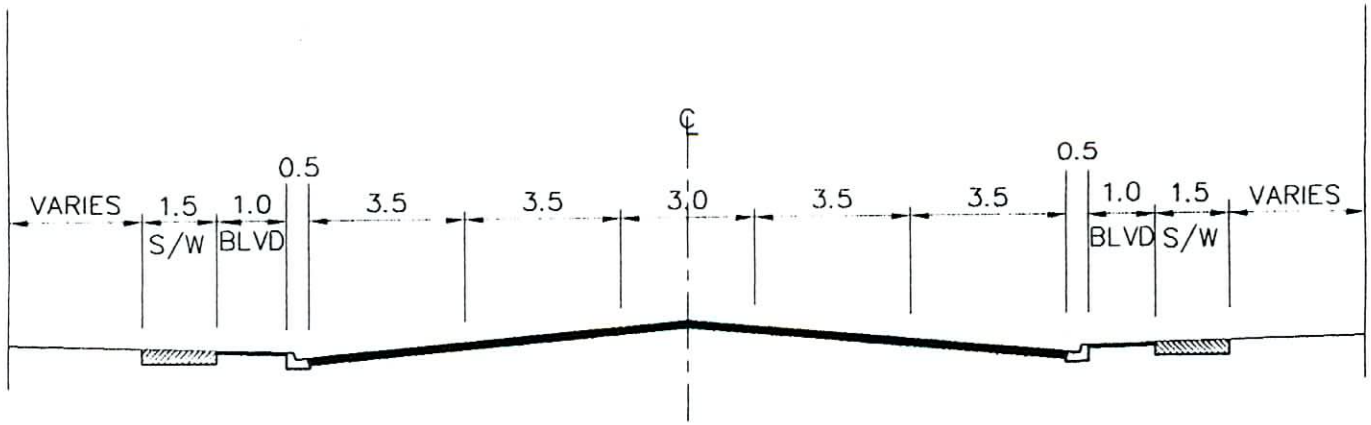
McKeown Avenue will be reconstructed in this section from a four lane urban cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a centre left turn lane. Additional lanes for acceleration or deceleration and turning lanes are included in the design.

5.1.2 Recommended Design - Cross-Section

The proposed cross-section includes four 3.5 metre driving lanes, a 3.0 metre centre left turn lane, curb and gutter, boulevard and sidewalk. The 3.0 metre centre left turn lane is continuous throughout McKeown Avenue from Algonquin Avenue to Gormanville Road except at signalized intersections where the lane becomes an exclusive lane for intersection left turn movements. The cross-section specifications are listed below and are shown on Exhibit 14.

Side-walk	Blvd	Curb and Gutter	Driving Lane	Driving lane	Left Turn Lane	Driving Lane	Driving lane	Curb and Gutter	Blvd	Side-walk
1.5 m	varies	0.5 m	3.5 m	3.5 m	3.0 m	3.5 m	3.5 m	0.5 m	varies	1.5 m

The cross-section provides a 1.5 m sidewalk on both the north and south sides of McKeown Avenue and a boulevard of varying width between the sidewalks and edge of curb. The area beyond the sidewalk will be suitably graded and landscaped to fit adjacent properties.



FIVE LANE ROADWAY

Exhibit 14 - CROSS-SECTION

5.1.3 Cross-Section and Property

The proposed cross-section is a minimum 25 metres wide including allowances for boulevards and right-of-way. The cross-section will require minor property acquisition from adjacent parcels throughout most of the project limits for lane widening and day lighting at intersections. An inventory of property required is included in Appendix 5.

5.1.4 Storm Drainage

Storm drainage will be provided by the two existing storm sewer systems that run from Algonquin Avenue and the Ontario Government Office Building to Pinewood Parkway Creek and from the Ontario Government Building to open ditches along Gormanville Road.

5.1.5 Traffic Signals

New traffic signals are recommended at Josephine Street to coincide with new development in the area and at Gormanville Road. In the future, traffic signals may also be required at McNamara Street.

5.1.6 Illumination

There is existing illumination from east of McNamara Street through to Algonquin Avenue. The existing illumination from Algonquin Avenue to Cartier Street was replaced with the realignment of McKeown Avenue in 1993. The existing illumination will be upgraded where required and new illumination will be provided to Gormanville Road.

5.1.7 Utilities

Ontario Hydro, North Bay Hydro, Bell Canada and Union Gas will be contacted at the detail design stage for review and approval of the final design drawings.

5.1.8 Underground Infrastructure

Sanitary Sewer and Watermains

There have been no reported deficiencies in either of these services either due to capacity or maintenance related issues. However, due to the current age of these services we would recommend that further investigation be undertaken to confirm their adequacy in terms of stuctural integrity and system capacity prior to the commencement of design. No costs have been assigned in out estimate for the replacement of these services.

Storm Sewer

There have been reported incidences of capacity problems most notably adjacent to the outlet at Pinewood Creek. This problem is likely controlled by downstream system capacity and can only be relieved if and when remedial work has been undertaken for the remainder of the drainage system.

Due to the revision in the design standards for the municipality and the current requirements with respect to water quality and quantity it is imperative that future developers provide provisions to accommodate this.

With respect to increase in flow due to the revised road section there is an opportunity to accommodate a portion of this flow in property located at the outlet of the storm sewer (dry pond scenario). This property is currently owned by the Management Board Secretariat and is known as

Part 2 on Plan 36R-8858 with the potential to utilize adjacent property under the same ownership.

No costs have been assigned in our estimate for either the construction of a pond or the purchase of property.

5.1.9 Construction Staging

The improvements associated with the recommended alternative will likely be staged over a number of years as all of the capacity improvements are not expected to be warranted at the same time. The recommended timing for improvements is based on traffic volumes, identified capacity deficiencies which exist now and the sequence in which capacity shortfalls are expected to occur.

McKeown Avenue from Algonquin Avenue to Champlain Street

The analysis of existing traffic volumes and accident statistics indicate **an existing need** to provide a fifth centre left turn lane within this section of roadway. The improvements can be timed to coincide with the development of vacant lands along the corridor or with the redevelopment of existing properties.

McKeown Avenue from Champlain Street to Gormanville Road

There will be **a future need** to provide a fifth centre left turn lane within this section of roadway with two through lanes in each direction to provide sufficient capacity over the planning period with full development. The timing for the recommended improvements from Cartier Street to Gormanville Road will be warranted as new development occurs in the corridor west of Champlain Street.

McKeown Avenue/Gormanville Road/College Drive Intersection

It is expected that **traffic signals will be warranted at the intersection within the next few years**. The left turns from McKeown Avenue onto Gormanville Road are facing long queues and delays at peak hours (Level of Service F). It is recommended that the intersection be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

5.2 RECOMMENDED DESIGN - POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

5.2.1 Natural Environment

Impacts to the natural environment as a result of the proposed work are minor as the reconstruction will be limited to roadway widening of approximately 5 m on the south side within a highly urbanized environment.

The road widening will require a 5 metre extension (approximate) of a 66 inch diameter storm sewer which would result in enclosing an open section of Pinewood Parkway Creek for the 5 metre length. The extension would most likely consist of adding the required length of 66 inch diameter precast reinforced concrete pipe, a new concrete headwall with end grade and stream bed armouring with rip rap for long term erosion protection. Although the creek at this location does not contain critical fish habitat (eg. spawning areas), it is an open natural channel that supports warmwater minnow species. The creek outlets at the Lake Nipissing shoreline which is known to support walleye spawning and the creek and downstream waters could be affected by sedimentation generated by upstream

construction activities.

It is recommended that the construction of the storm sewer extension occur in low flow conditions. If it becomes necessary, standard construction practices to temporarily dam or dam and pump flows for dewatering of the work area could be employed and specified in contract documents. It is also recommended that a detailed erosion and sedimentation control plan be prepared for the entire project identifying controls to be employed before, during and after construction. Consideration should be given to incorporating silt fence barriers along both banks of Pinewood Parkway Creek at McKeown Avenue and straw bale flow checks in the open ditches discharging to the creek.

When detailed design drawings are available and before construction proceeds, the drawings should be submitted to the appropriate public authority to finalize mitigation plans.

5.2.2 Social Environment

The overall adverse impacts associated with the recommended improvements are minor. There will be some noise impacts with this project due to the increases in traffic. The residential areas on the north side of McKeown Avenue are recognized as sensitive noise receptors and a Noise Impact Assessment completed in May 1999 indicated that:

> *"The existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less than the Ministry of Environment desirable Criteria of $L_{eq\ (16)}$ 55dBA. Traffic volumes in the future as a result of the expansion in traffic will increase the sound levels by about 4dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other roadway mitigation are not possible or feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.*
>
> *The conclusion of the noise study is that noise will increase as a result if expected increases in the traffic but would remain within acceptable levels. Barriers and other devices on the right-of-way are not required or feasible."*

The selected alternative has a number of features which provide social benefits to the residents of the area and to road users. There will be a decrease in driver frustration with reduced congestion of the roadway. Traffic signals at intersections will provide for safer turning and allow through vehicles to pass safely in the additional lane. Vehicles will move through the area quicker and with increased safety. It is expected that there will be a reduction in the number of accidents at the intersections and entrances as a result of this project.

The road will be illuminated and should result in safer pedestrian movements through the area with sidewalks on both sides of the street.

5.2.3 Property

The recommended design will involve land acquisition from adjacent properties. The property requirements were identified using the best information available to the Study Team including preliminary engineering design drawings of the recommended alternative, assessment base mapping

and existing Plan and Profile drawings of McKeown Avenue supplied by the City of North Bay.

The property requirements should not be considered to be survey accurate. Prior to construction, and when detailed Plan and Profile drawings of the recommended design are available, a legal survey will be prepared to finalize property requirements.

Where property is acquired for public road allowance by the City of North Bay, it is the policy of the City to negotiate a fair and full compensation based on current appraised value in accordance with the provisions of the Expropriations Act.

5.3 RECOMMENDED DESIGN - SPECIFIC CONSTRUCTION REQUIREMENTS

There are no site specific conditions which require special consideration over and above those that are normally prescribed for a project of this nature.

5.4 SUMMARY OF PUBLIC COMMENTS AND RESPONSES

The study process included extensive public consultation and review which was previously described in Chapter 2. The comments concerns brought forward in the study ware summarized in the following table:

Commenter / Study Participant	Comments / Concerns	Response
Willis Enterprises Ltd.	- owner of vacant parcel on south side of McKeown Avenue - concerned about future access to the property from McKeown Avenue and the amount of property required from the parcel for road widening - Q. Will the City of North Bay pay compensation for the property acquisition to accommodate the road widening? - Q. Will the widening and reduced lot area affect the development potential of the remaining parcel? - Q. Will access to the property from McKeown Avenue be approved in the future?	- study team members met with the owner at both PICs and at a follow up meeting with the City of North Bay - answers to the questions/concerns were provided at the meetings and in correspondence to the owner (Northland Engineering letter to Willis Enterprises dated July 7, 1999) - no further action required

Commenter / Study Participant	Comments / Concerns	Response
D.J. Venasse Construction Ltd.	- owner of developed parcel on south side of McKeown Avenue - expressed concerns regarding the impact of the proposed Alternative on a newly severed property - requested that any new development fees for road improvements be calculated on an area and not road frontage basis	- the owner was provided with correspondence from Northland Engineering (dated July 14, 1999) and from the City of North Bay (dated August 18, 1999) on what action was to be taken to maintain the severed parcel size with the road widening - Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA Study is completed. - no further action required
Algonquin Square Mall	- owner concerned that future special area charges should not apply to new development on the Algonquin Square Mall lands as road improvement contributions were already provided to the City - identified that the consolidation of the commercial entrances to Tim Horton Donuts/Algonquin Mall would impact access to the property	- the Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA is completed - the two existing entrances would be consolidated and replaced with a new signalized intersection at Josephine Street which would provide controlled access into the property - preliminary sketches identifying how the internal driveway and parking would fit with a new intersection were supplied by Tranplan Associates - no further action required at this time
J.S. Redpath Limited	- owns property on the south side of McKeown Avenue - requested to be kept informed of the study	- contact name was kept on the mailing list to receive notices
Hopper Pontiac Buick GMC	- requested to participate in study	- contact name was kept on mailing list to receive notices
McDonald's Restaurant	- requested to receive notice of meetings for the study	- contact name was kept on mailing list to receive notices
Leon's Furniture	- requested copy of the McKeown Avenue/Josephine Street Traffic Study - identified a concern that access to the property from McKeown Avenue be maintained	- copy of the study was provided as requested - recommended centre left turn lane would allow access to the existing rear entrance. Left turn arrows were added to the design drawing to indicate the turning movement

Commenter / Study Participant	Comments / Concerns	Response
Multidev de l'Outaouais	- requested notices and copies of the recommended road improvements	- plans were provided - contact name was kept on the mailing list to receive notices
Ontario Hydro	- requested detailed design drawings of the recommended road improvements - concerned that incompatibilities between the road improvements and the Ontario Hydro transmission line be identified and addressed prior to approval of detailed engineering design	- contact at detail design stage for Ontario Hydro review and approval of design drawings
Bell Canada	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Bell Canada review and approval of design drawings
Union Gas	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Bell Canada review and approval of design drawings
North Bay Hydro	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Bell Canada review and approval of design drawings
North Bay-Mattawa Conservation Authority	- requested detailed design drawings of the recommended improvements to storm sewer outlets affecting Pinewood Parkway Creek	- contact at detail design stage for Conservation Authority review of recommended erosion and sedimentation control plan
Ministry of Citizenship, Culture and Recreation	- provided clearance that no archaeological study was required	- no further action required
Ministry of Transportation	- was consulted and provided input on what design considerations were required to integrate MTO interests into the design alternatives for the Class EA	- on-going involvement of MTO during detailed design stage

CHAPTER 6 - MONITORING

Contract supervision should be provided during construction to monitor work in progress and ensure that the recommended mitigation measures in this report and which are incorporated into the detailed design and contract package are carried out.

APPENDIX 1

PUBLIC CONSULTATION

Public Notices
PIC Attendance
Mailing List

NOTICE OF STUDY COMMENCEMENT
CLASS ENVIRONMENTAL ASSESSMENT
McKeown Avenue from Gormanville Road to Algonquin Avenue
CITY OF NORTH BAY

The City of North Bay passed Resolution No. 20 on December 7, 1998 which gives direction to conduct an environmental assessment study and associated traffic planning and design study for McKeown Avenue from Gormanville Road to Algonquin Avenue. Accordingly, the City is commencing a study to identify any required improvements on McKeown Avenue in accordance with the Schedule 'C' planning requirements of the Class Environmental Assessment for Municipal Roads.

The study will examine the development potential of the study area and determine the impacts that this development will have on the capacity of the existing road system. Options to alleviate the problems will be investigated and recommendations made for improvements. The primary study area is indicated on the key plan attached to this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City in 1996.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct this study on behalf of the City of North Bay. The study team will present their findings to the general public at two Public Information Centres. The first Public Information Centre will be held in the spring. The date, time and location will be advertised in the local paper.

If you would like to participate in the study process or to obtain further information, please contact

Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre St. East
NORTH BAY, ON, P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P.Eng. **Or** **Mr. Dave Richards, P.Eng.**
Tranplan Associates **Northland Engineering (1987) Limited**
1850 Bond Street
NORTH BAY, ON, P1B 8G5
Telephone: 474-2720

NOTICE

Notice of Public Information Centre — Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and options to alleviate identified problems will be displayed at a Public Information Centre (PIC) at the following location:

Location: Main Foyer, City Hall, 200 McIntyre Street East
Date: Wednesday, April 14, 1999
Time: 4:30 p.m. to 8 p.m.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

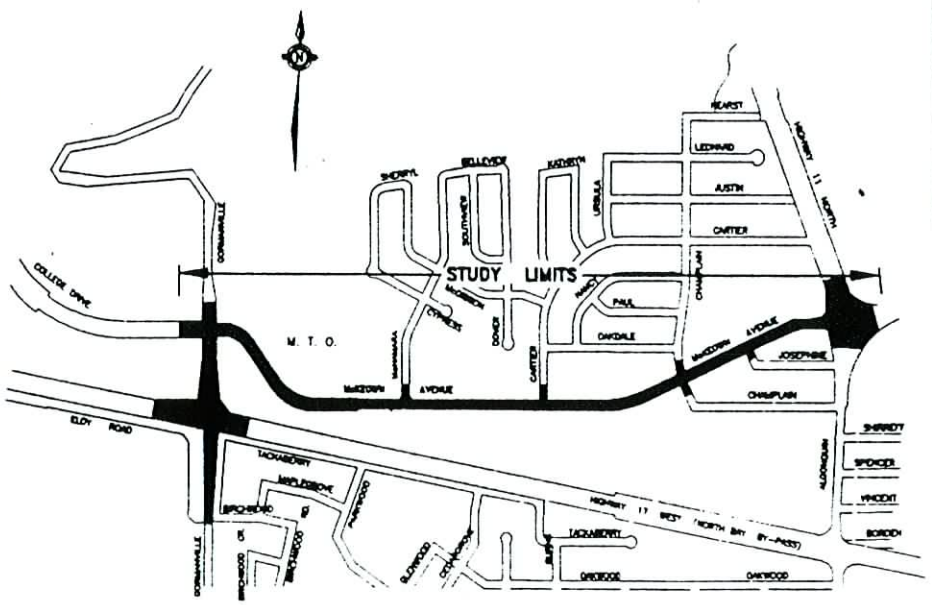
Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre Street East
NORTH BAY, ON P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P. Eng.
Tranplan Associates
Telephone 474-2720

Or

Mr. Dave Richards
Northland Engineering
(1987) Limited

1850 Bond Street
NORTH BAY, ON P1B 8G5
Telephone: 474-2720



NOTICE

Notice Of
Second Public Information Centre
Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class Environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts that any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and road improvement alternatives will be displayed at a second Public Information Centre (PIC) at the following location:

Location: **Main Floor, City Hall, 200 McIntyre St. East**
Date: **Wednesday, June 2, 1999**
Time: **4:30 p.m. to 8 p.m.**

The road improvement alternatives under consideration include reconstructing McKeown Avenue to its current 2 lane and 4 lane configuration (Alternative A), widening McKeown Avenue to 4 traffic lanes throughout (Alternative B) and widening McKeown Avenue to 5 traffic lanes throughout (Alternative C).

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

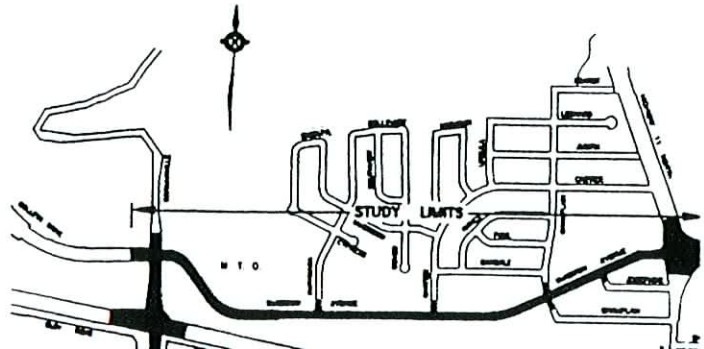
Please note that this study deals with McKeown Avenue, west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

Mr. John Simmonds
City Engineer
City of North Bay
200 McIntyre Street East
North Bay ON P1B 8H8
Telephone:
474-0400, Ext. 308

Mr. Toivo Rukholm, P.Eng.
Tranplan Associates
Telephone: 474-2720

Mr. Dave Richards
Northland Engineering
(1987) Limited
1850 Bond Street
North Bay ON P1B 8G5
474-2720



PUBLIC INFORMATION CENTRE

CITY OF NORTH BAY

MCKEOWN AVENUE - GORMANVILLE ROAD TO ALGONQUIN AVENUE

CITY HALL FOYER

Wednesday April 14, 1999

SIGN IN SHEET

Sheet _____

No	NAME	ADDRESS
1.	GEORGE MARRIS	232 ALGONQUIN AVE
2.	Doris Dalton	
3.	Cindy Chalmers	
4.	Heather Hahn	
5.	Joel Emond	
6.	Dave Whiting	67 SOUTHVIEW CR
7.	Dave Robinson	
8.	Jesse Caldwell	1132 Airport Road
9.	Barrie & Joy Willis	236 Greenhill Ave
10.	Pat & Bill Jeck	2167 Algonquin Ave
11.	Ken Brown	The Education Centre
12.	CHRIS MINOR	9 OAKDALE Rd.
13.	JW Neil	840 MCKEOWN AVE.
14.	Andrew Lewis	42 Oakdale Rd. N.B. P1B 6Y6 thought it was the cross to after
15.	Dr. MacWilliams	1868 McKeown Ave
16.	Glenn Scanlan	385 Aime Cres / North Bay General Hosp.
17.	Ed Handley	309 Cedar Hts
18.	Mohammad Z. Kabir	
19.	[illegible]	860 Stockdale Rd
20.	[illegible] Vernon	140 CARLO CRES.

PUBLIC INFORMATION CENTRE

CITY OF NORTH BAY
MCKEOWN AVENUE - GORMANVILLE ROAD TO
ALGONQUIN AVENUE PHASE 3 - CITY HALL FOYER
June 2, 1999

SIGN IN SHEET

Sheet 1

No	NAME	ADDRESS
1.		1202 [illegible] Rd
2.		595 Wyld
3.	Schultz	207 Duncan Ave
4.	B a Willis WILLIS ENTERPRISES LIMITED	236 GREENHILL AVE 472-78
5.	John Miller	35 Kathryn Cres N Bay
6.	Michael Venasse	Venasse Const Box 1110 NBay.
7.	J W Neil	840 McKROWN AVE.
8.	Dave Whiting	67 SOUTHVIEW CR.
9.	Kathy Wittick	73 Kellerview Cres.
10.		2167 Algonquin Ave
11.		
12.		
13.		
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16.		
17.		
18.		
19.		
20.		

CLASS ENVIRONMENTAL ASSESSMENT
McKEOWN AVENUE FROM GORMANVILLE ROAD TO ALGONQUIN AVENUE

MAILING LIST - PROPERTY OWNERS & GENERAL PUBLIC

May 3, 1999

881359 Ont. Ltd.
P. O. Box 910, Station Main
NORTH BAY, ON, P1B 8K1

McDonald's Restaurants of Canada Ltd.
Real Estate Dept.
Store #354/66 M515 #4345
2 McDonald's Place, Suite 100
TORONTO, ON, M3C 3L4

Metz Furniture
2167 Algonquin Avenue
NORTH BAY, ON, P1B 4Z3

C/O B. A. Willis
Willis Enterprises of North Bay Ltd.
236 Greenhill Avenue
NORTH BAY, ON, P1C 1J2

Consolidated Homes
P. O. Box 910, Station Main
NORTH BAY, ON, P1B 8K1

1003130 Ontario Inc.
P.O. Box 910, Station Main
NORTH BAY, ON, P1B 9A2

Board of Governors of the Canadore College
of Applied Arts & Technology
P. O. Box 5001, Station Main
NORTH BAY, ON, P1B 8K9

City of North Bay Fire Department
P. O. Box 360, Station Main
NORTH BAY, ON, P1B 8H8

Attn: Fire Chief Ted McCullough

Management Board Secretariat
Director of Subsidies Branch
12th Floor, 777 Bay Street
TORONTO, ON, M5G 2C8

Ministry of Transportation
Director of Subsidies Branch
12th Floor, 777 Bay Street
TORONTO, ON, M5G 2C8

Northern Lights Co-Operative
659 McKeown Avenue, Box B7
NORTH BAY, ON, P1B 9L6

Union Gas Limited
Property Tax Department
50 Keil Drive North
CHATHAM, ON, N7L 3V9

Golden Estates Limited
P. O. Box 910, Station Main
NORTH BAY, ON, P1B 8K1

New Era Homes Limited
P.O. Box 910, Station Main
NORTH BAY, ON, P1B 8K1

Steve Crea Homes Limited
c/o Steve Crea
848 McLeod Street
NORTH BAY, ON, P1B 9A5

Ontario Hydro
Real Estate - Land Management Assessment
and Taxation Unit
7676 Woodbine Avenue, Suite 300
MARKHAM, ON, L3R 2N2

Attention: Peter Clarke, Real Estate Officer

1017249 Ontario Ltd.
Johnsea Holdings Limited
P.O. Box 1020, Station Main
NORTH BAY, ON, P1B 8K3

D.J. Venasse Construction
P.O. Box 1110, Station Main
NORTH BAY, ON, P1B 8K4

JKS Boyles International Inc.
P.O. Box 197, Station Main
NORTH BAY, ON, P1B 8H2

Canadian Tire Corporation
2180 Yonge Street, 15th Floor
TORONTO, ON, M4S 2B9

J.S. Redpath Holdings Inc.
P.O. Box 810, Station Main
NORTH BAY, ON, P1B 8K1

Sandra and Herbert Davis
977 Premier Road
NORTH BAY, ON, P1A 2H9

James W. Neil Investments
P.O. Box 1152, Station Main
NORTH BAY, ON, P1B 8K4

Bell Canada
Property Tax Manager
P.O. Box 610, Station K
TORONTO, ON, M4P 2H1

James W. Neil Investments
840 McKeown Avenue
NORTH BAY, ON, P1B 8M1

Bill Jenkins
2167 Algonquin Avenue
NORTH BAY, ON, P1B 4Z3

Multidev de l'Outaouais
c/o Capital Beau Bois
1010 rue Sherbrooke Ouest, Bureau 1800
MONTREAL, P.Q., H3A 2R7

Attention: Andre Nadon, President

CLASS ENVIRONMENTAL ASSESSMENT
McKEOWN AVENUE FROM GORMANVILLE ROAD TO ALGONQUIN AVENUE

MAILING LIST - AGENCIES & INTEREST GROUPS

May 3, 1999

Bell Canada - AN Facilities
P.O. Box 3000
250 McIntyre Street West, Floor 2
NORTH BAY, ON P1B 8L6

Attention: Mr. Calvin Kohlsmith, Project Manager

North Bay Hydro
1350 Fisher Street
NORTH BAY, ON P1B 2H1

Attention: Mr. Brian McMillan, P.Eng.,
Manager of Engineering and Customer Service

Cogeco Cable Solutions
P.O. Box 5076, Station Main
BURLINGTON, ON L7R 4S6

Attention: Ben Lawrence

Union Gas
P.O. Box 3040
36 Charles Street East
NORTH BAY, ON P1B 8K7

Attention: Mr. Jeff Peroff,
Supervisor Distribution Planning

Ministry of Natural Resources
3301 Trout Lake Road
NORTH BAY, ON P1A 4L7

Attention: Mr. Rick Calhoun, District Planner

Ministry of the Environment
Northeastern Regional Office
199 Larch Street, 11th Floor, Suite 1101
SUDBURY, ON P3E 5P9

Attention: Mr. Mark Delmonte, Planner

Ministry of the Environment
North Bay District Office
P.O. Box 6000
447 McKeown Avenue
NORTH BAY ON P1B 9T3

Attention: Mr. Harvey Nelson, Senior
Environmental Officer

Ministry of Citizenship, Culture and Recreation
Culture Division
77 Bloor Street West, 2nd Floor
TORONTO, ON M7A 2R9

Attention: Mr. Winston Wong, Heritage Planner

Ministry of Transportation
P.O. Box 3030
447 McKeown Avenue
NORTH BAY, ON P1B 8L2

Attention: Mr. Paul Lecoarer, Area Engineer

North Bay - Mattawa Conservation Authority
700 Oak Street East
NORTH BAY, ON P1B 9T1

Attention: Ms. Paula Scott, Planner

Northwatch
P.O. Box 282
NORTH BAY, ON P1B 8H2

Attention: Brennain Lloyd

Nipissing Naturalists Club
c/o 477 Sherbrooke Street
NORTH BAY, ON P1B 2C2

Attention: Mr. Richard Tafel, President

Ontario Hydro
957 Falconbridge Road
P.O. Box 2040, Station A
SUDBURY, ON, P3A 4R8

Attention: Jim Krats, Transmission Lines Tech.

North Bay Transit
P. O. Box 360, Station Main
NORTH BAY, ON, P1B 8H8

Attention: Mr. Terry Brent

North Bay General Hospital
750 Scollard Street
P. O. Box 2500
NORTH BAY, ON, P1B 5A4

Attention: Glen Scanlan, Program Director
Facilities Service Centre

Corporation of the City of North Bay
Dept. of Tourism Leisure Services
P. O. Box 360, Station Main
NORTH BAY, ON, P1B 8H8

Attention: Jamie Houston
Manager of Parks & Facilities

College Education Centre
100 College Drive
NORTH BAY, ON, P1B 8L7

Attention: Ken Brown
Director College Facilities

Near North District School Board
200 McIntyre Street East
P. O. Box 3110
NORTH BAY, ON, P1B 8H1

Attention: Dan Alexander
Superintendent of School Support Services

Nipissing-Parry Sound Catholic District School Board
1140 Front Street
NORTH BAY, ON, P1B 6P2

Attention: Richard Shank, Manager of
Transportation and Assessment
Services

Conseil Scolaire du District Catholique Français Nipissing
681-C Chippewa Street
NORTH BAY, ON, P1B 6G8

Attention: Richard Shank, Manager of
Transportation and Assessment
Services

Conseil Scolaire Public du Nord-Est de l'Ontario
200 McIntyre Street East, 6th Floor
NORTH BAY, ON, P1B 9T5

Attention: Denis Boyer
Chief of Financial Services

North Bay and District Ambulance Service
750 Scollard
NORTH BAY, ON, P1B 5A4

Attention: Jack Brotherston, Director

North Bay Police Department
P. O. Box 717
135 Princess West
NORTH BAY, ON, P1B 8J8

Attention: Constable M. Lahaie

APPENDIX 2

NOISE IMPACT ASSESSMENT

NOISE IMPACT ASSESSMENT

NEL 4351 - MCKEOWN AVENUE, NORTH BAY

FROM GORMANVILLE ROAD EASTERLY TO ALGONQUIN AVENUE

prepared for the

CITY OF NORTH BAY



May 21, 1999

northland
engineering
limited
north bay sudbury

EXECUTIVE SUMMARY

NOISE IMPACT ASSESSMENT
CITY OF NORTH BAY - MCKEOWN AVENUE, NORTH BAY

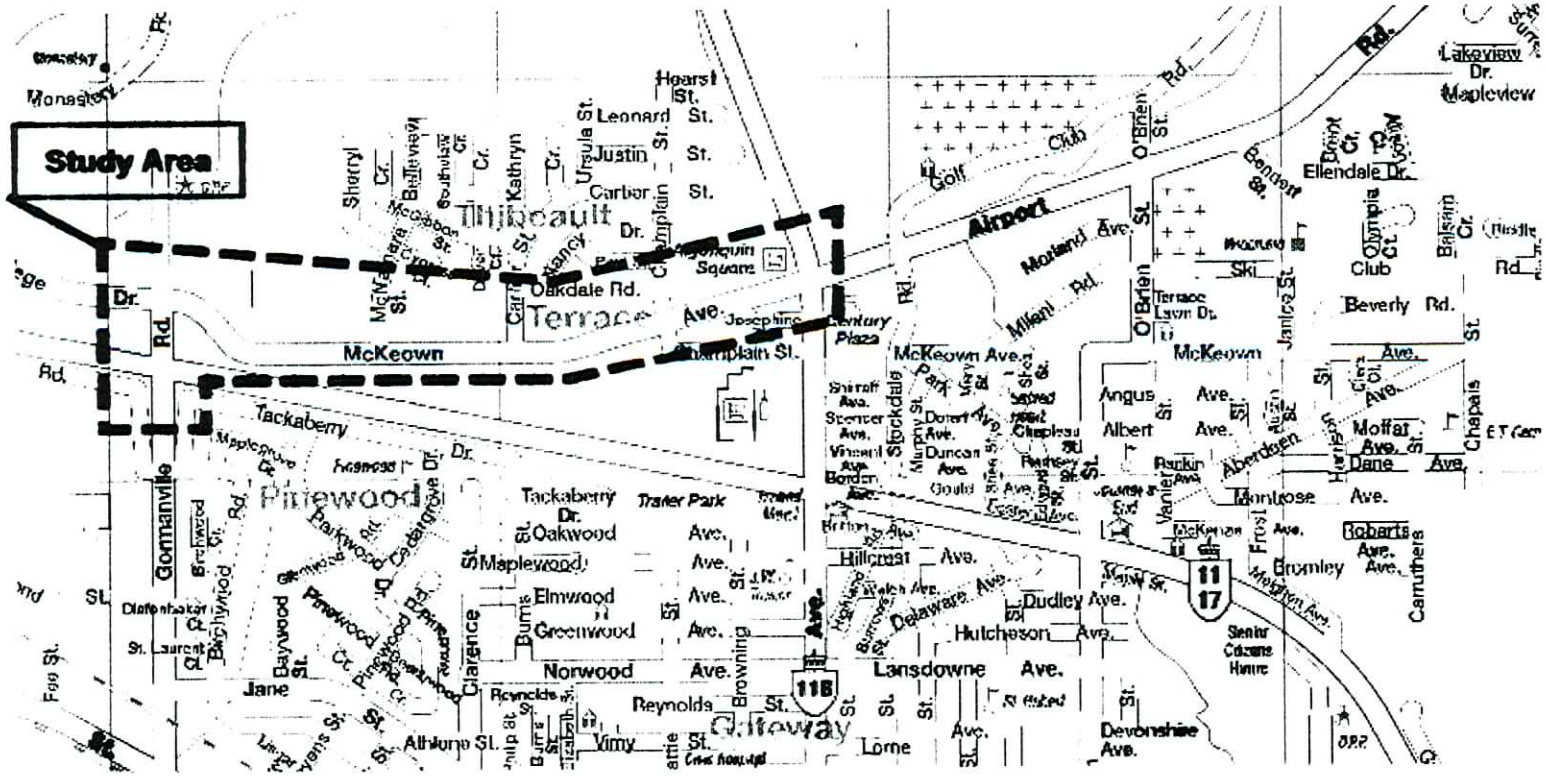
From Gormanville Road
Easterly to Algonquin Avenue

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

KEY PLAN



MCKEOWN AVENUE FROM GORMANVILLE TO ALGONQUIN AVENUE
TRAFFIC PLANNING STUDY - NOISE ASSESSMENT STUDY

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1.0 INTRODUCTION

1. This report analyzes the 1999 sound levels resulting from the 1999 traffic volumes on McKeown Avenue and the associated side streets, of McNamara Street, Cartier Street and Champlain Street. It compares these levels with the future full development scenario traffic volumes for the McKeown Avenue corridor.

2. The purposes of the study are to:

   - To determine the potential changes to the ambient environment due to the proposed widening and reconfiguring of traffic lanes on McKeown Avenue and the adjacent side streets.

   - To assess the significance of the changes, and to recommend mitigation appropriate to the increases if necessary.

3. At the present time McKeown Avenue is four lanes from Algonquin Boulevard to Cartier Street. The section from Cartier Street over to Gormanville Road is two lanes.

4. The future traffic predictions are based on the proposed five lane section - four through lanes with a continuous left turn in the middle to accommodated left turns for both directions of travel.

5. The predictions in this report are based on traffic volumes for the present traffic volumes and predictions traffic volumes prepared by Tranplan Associates.

6. The sound level predictions were made using STAMSON. This is a computer version of the road and rail noise prediction methods contained in ORNAMENT (Ontario Road and Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). This project used the road's portion of this program to make the prediction for present and future traffic in the corridor. Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

2.0 SOUND LEVELS CRITERIA

2.1 MOE/MTO Protocol

The MOE/MTO protocol is a joint effort of both the Ministry of the Environment (MOE) and the Ministry of Transportation (MTO) as outlined in the document titled "a Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of the Provincial Highways Environmental Assessments," Feb. 1986. It primarily applies to Provincial Highways undertaking such as Freeways and Kings Highways

The MOE has informally extended the use of the MOE/MTO protocol criteria to also embraced other roadways, such as the Regional and local Municipal roads subject to the provisions of the Environmental Assessment Act (EAA) administered by the MOE. Since there is no formal direction published by the MOE on the protocol application, it is recommended that the same directions with regards to mitigation applies to the MTO projects be applied also for this Municipal project. The criteria which should apply to this and other municipal projects, is a review of mitigation within the roadway road allowance. The noise impacts assessment should be reviewed for the Outdoor Living Area (OLA). The protocol does not specify whether the L_{eq} sound levels should be 24-hour based or some other time frame, the MOE extended the appropriate technical logic to municipal roads by requesting calculations be done on the basis of the daytime $L_{eq\,(16)}$ dBA[1].

To ensure that the assessment covers the most significant sound levels, predictions are made in this the assessment on the 16 hour time frame from 07:00 to 23:00 hours. This is considered the day time hours. As this an urban residential areas and commercial industrial area we have assumed 90% of the traffic is in this time frame. For purposes of determining the traffic needs for this roadway Tranplan Associates developed traffic volumes for the Design Hour Volume (DHV). These figures are 10% of the Annual Average Daily Traffic (AADT) traffic volumes.

The study also calculated the sound levels which would be experienced under the Design Hour Volume flows for comparison against the 16 hours volumes. There is a slightly higher level of 2 or 3 dBA using the DHV versus the 16 hour volumes. The increases from now to future are about the same using either method. For the purposes of the evaluation the 16 hour volumes were used, and is more representative of the sound levels experienced in this residential area, and in keeping with the latest Ministry of the Environmental Guidelines "Noise Assessment Criteria in Land Use Planning LU-131, October 1997, and its ancillary publications. The other point worth noting is that despite the presence of Provincial objective the outdoor levels of L_{eq} 55

---

[1] The sound levels in this report are all report in $L_{eq\,(16\ hour)}$ dBA. This is the 16 hour time frame from 07:00 to 23:00, reported in dBA which is the A weighted sound scale which best represent the hearing of the human ear. For purposes of simplification and convenience in the report figures will be reported as L_{eq} dBA the 16 hours will be assumed unless noted otherwise.

dBA[2], 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 levels criteria, the following statements are quoted from the protocol:

1 Section 3.1.2 of the publication LU-131 gives the equivalent sound level (L_{eq}) criterion in the selected Outdoor Living Area. The criterion applies to the entire daytime period from 07:00 to 23:00. The objective for outdoor sound levels is the higher of the L_{eq} 55 dBA or the existing ambient. The significance of the noise impact will be quantified by using this objective in addition to the change in noise levels above the ambient.

2. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as it 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 Levels above the Ambient	Mitigation Effort
0 to 5 dBA	none
greater than 5 dBA	• investigate noise control measures on ROW. • if project costs are not significantly affected introduce noise control measures within ROW • noise control measures, where introduced, should achieve the minimum of 5 dBA attenuation, over first row receivers • mitigate to ambient, as administrative, economically and technically feasible

[2] L_{eq} is an energy averaging concept adopted by the MOE to sum the time varying noise generated by vehicular traffic. The result are expressed in dBA: which is a logarithmic scale that approximates the response to the human ear.

2.2 MTO Directive A - 1

This directive is specifically written for the Provincial Highways, the MTO also applies this directive to Arterial and the Municipal roads.

The following are some of the typical applicable highlights of the MTO directive, supplemented by previous MTO work experience knowledge.

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

2. There are no subsidies for off ROW mitigation.

3 The MTO favors the institution of retrofit programs where the present or future levels exceed L_{eq} 70 dBA irrespective of how small the excess of future levels is above the present ambient, or the future Do Nothing scenarios.

3.0 ANALYSIS AND THE RESULTS

3.1 Noise Impact Methodology

1. Noise is generally defined as unwanted sound. In this case, the noise under consideration is the road traffic noise perceived along the McKeown Avenue corridor. The glossary section provides technical definitions of the road traffic noise analysis to assist in understanding the principles and terminology used in this report.

   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 preset sound level limit (criterion) such as L_{eq} 55 dBA. The degree of noise impact varies directly as the ratio between the intruding and existing noise levels; for instance, the more the intruding noise level exceeds the existing noise level, the higher the impact

   Since the proposed roadway traffic noise represents the future consideration, projections are made as to sound levels which will be generated by the project under consideration when the roadway has been in operation for at least ten years and the existing and adjacent commercial/industrial properties have come to full development and the other areas serviced by the road have been fully developed.

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

   The MTO and MOE modifications included adjustments for ground cover, terrain differences and barrier adjustments. The algorithms were also adjusted to accommodate typical Ontario traffic mixes, speeds, and situations. These modifications resulted in the ORNAMENT noise prediction methodology. The computerized version of the program is STAMSON. Version 5.1 of the prediction program was used to make sound level predictions for this project. The technical data of the ornament model used and the various adjustments implemented are summarized in appendix B.

3. There are a variety of descriptors that can be used to describe the noise levels at any location. The prediction methods all use the same descriptors are all therefore similar, in that they account for all the different parameters that modify or attenuate the noise at that location such as intervening rows of homes, townhouses, length of roadway segments, various roadway etc. Therefore, the differences in the sound levels experienced is therefore more or less based on traffic volumes.

   The sound levels for these locations selected were predicted using the L_{eq} 16 hour traffic volumes, which is approximately 90% of the daily traffic, percentages of the medium and heavy trucks, posted speed limits, road receptor distances, elevation differentials between the road and the receptor, roadway grading, pavement types and the type of ground cover between the road receptor in question. The percentage of trucks and classifications were derived from traffic counts by Tranplan and the City of North Bay.

   The sound levels which would result from the Design Hour Volumes were also calculated and compared to the 16 hour volumes. These values are higher by 2 or 3 dBA than the normal 16 hour dBA prediction. This was done to determine a peak sound level. The MOE criteria uses the 16 hour volumes to get a better representation of the sound levels. The 16 hour dBA L_{eq} is based on 90% of the traffic occurring in the 16 hour period from 7:00 a.m. to 11:00 p.m. Using this descriptor the value are approximately 2.5 dBA less than the DHV traffic volumes. The DHV then indicates the worst case scenario, and is associated with the level of traffic occurring in the highest afternoon peak hour. The levels for the remainder of the day are best represented by the dBA $L_{eq\ (16)}$ levels.

4. Ambient or existing sound levels along McKeown Avenue are largely due to the traffic on McKeown Avenue and the existing side streets. There are some sound levels in the area as a result of the nearby Highway 17 corridor to the south of this

area. The remainder of the sound in the neighbourhood is typical of urban subdivisions, children playing, traffic on local streets, lawnmowers, etc.

3.2 Study of the Alternatives.

For the purpose of the design study 6 receivers were selected which typify the various neighbourhoods adjacent to the study area. These represent more or less the areas that are impacted by sound levels from the McKeown Avenue traffic in the corridor.

There are three main alternatives,

A. The existing corridor with reconstruction to fix frost heaves and poor subbase conditions, this alternative utilizes the existing centreline.

B. Four lanes throughout, the existing Algonquin Avenue to Cartier Street section would remain the same and the section from Cartier Street to Gormanville Road would be widened to four lanes similar in cross section to the section from Cartier Street to Algonquin Avenue, this alternative utilizes the existing centreline.

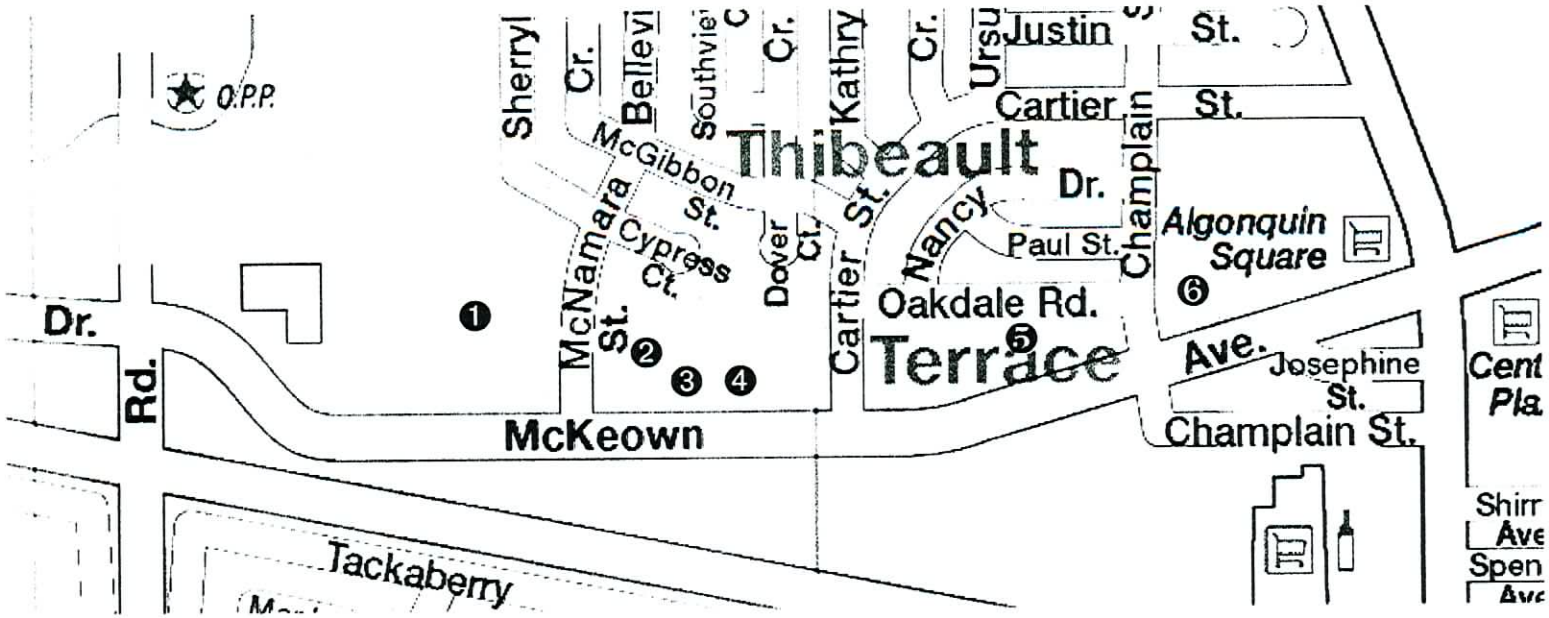
C. This alternative has a five lane section throughout from Algonquin Avenue to the Gormanville Road intersection. This centre lane will allow left turns in both directions to entrances and side streets. This alternative moves the centreline to the south about 1.5 m's in the section from Cartier Street to the Ontario Government Building west entrance.

The minor difference in source to receiver distance is so minor as to not make any significant difference in the predictions. The future traffic predictions are generally based on the commercial and industrial properties developing to their highest and best use. The larger traffic volumes as a result of this development is the most significant difference in the increase in sound levels.

3.3 Receiver Locations

There were six locations selected as representing the various neighbourhoods adjacent to McKeown Avenue. Each of these locations are typical for a particular site. They are illustrated on the McKeown Avenue Receiver Site Map. A description of each of the sites follows.

MCKEOWN AVENUE - GORMANVILLE ROAD TO ALGONQUIN AVENUE
NOISE ASSESSMENT RECEIVER LOCATIONS



3.3.1 Receiver #1 - 545 McNamara Street, Maplecrest #2

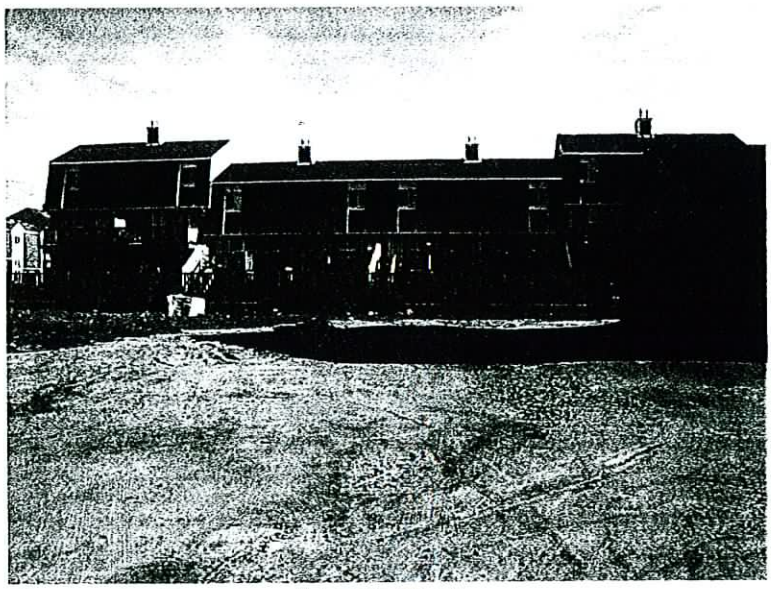


Figure 1 - Receiver #1 575 McNamara in the outside recreational area

This is a townhouse development off MacNamara Street north of Algonquin Avenue, behind the Lucky 13 Convenience Store Strip Mall. The outside recreational area to the left of the picture is used for the receiver location and represents the outdoor living area of the housing complex. The townhouse recreational and playground area are here as well. This site represents the highest sound levels in the complex. The homes elsewhere in the complex are shielded by the first row of continuous houses.

3.3.2 Receiver #2 - New Era Outdoor Recreational Area

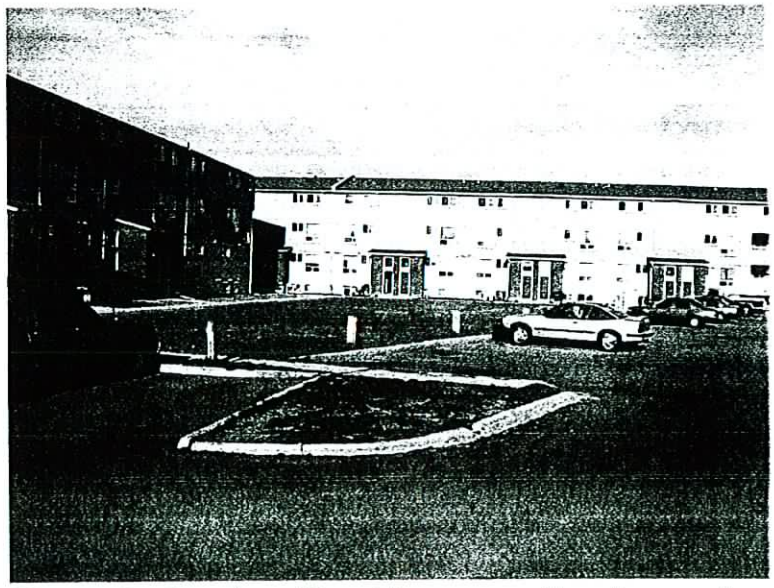


Figure 2 - Receiver #2 outdoor recreational area of the New Era townhouse complex

This receiver location is the outdoor recreation area in the courtyard of the New Era Townhouse at the northwest corner of McKeown Avenue and McNamara Street. This also represent the common outside recreational area to the north of the townhouse complex on McNamara Street. This area is shielded by the 3 story building on two sides. The area to the right, which is the next complex on McNamara St., also receive the benefit of this shielding.

3.3.3 Receiver #3 - New Era Townhouse Outside Area east of building

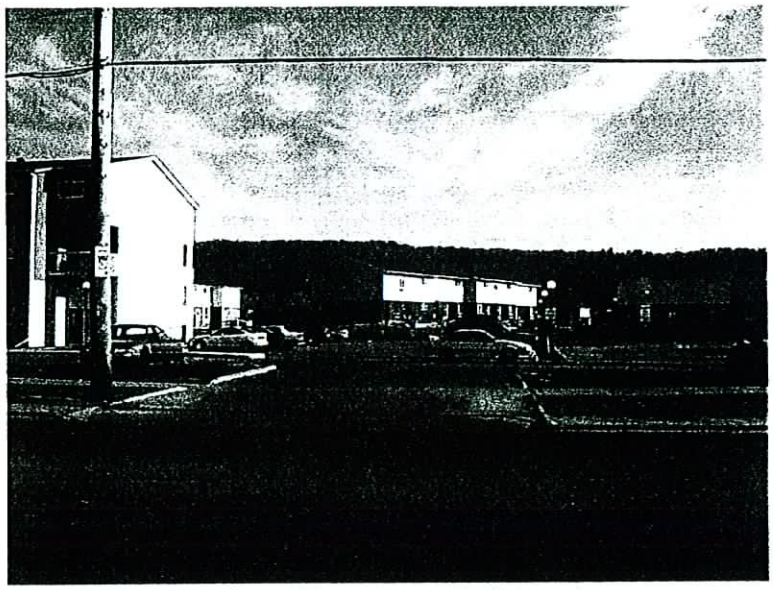


Figure 3 - Receiver #3 area east of townhouse complex

This is the area is to the east of the New Era Townhouse complex. This encompasses the are between the New Era Complex and the Northern Co Operative Housing next door. This represent a nearby area with some shielding and also approximates the levels at the townhouse complex next door on McNamara Street visible in the background.

3.3.4 Receiver #4 - Northern Co Operative Housing Complex outside living area

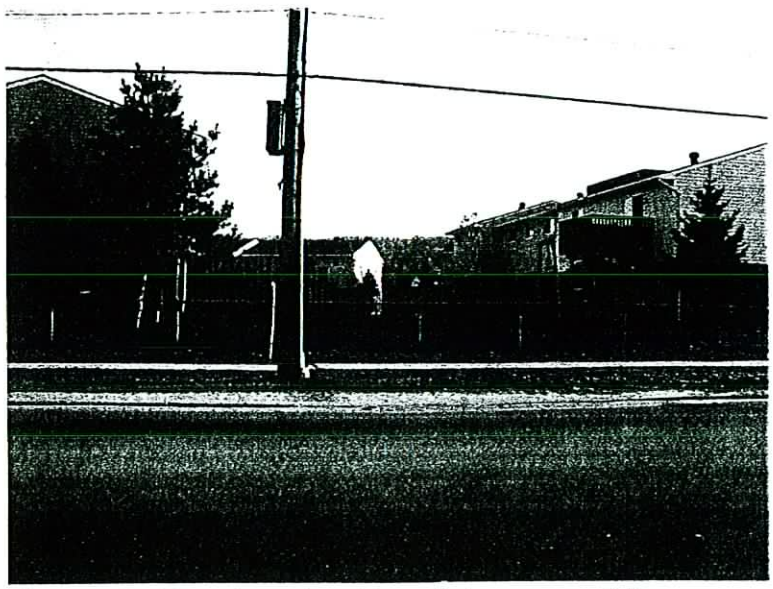


Figure 4 - Receiver 4 outdoor living area of the Northern Co Operative

This location is in the outdoor living area for the Northern Co Operative Housing Complex on McKeown Avenue. This location is representative of the outdoor living areas for the complex. The location is in the centre of the common area of the backyards and outside areas.

3.3.5 Receiver #5 - Rear Backyards of the homes on Oakdale Avenue.

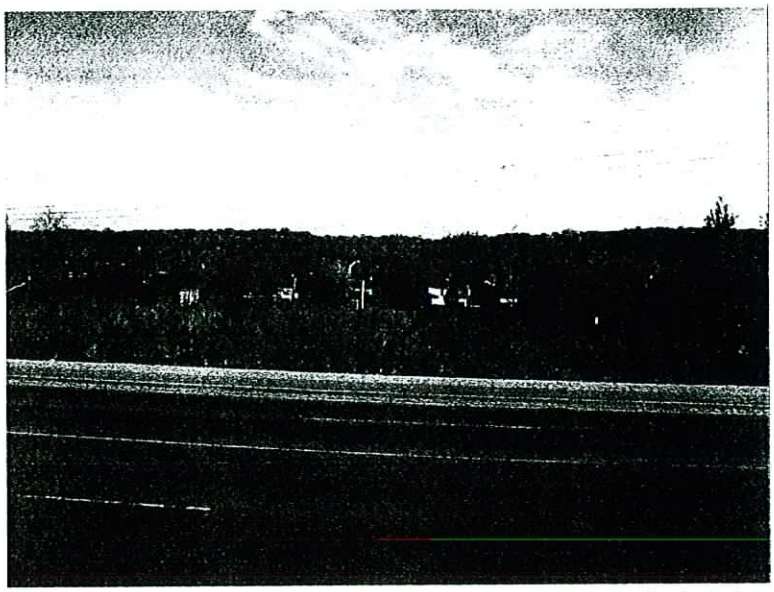


Figure 5 - Receiver #5 rear of the homes on Oakdale Avenue

Receiver #5 is the rear back yards of the residences along Oakdale Avenue. These outdoor living areas face McKeown Avenue. They are separated from McKeown Avenue by the Ontario Hydro corridor. There is some intervening shrubbery which provides some screening. This are along McKeown is likely going to develop as commercial property.

3.3.6 Receiver #6 - Rear of the Homes on Champlain Street on east side of street.



Figure 6 - Receiver #6 rear of homes on the east side of Champlain Street north.

This location is in the rear yard and outdoor living area of the homes on Champlain Street north on the east side. The actual location for evaluation was in the rear yard of the second home north of McKeown Avenue.

3.4 Description of the Ambient Noise

The existing ambient noise referred to in this study is the 1999 ambient or existing sound levels at the receptors locations based on the existing traffic volumes and lane configuration. The future full development ambient levels are based on the traffic volumes predicted by Tranplan Associates. These future ambient have been calculated in accordance with the MOE guidelines and using the Stamson computer noises prediction program based on the Ornament noise prediction methodology.

The dominant sources of noise in the project area is vehicular traffic movements along McKeown Avenue and the neighbourhood traffic in the side streets. Highway 17 is nearby and has large traffic volumes. It was included in the receiver #1 calculations because of the proximity and visibility. For the other receivers the highway is further away and there are intervening structures which means that the highway contribute little to the sum of the noise in the receiver locations. A prediction including this source resulted in a very minor increase in the sound levels of about 0.1 dB. In the still of the night the highway may be audible from some of these other locations.

3.5 Traffic Data

For the purposes of the study, AADT volumes for all the streets were used as supplied by Tranplan Associates. The AADT for the existing ambient is based on the present Design Hour Volumes which have been calculated for all roadways and intersections. The Design Hour Volume is basically 10% of the AADT. The future AADT was based on a future scenario where all of the properties along McKeown have been developed to their fullest and best use as commercial and industrial properties. The traffic generated at these location and in the study area is based on the present plans that are in place for a number of these properties. See Figure 7 McKeown Avenue Traffic Volumes Presents and Figure 8 McKeown AvenueTraffic Volumes - Future.

3.6 Impact Assessment

The process for assessing the impact of the project for the adjacent resident was to calculate the existing sound levels based on today's traffic volumes. The future traffic sound levels were predicted as well. These were based on the full development of adjacent properties. These values were compared to the established criteria as determined by MOE. Figure 11 - McKeown Avenue Noise Predictions which shows the sound levels at the various receiver locations for the existing traffic and the levels expected with the future traffic volumes. The change in dBA is also illustrated on Figure 12 McKeown Avenue Sound Levels, which shows a graphical representation of these predictions.

McKeown Avenue Traffic Planning Study - Traffic Volumes Present

May 20, 1999

1999 - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	6,750	6,480	99	171
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	8,100	7,767	126	207
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	13,050	12,528	198	324
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	9,000	8,100	405	495

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

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Figure 7

McKeown Avenue Traffic Planning Study - Traffic Volumes Future

May 20, 1999

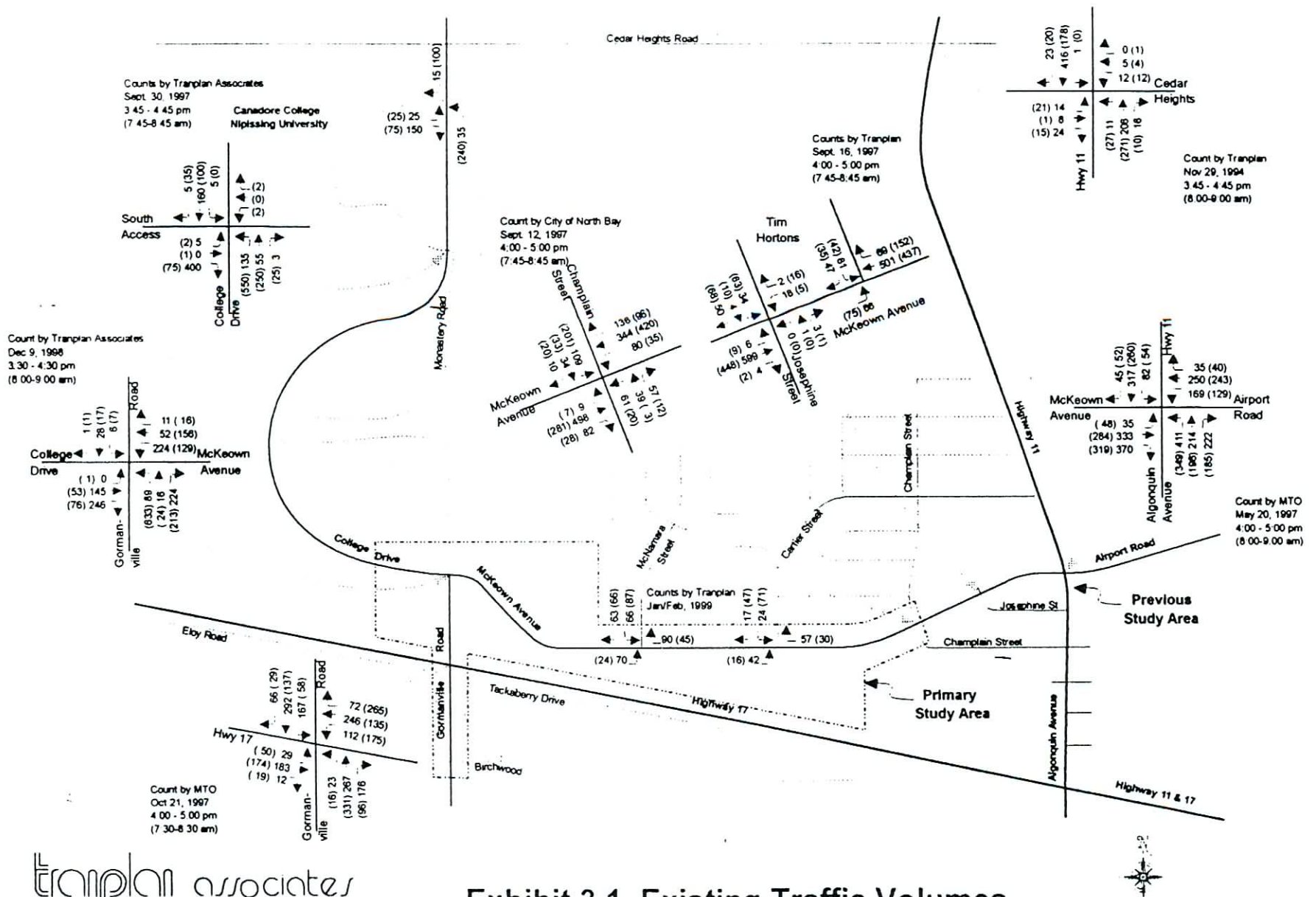
FUTURE - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	11,350	18,576	290	484
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	21,150	20,304	317	529
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	27,000	25,920	410	670
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	15,300	13,770	689	841

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

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Figure 8

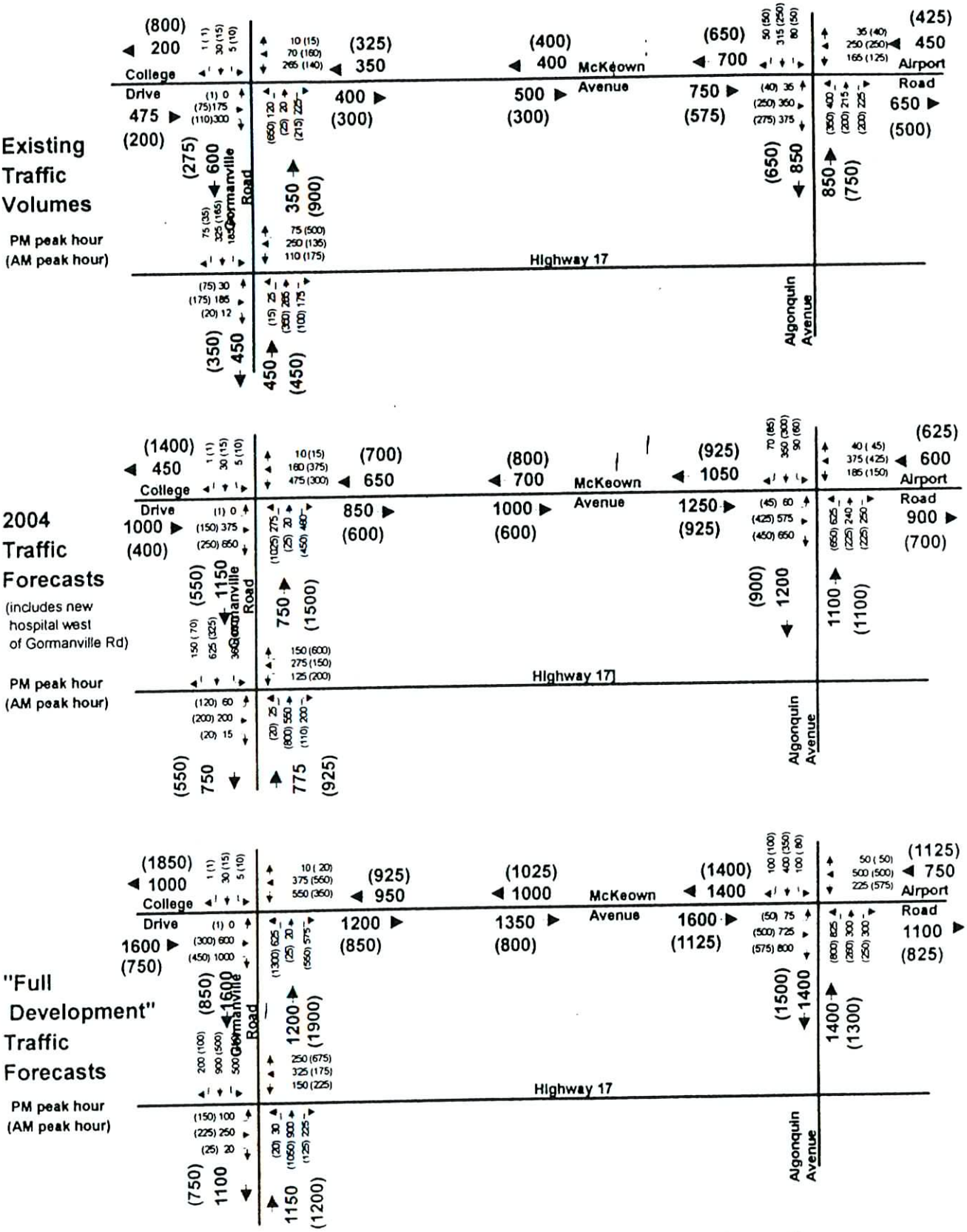


tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville Tel (905) 849-1500 Fax (905) 849-8164
Sudbury Tel (705) 522-0272 Fax (705) 522-1733

Exhibit 3.1 Existing Traffic Volumes

Figure - 9

Figure - 10



McKeown Avenue Traffic Study

Traffic Forecasts

PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD STE 1 OAKVILLE ONT L6H 7S5
Oakville Tel (905) 849-1500 Fax (905) 849-8164
Sudbury Tel (705) 522-0772 Fax (705) 522-1733

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA 16 hour May 17, 1999

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates.
The predictions were made using the Ministry of Environment STAMSON* prediction program

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	49.03	52.89	3.86
2	centre of courtyard on New Era townhouses	43.04	43.84	0.8
3	rear of parking lot of New Era townhouses	54.81	58.91	4.1
4	centre of play/common area in backyards of Northern Lights co-op	54.28	58.38	4.1
5	backyards of the homes on south side of Oakdale Road	48.04	52.14	4.1
6	backyards of homes on east side of Champlain	52.76	55.59	2.83

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Figure - 11

Northland Engineering Limited

The Annex to Publication LU-131 indicates that the:

> "If the daytime sound level in the Outdoor Living Area is 55 dBA or less, no further assessment is required.
>
> Where it can be clearly demonstrated that it is not technically feasible to achieves the Ministry's outdoor sound level criterion for road and rail traffic, a tolerance of no more than 5dBA above the stated criteria may be allowed.[3] "

This means that even though these receivers are above the desirable criteria, and there are no outdoor mitigation available to lessen their impacts, then this situation is acceptable.

3.7 1999 Sound Levels

Figure 11 - McKeown Avenue Noise Predictions, shows the predicted existing values. The LU 131 guidelines recommend the level of 55 dBA L_{eq} 16 hour as the desirable criteria. As can be seen from the number in this figure that all of the locations are within acceptable values. Even the closest receivers with little or no attenuation from structures are below 55. There are no receivers with existing noise problems or concerns.

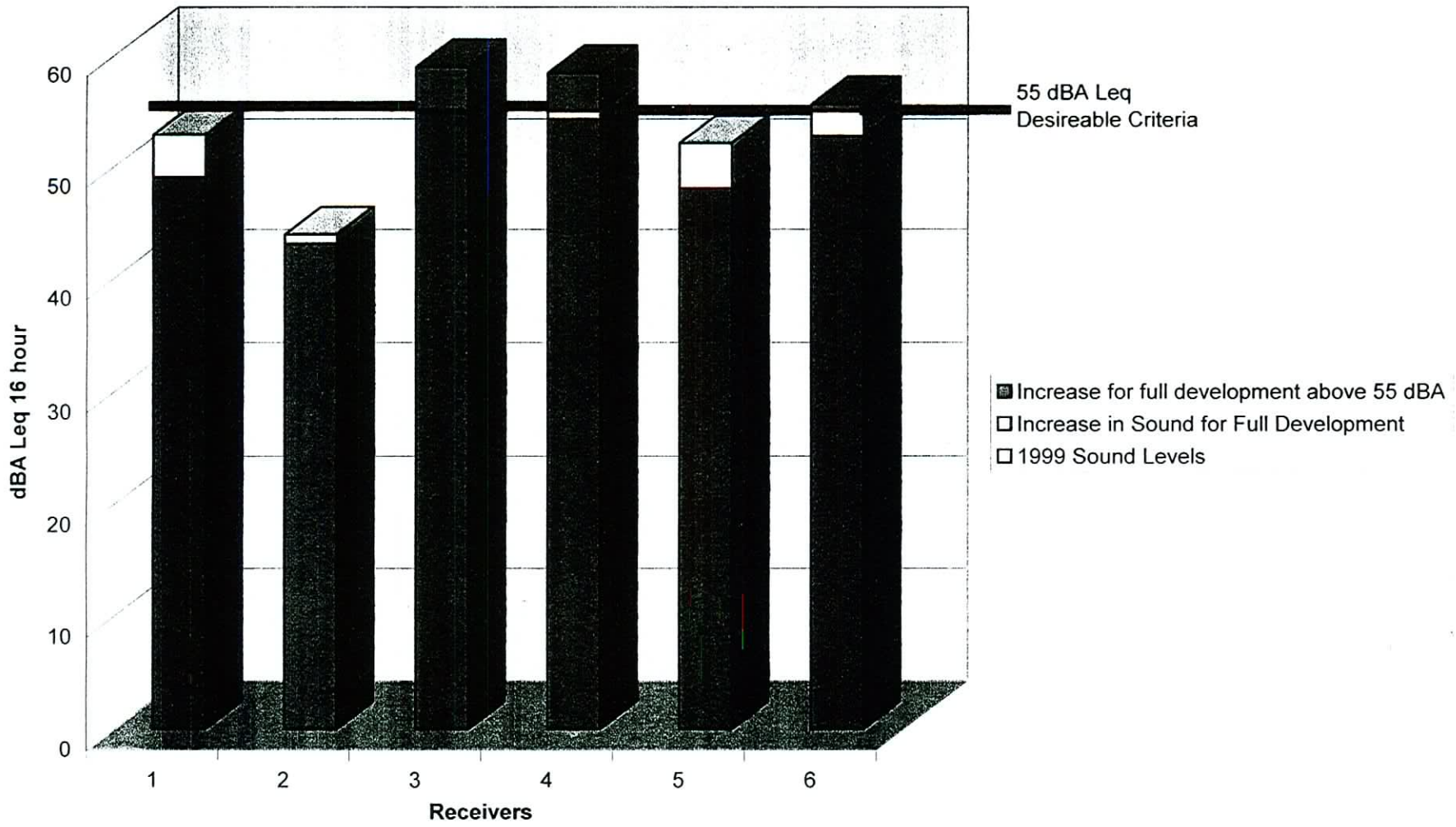
3.8 Future Full Development sound Levels.

Figure 12 - McKeown Avenue Sound Levels, shows the values of the predicted sound levels for the same receivers with the future traffic volumes. Three receivers exceed the criteria of 55 dBA L_{eq}. These are:

Receiver location	Present L_{eq} dBA	Future L_{eq} dBA	Change in L_{eq} dBA	Exceed 55 dBA
3	54.81	58.91	4.1	3.91
4	54.28	58.38	4.1	3.38
6	52.76	55.59	2.83	0.59

[3] Annex to Publication LU - 131 Noise Assessment Criteria in Land Use Planning, October 1997, Section A.3.2.1 Application of Criteria, part (a) Road and Rail

Figure 12 - McKeown Avenue Sound Levels
Leq 16 hour



These values are also illustrated in Figure 12 McKeown Avenue Sound Levels, which shows the existing levels and the increase which will result from the higher volumes in the future. It shows in yellow the receivers that exceed the desirable criteria of 55 dBA. These values are not above 60 dBA L_{eq} which is the second criteria. A number of options were reviewed in relation to reducing these values. All normal noise mitigation measures such as barriers were reviewed. Any attempt to install barriers at these locations are unfeasible. The problem being the access through the barriers for entrances and access seriously compromise the barrier, and render them unfeasible. The barriers, even if continuous would not achieve the necessary 5 dBA attenuation required for barrier. Anything less than the 5 dBA decrease is not usually considered noticeable by adjacent receivers.

The outside areas which are affected are the parking lot area beside the New Era parking lot (Receiver 3), which is not used very much as a recreational area. The outdoor areas of Kingsview Court which is adjacent to the New Era development will be at lower levels and the impact less than receiver 3 levels.

The Receiver 4 area is the outside living area at the Northern Cooperative Housing. The future levels expected are above 55 dBA but below the 60 dBA levels. The outdoor living area that are further back will have lower sound levels. The predictions did

not include the effect of the privacy fencing around all of the backyards. This would reduce the sound levels a little. They certainly cannot be considered as noise barriers.

Receive 6 is the other location that will be subjected to levels above 55 dBA. This location is in the rear backyard of the second home north of McKeown Avenue. The outdoor living area here is fenced. This will have some minor effect, but cannot be considered a noise barrier. The area to the rear of the building will eventually be part of the strip mall development, which will likely have a more significant impact on these outdoor living areas at the rear of these homes.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Summary

This study has been carried out to review the sound levels which are being experience at a number of locations that represent a variety of the typical neighbourhoods adjacent to the project. The study dealt with the documentation of the existing sound levels and the future projected sound levels for these area. There are three areas where the predicted levels exceed the desirable levels. These three areas are still within the

allowable maximum which is outlined in the appropriate MOE documentation mentioned previously. Noise barriers are unfeasible and cannot achieve an appreciatable reduction in these levels.

4.2 Noise Control During Construction

In addition to the noise emitted during the operation of vehicles on the updated roadway, another noise issue is the noise associated with the construction of the roadway.

Unlike the operational noise, construction noise is temporary in nature. It is also transient throughout the site. It is also dependent on the nature of work underway at the time. The significance of the noise impact is dependent on the number of pieces of equipment, type, hours of operation and proximity to the receptors. The following points should be reviewed during detail design stage to ensure the aspect of construction noise is addressed.

1. The City of North Bay has adopted the Model Municipal Noise Control Bylaw. The Bylaw should be reviewed during the design stage to determine contract package requirements for noise control.

2. There are no noise sensitive land uses adjacent to the project other than the residences and apartments.

3. The contract package should include "general noise control measures" referring to the maintenance levels of equipment and assurance that the equipment is being maintained in the appropriate manner to reduce noise. This would include operation methods of the equipment, and requirements like mufflers in good repair.

4. The operation and location of granular sources should also be considered and reviewed during detail design to ensure that aggregate production and extraction does not cause noise problems to residents living near the aggregate production areas.

5. In the event of a complaint about noise from the construction, the municipality or its contract administrator, should enure the general noise control measures are being abided to. If they are not, then the municipality will ensure that contractor is made aware of the problem and of the complaint, and indicate to them to adjust or modify their operation or equipment as required.

5.0 CONCLUSION

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

APPENDIX

A -Definition of Terms

B - Stamson Noise Receivers Printouts

2. DEFINITIONS

"Adverse effect"

means one or more of the following effects of sound and vibration, selected from the relevant definitions in the Environmental Protection Act, Reference [6]:

- impairment of the quality of the natural environment for any use that can be made of it;
- harm or material discomfort to any person;
- an adverse effect on the health of any person, and
- loss of enjoyment of normal use of property.

"Ambient sound level"

means Background sound level;

"Background sound level"

is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by a source such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level;

"Class 1 Area"

means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the urban hum.

"Class 2 Area"

means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 19:00 and 23:00 hours;
- evening background sound level defined by natural environment and infrequent human activity;
- no clearly audible sound from stationary sources other than from those under impact assessment.

"Class 3 Area"

means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

"Construction", "Conveyance"

refer to the Annex.

"Control measure"

refers to action which can be taken to achieve compatibility for the specific land use or activity. The control measure should be permanent in nature and not be readily removable or alterable by the future occupants. Control measures may include, but are not limited to, the following:

- Acoustical Barriers - berms, walls, favourable topographical features, other intervening structures;
- Architectural Design - room and corridor arrangement, blank walls, placement of windows, balconies, and courtyards, building height;

- Building Construction - acoustical treatment of walls, ceilings, selection of acoustical materials and other control devices. Provision for air conditioning;
- Mitigation at Source - noise control applied directly to the noise source;
- Site Planning - orientation of buildings and Outdoor Living Areas with respect to noise sources, spatial separation such as the insertion of noise insensitive land uses between source and receiver, appropriate setbacks, and the use of intervening service roads;
- Windows/Doors - acoustically designed windows or doors that provide the required noise reduction. In order to allow for the windows and doors to remain closed, air conditioning, i.e. mechanical ventilation and climatic control system, is necessary.

Refer to References [1] and [2] for further description of control measures and their application.

"dBA"
means the A-weighted sound pressure level.

"dBAI"
means the A-weighted sound pressure level of an impulsive sound measured with a sound level meter set to "impulse" response.

"Indoor sound level"
is an estimated sound level in the central part of a room.

"L_{eq} (T): L_{eq} (16), L_{eq} (8), L_{eq} (1)"
means the A-weighted level of a steady sound carrying the same total energy in the time period T as the observed fluctuating sound. The time period T is given in hours.

"Ministry"
means the Ontario Ministry of the Environment.

"NEF/NEP"
means Noise Exposure Forecast/Noise Exposure Projection contours for major Ontario airports.

"Noise"
means unwanted sound.

"Noise sensitive land uses"
mean the following sensitive land uses:

- residential developments;
- seasonal residential developments;
- hospitals, nursing/retirement homes, schools, day-care centres, etc.

Sensitive land use means a land use that is sensitive in accordance with the definition of Reference [15], and that must be planned and/or designed using appropriate land use compatibility principles.

"Outdoor Living Area"
is the part of an outdoor area easily accessible from the building and designed for the quiet enjoyment of the outdoor environment. Outdoor Living Areas include, but are not limited to, the following:

- Backyards or front yards or gardens or terraces or patios;
- Balconies, provided they are the only Outdoor Living Areas for the occupant and meet the following conditions:

(a) minimum depth of 4 m;
(b) outside the exterior building facade;
(c) unenclosed;

- Common Outdoor Living Areas associated with multi-storey apartment buildings or condominiums;
- Passive recreational areas such as parks if identified by the municipality.

"Point of Reception"
means any point on the premises of a person where sound or vibration originating from other than those premises is received, see Reference [12].

"Stationary Source"
means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance, see Reference [12]. Section A.2.1.1 provides further explanation.

"Time Periods"
"Day-time"
is the 16-hour period between 07:00 and 23:00 hours.

"Evening"
is the 4-hour period between 19:00 and 23:00 hours.

"Night-time"
is the 8-hour period between 23:00 and 07:00 hours.

"Urban Hum"
means aggregate sound of many unidentifiable, mostly road traffic related sound sources.

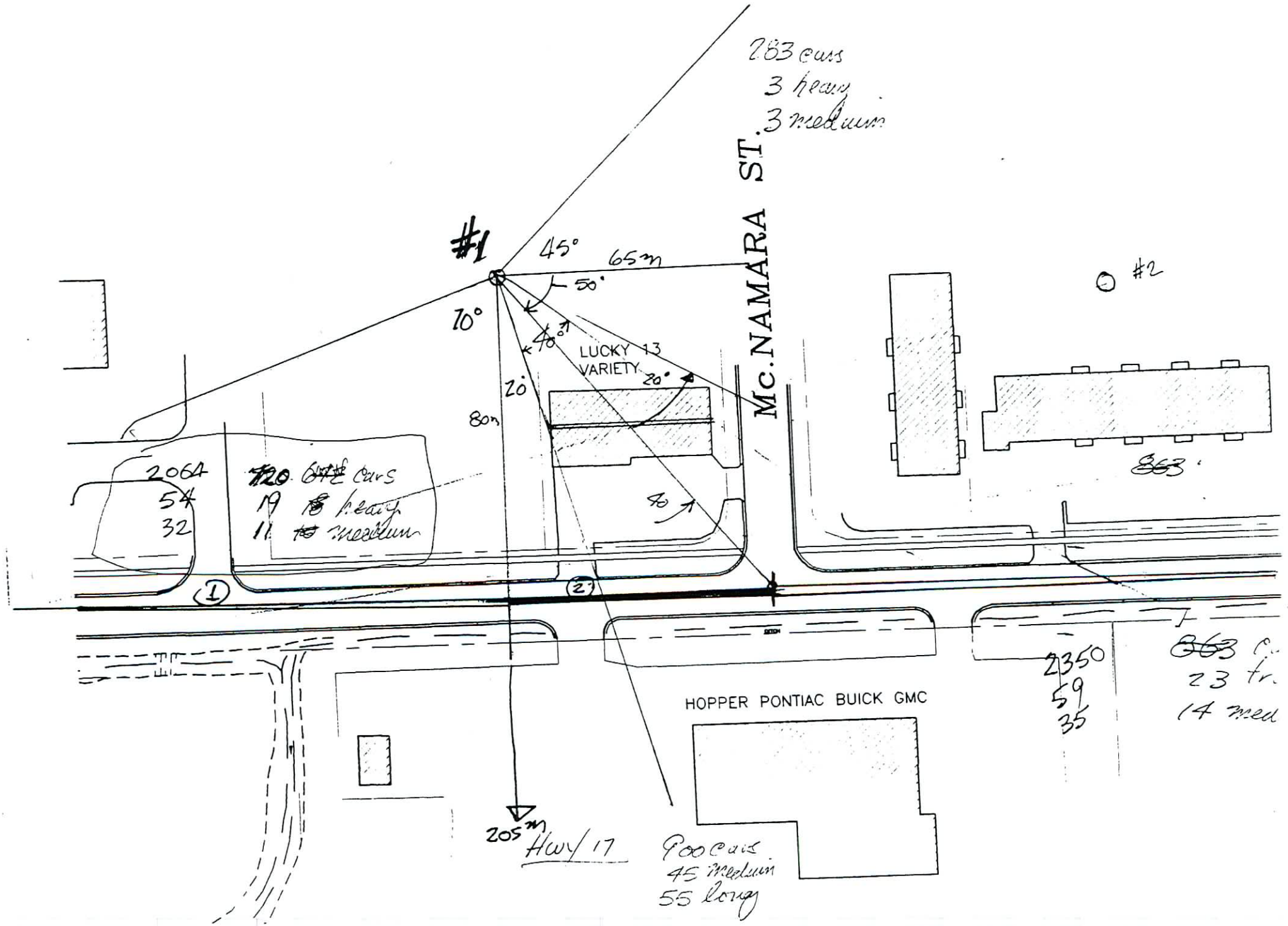
"Warning Clause" (or "Environmental Warning/Restriction")
means a notification of or obligation to notify a potential purchaser of some environmental concern; in this case the concern is potential annoyance due a source of noise.

3. NOISE IMPACT ASSESSMENT, TRANSPORTATION SOURCES

This section deals with noise impact from transportation corridors (i.e., road, rail and air traffic). In case of multiple transportation noise sources:

(a) the outdoor noise impact due to air traffic shall be established separately from the impact due to road and/or rail traffic;
(b) the outdoor noise impact due to road and rail traffic shall be combined;
(c) the indoor noise impact shall be assessed separately for road, rail and aircraft noise. The required indoor noise control measures for the multiple source impact are then defined by a combined acoustical insulation parameter (descriptor) that is evaluated by combining the acoustical insulation parameters determined for each of the sources.

In all cases, consideration should be given to future sound levels. For road and rail noise, a minimum ten year prediction should be made and for aircraft noise, the current NEF/NEP contours shall apply.


783 cars
3 heavy
3 medium
#1
45°
65m
50°
70°
40°
LUCKY 13
VARIETY
20°
20
80m
MC. NAMARA ST.
#2
2064
54
32
720 cars
19 heavy
11 medium
40
1
2
2350
59
35
HOPPER PONTIAC BUICK GMC
205m
HWY 17
900 cars
45 medium
55 heavy

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:.AMSON 5.0          NORMAL REPORT          Date: 14-05-1999 11:43:51
:INISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

: lename: r1b1699.te                Time Period: 16 hours
)escription: 4351 Rec #1 16 hour volumes 1999 575 MacNamara Pla


:oad data, segment # 1: mck west 1
----------------------------------
: r traffic volume   :  6480 veh/TimePeriod
:.dium truck volume  :    99 veh/TimePeriod
:eavy truck volume   :   171 veh/TimePeriod
: )sted speed limit  :    50 km/h
: )ad gradient       :     0 %
:oad pavement        :     1 (Typical asphalt or concrete)

: ita for Segment # 1: mck west 1
---------------------------------
Angle1   Angle2              :   0.00 deg    70.00 deg
/ )od depth                  :      0        (No woods.)
: ) of house rows            :      0
Surface                      :      1        (Absorptive ground surface)
: eceiver source distance    :  80.00 m
: eceiver height             :   1.50 m
Topography                   :      1        (Flat/gentle slope; no barrier)
Reference angle              :   0.00

:oad data, segment # 2: mck west 2
----------------------------------
ar traffic volume   :  6480 veh/TimePeriod
edium truck volume  :    99 veh/TimePeriod
Heavy truck volume  :   171 veh/TimePeriod
Posted speed limit  :    50 km/h
oad gradient        :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

ata for Segment # 2: mck west 2
 ---------------------------------
Angle1   Angle2              : -40.00 deg    0.00 deg
ood depth                    :      0        (No woods.)
o of house rows              :      0
Surface                      :      1        (Absorptive ground surface)
Receiver source distance     :  80.00 m
.eceiver height              :   1.50 m
Topography                   :      2        (Flat/gentle slope; with barrier)
Barrier angle1               : -40.00 deg    Angle2 : -20.00 deg
Barrier height               :   6.00 m
Barrier receiver distance    :  50.00 m
Source elevation             :   1.00 m
Receiver elevation           :   0.00 m
Barrier elevation            :   0.00 m
Reference angle              :   0.00
```

ad data, segment # 3: mck east 1
---
ar traffic volume : 7767 veh/TimePeriod
edium truck volume : 126 veh/TimePeriod
avy truck volume : 207 veh/TimePeriod
osted speed limit : 50 km/h
oad gradient : 0 %
ad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 3: mck east 1
---
gle1 Angle2 : -60.00 deg 0.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
rface : 1 (Absorptive ground surface)
ceiver source distance : 150.00 m
Receiver height : 1.50 m
pography : 2 (Flat/gentle slope; with barrier)
rrier angle1 : -60.00 deg Angle2 : -40.00 deg
Barrier height : 5.00 m
rrier receiver distance : 55.00 m
urce elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
ference angle : 0.00

Road data, segment # 4: mcn north 1
---
r traffic volume : 2547 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
osted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

ata for Segment # 4: mcn north 1
---
gle1 Angle2 : -45.00 deg 45.00 deg
od depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
eceiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
arrier angle1 : 30.00 deg Angle2 : 45.00 deg
arrier height : 5.00 m
Barrier receiver distance : 55.00 m
ource elevation : 0.00 m
eceiver elevation : 0.00 m
arrier elevation : 0.00 m
Reference angle : 0.00

esults segment # 1: mck west 1

ource height = 1.26 m

AD (0.00 + 45.80 + 0.00) = 45.80 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	62.76	0.00	-12.07	-4.89	0.00	0.00	0.00	45.80

gment Leq : 45.80 dBA

esults segment # 2: mck west 2

ource height = 1.26 m

rrier height for grazing incidence

ource ight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.98	1.98

AD (0.00 + 30.11 + 41.09) = 41.43 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	62.76	0.00	-9.50	-9.74	0.00	0.00	-13.40	30.11
-20	0	0.66	62.76	0.00	-12.07	-9.60	0.00	0.00	0.00	41.09

egment Leq : 41.43 dBA

sults segment # 3: mck east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.41	1.41

ROAD (0.00 + 30.42 + 40.22) = 40.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	-40	0.37	63.60	0.00	-13.67	-10.26	0.00	0.00	-9.24	30.42
-40	0	0.66	63.60	0.00	-16.60	-6.77	0.00	0.00	0.00	40.22

Segment Leq : 40.66 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

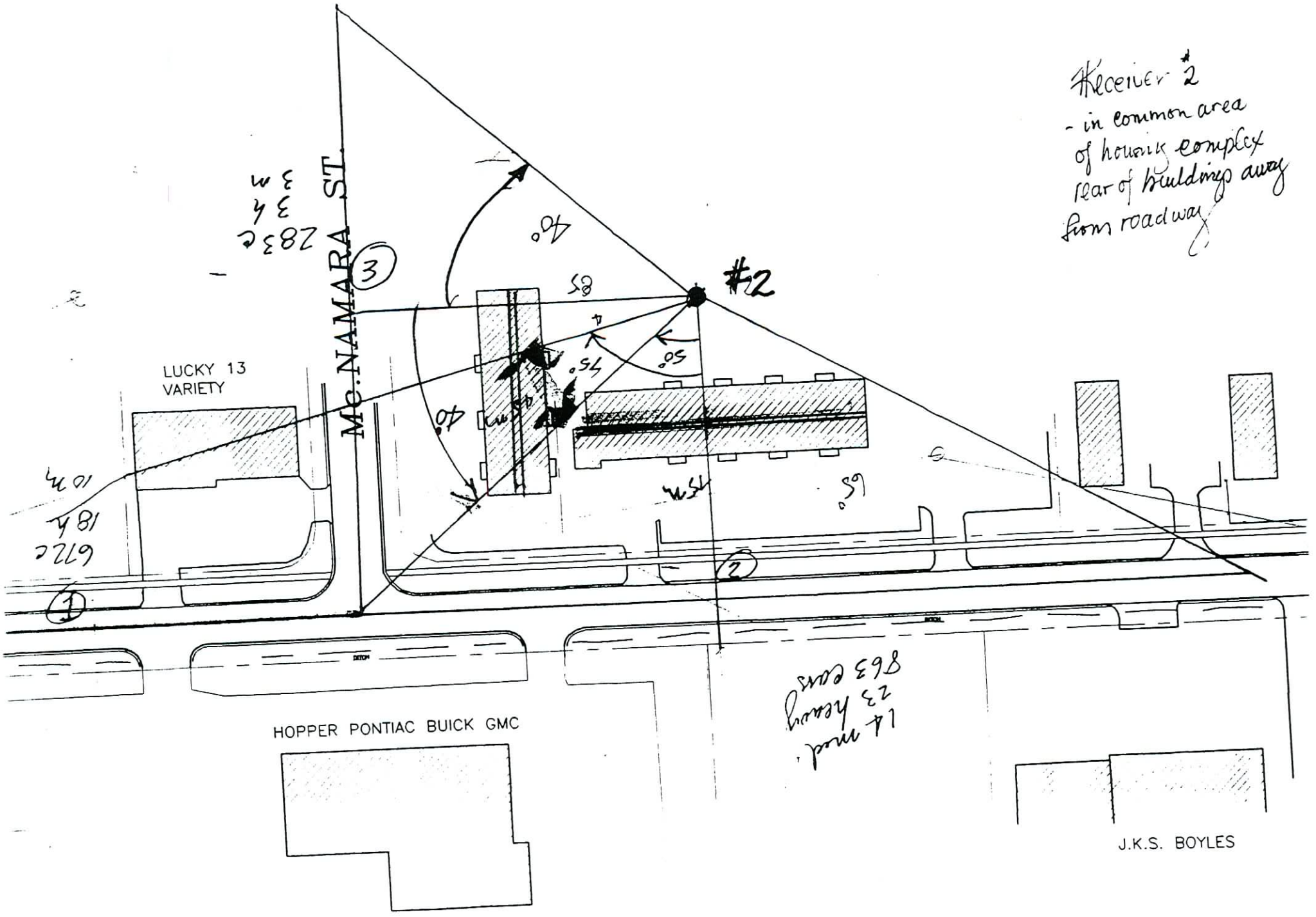
OAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.11
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.75

Segment Leq : 42.14 dBA

Total Leq All Segments: 49.03 dBA

TOTAL Leq FROM ALL SOURCES: 49.03


Receiver #2
- in common area of housing complex rear of buildings away from roadway
Mc.NAMARA ST.
LUCKY 13 VARIETY
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
#2
40°
85
75°
50
65
15m
40
1
2
3

: AMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:45:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

: lename: r1b16fut.te Time Period: 16 hours
Description: 4351 Rec#1b 16 hour volumes ~~1999~~ future 575 McNamara Rec

.oad data, segment # 1: mck west 1
---
ar traffic volume : 18576 veh/TimePeriod
edium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
oad gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

ata for Segment # 1: mck west 1

Angle1 Angle2 : 0.00 deg 70.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
eceiver height : 1.50 m
opography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

oad data, segment # 2: mck west 2
---
ar traffic volume : 18576 veh/TimePeriod
edium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
oad gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

ata for Segment # 2: mck west 2

Angle1 Angle2 : -40.00 deg 0.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
eceiver height : 1.50 m
opography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : -20.00 deg
arrier height : 6.00 m
arrier receiver distance : 50.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
arrier elevation : 0.00 m
eference angle : 0.00

ad data, segment # 3: mck east 1

Car traffic volume	: 21150	veh/TimePeriod
Medium truck volume	: 317	veh/TimePeriod
avy truck volume	: 529	veh/TimePeriod
osted speed limit	: 50	km/h
Road gradient	: 0	%
ad pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 3: mck east 1

gle1 Angle2	: -60.00 deg	0.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
rface	: 1	(Absorptive ground surface)
eceiver source distance	: 150.00 m	
Receiver height	: 1.50 m	
opography	: 2	(Flat/gentle slope; with barrier)
arrier angle1	: -60.00 deg	Angle2 : -40.00 deg
Barrier height	: 5.00 m	
Barrier receiver distance	: 55.00 m	
ource elevation	: 0.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
eference angle	: 0.00	

Road data, segment # 4: mcn north 1

ar traffic volume	: 2547	veh/TimePeriod
Medium truck volume	: 27	veh/TimePeriod
Heavy truck volume	: 27	veh/TimePeriod
osted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

ata for Segment # 4: mcn north 1

ngle1 Angle2	: -45.00 deg	45.00 deg
ood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
eceiver source distance	: 65.00 m	
eceiver height	: 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
arrier angle1	: 30.00 deg	Angle2 : 45.00 deg
arrier height	: 5.00 m	
Barrier receiver distance	: 55.00 m	
Source elevation	: 0.00 m	
eceiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
Reference angle	: 0.00	

sults segment # 1: mck west 1

Source height = 1.26 m

OAD (0.00 + 50.35 + 0.00) = 50.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.31	0.00	-12.07	-4.89	0.00	0.00	0.00	50.35

gment Leq : 50.35 dBA

Results segment # 2: mck west 2

Source height = 1.26 m

arrier height for grazing incidence

Source eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.97	1.97

OAD (0.00 + 34.66 + 45.64) = 45.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	67.31	0.00	-9.50	-9.74	0.00	0.00	-13.41	34.66
-20	0	0.66	67.31	0.00	-12.07	-9.60	0.00	0.00	0.00	45.64

Segment Leq : 45.98 dBA

Results segment # 3: mck east 1

Source height = 1.25 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.25	1.50	1.41	1.41

ROAD (0.00 + 34.57 + 44.39) = 44.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	-40	0.37	67.76	0.00	-13.68	-10.26	0.00	0.00	-9.25	34.57
-40	0	0.66	67.76	0.00	-16.60	-6.77	0.00	0.00	0.00	44.39

Segment Leq : 44.82 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

ROAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.11
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.75

Segment Leq : 42.14 dBA

Total Leq All Segments: 52.89 dBA

TOTAL Leq FROM ALL SOURCES: 52.89

```
STAMSON 5.0          NORMAL REPORT          Date: 14-05-1999 11:52:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_1699.te                Time Period: 16 hours
Description: 4351 Rec #2 16 hour volumes 1999 New Era Courtyard


Road data, segment # 1: McK west 1
----------------------------------
Car traffic volume   :  6480 veh/TimePeriod
Medium truck volume  :    99 veh/TimePeriod
Heavy truck volume   :   171 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1
--------------------------------
Angle1   Angle2              :  50.00 deg    75.00 deg
Wood depth                   :        0      (No woods.)
No of house rows             :        0
Surface                      :        1      (Absorptive ground surface)
Receiver source distance     :  75.00 m
Receiver height              :   1.50 m
Topography                   :        1      (Flat/gentle slope; no barrier)
Reference angle              :   0.00

Road data, segment # 2: McK east 1
----------------------------------
Car traffic volume   :  7767 veh/TimePeriod
Medium truck volume  :   126 veh/TimePeriod
Heavy truck volume   :   207 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1
--------------------------------
Angle1   Angle2              : -65.00 deg    50.00 deg
Wood depth                   :        0      (No woods.)
No of house rows             :        0
Surface                      :        1      (Absorptive ground surface)
Receiver source distance     :  75.00 m
Receiver height              :   1.50 m
Topography                   :        2      (Flat/gentle slope; with barrier)
Barrier angle1               : -65.00 deg    Angle2 : 50.00 deg
Barrier height               :   8.00 m
Barrier receiver distance    :  30.00 m
Source elevation             :   1.00 m
Receiver elevation           :   0.00 m
Barrier elevation            :   0.00 m
Reference angle              :   0.00
```

oad data, segment # 3: Mcn north 1
---

ar traffic volume : 2547 veh/TimePeriod
edium truck volume : 27 veh/TimePeriod
avy truck volume : 27 veh/TimePeriod
sted speed limit : 50 km/h
oad gradient : 0 %
ad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 3: Mcn north 1
---

gle1 Angle2 : -40.00 deg 40.00 deg
od depth : 0 (No woods.)
o of house rows : 0
rface : 1 (Absorptive ground surface)
ceiver source distance : 85.00 m
eceiver height : 1.50 m
pography : 2 (Flat/gentle slope; with barrier)
rrier angle1 : -40.00 deg Angle2 : 5.00 deg
arrier height : 8.00 m
arrier receiver distance : 45.00 m
urce elevation : 1.00 m
ceiver elevation : 0.00 m
arrier elevation : 0.00 m
ference angle : 0.00

esults segment # 1: McK west 1
---

ource height = 1.26 m

AD (0.00 + 40.32 + 0.00) = 40.32 dBA

gle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	75	0.66	62.76	0.00	-11.60	-10.84	0.00	0.00	0.00	40.32

gment Leq : 40.32 dBA

sults segment # 2: McK east 1

ource height = 1.26 m

arrier height for grazing incidence

urce ight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.81	1.81

ROAD (0.00 + 36.30 + 0.00) = 36.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	63.60	0.00	-8.30	-2.11	0.00	0.00	-16.89	36.30

gment Leq : 36.30 dBA

sults segment # 3: Mcn north 1

ource height = 1.01 m

arrier height for grazing incidence

ource eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.75
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.83

egment Leq : 37.09 dBA

otal Leq All Segments: 43.04 dBA

OTAL Leq FROM ALL SOURCES: 43.04

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:50:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_16fut.te Time Period: 16 hours
Description: 4351 Rec#2 16 hour volumes future 575 McNamara

Road data, segment # 1: McK west 1

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1

Angle1 Angle2 : 50.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 50.00 deg Angle2 : 75.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK east 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1

Angle1 Angle2 : -65.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: Mcn north 1

Car traffic volume	2547	veh/TimePeriod
Medium truck volume	27	veh/TimePeriod
Heavy truck volume	27	veh/TimePeriod
Posted speed limit	50	km/h
Road gradient	0	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 3: Mcn north 1

Angle1 Angle2	-40.00 deg	40.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	85.00 m	
Receiver height	1.50 m	
Topography	2	(Flat/gentle slope; with barrier)
Barrier angle1	-40.00 deg	Angle2 : 5.00 deg
Barrier height	8.00 m	
Barrier receiver distance	45.00 m	
Source elevation	1.00 m	
Receiver elevation	0.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

Results segment # 1: McK west 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.47	1.47

ROAD (0.00 + 39.10 + 0.00) = 39.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	75	0.49	67.31	0.00	-10.40	-10.26	0.00	0.00	-7.56	39.10

Segment Leq : 39.10 dBA

Results segment # 2: McK east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.80	1.80

ROAD (0.00 + 40.40 + 0.00) = 40.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	67.70	0.00	-8.30	-2.11	0.00	0.00	-16.90	40.40

Segment Leq : 40.40 dBA

Results segment # 3: Mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

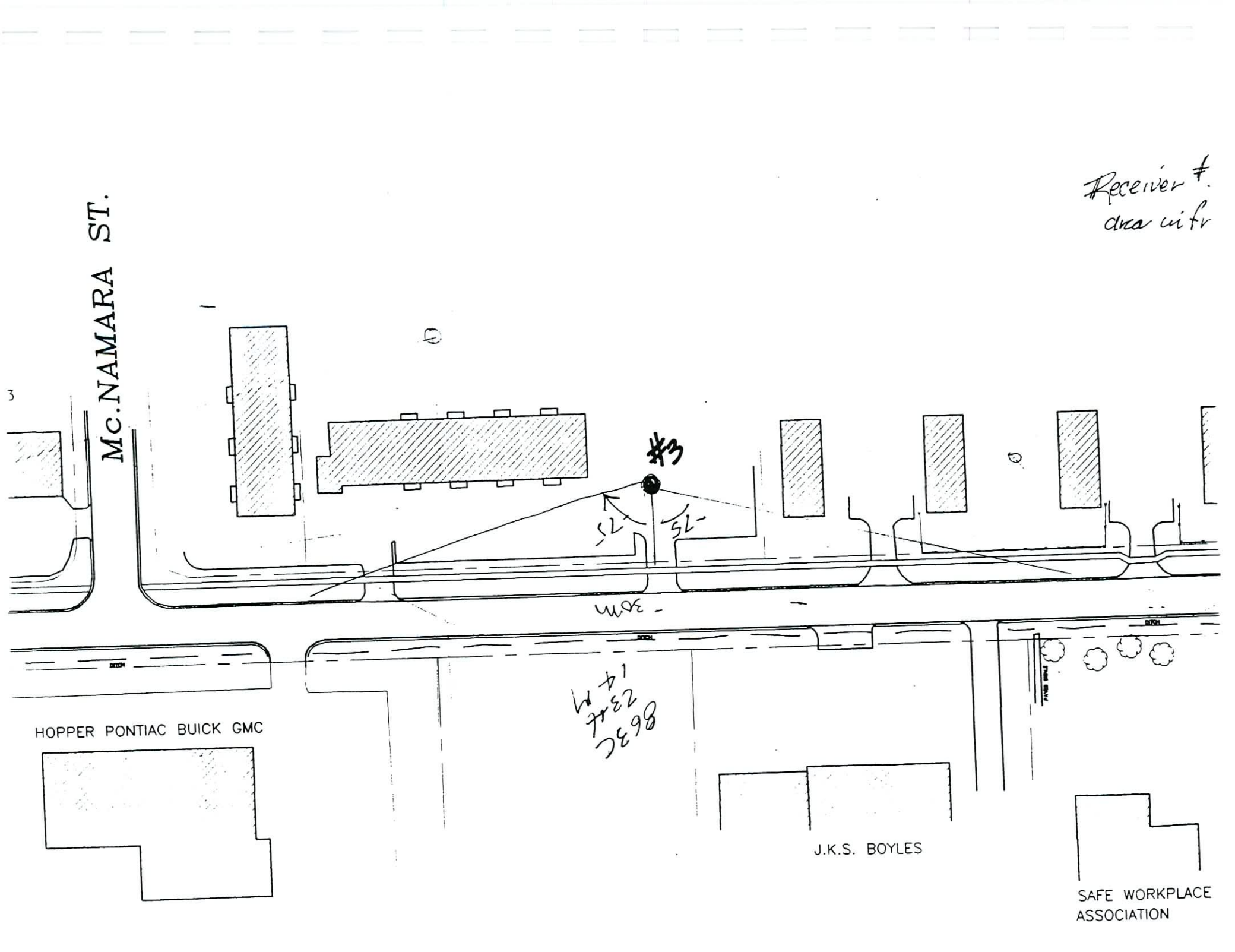
ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.75
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.83

Segment Leq : 37.09 dBA

Total Leq All Segments: 43.84 dBA

TOTAL Leq FROM ALL SOURCES: 43.84


Receiver #.
area with
Mc.NAMARA ST.
#3
75'
75'
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
SAFE WORKPLACE
ASSOCIATION

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:55:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_1699.te Time Period: 16 hours
Description: 4351 Rec #3 16 hour volumes 1999 New Era Parking

Road data, segment # 1: McKeown

Car traffic volume	: 7767	veh/TimePeriod
Medium truck volume	: 126	veh/TimePeriod
Heavy truck volume	: 207	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2	: -75.00 deg	75.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 40.00 m	
Receiver height	: 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: McKeown

Source height = 1.26 m

ROAD (0.00 + 54.81 + 0.00) = 54.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	75	0.66	63.60	0.00	-7.07	-1.72	0.00	0.00	0.00	54.81

Segment Leq : 54.81 dBA

Total Leq All Segments: 54.81 dBA

TOTAL Leq FROM ALL SOURCES: 54.81

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 10:35:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_16fut.te Time Period: 16 hours
Description: 4351 Rec#3 16 hour volumes future New Era Parking

Road data, segment # 1: McKeown

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2 : -75.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: McKeown

Source height = 1.26 m

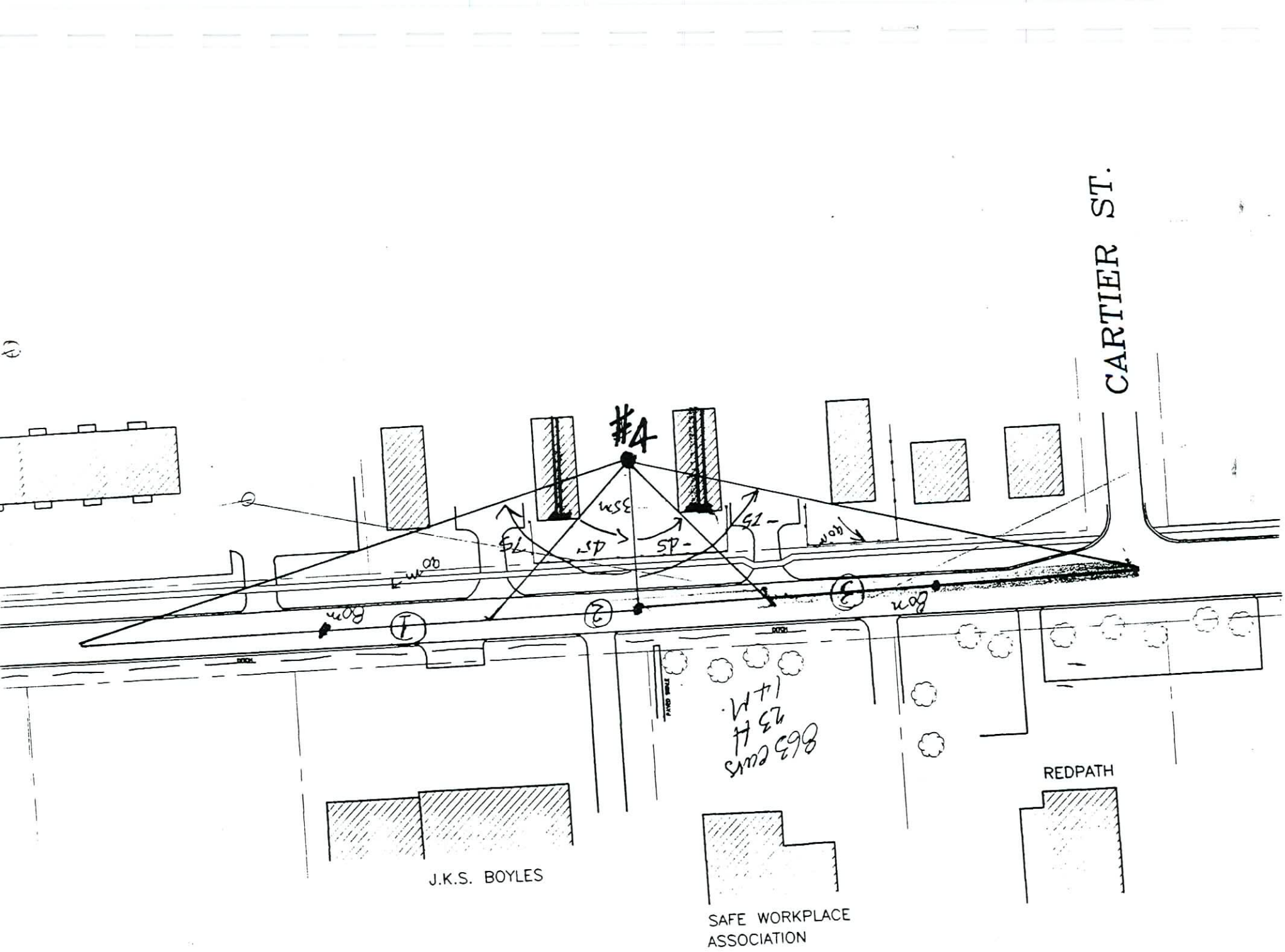
ROAD (0.00 + 58.91 + 0.00) = 58.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	75	0.66	67.70	0.00	-7.07	-1.72	0.00	0.00	0.00	58.91

Segment Leq : 58.91 dBA

Total Leq All Segments: 58.91 dBA

TOTAL Leq FROM ALL SOURCES: 58.91


CARTIER ST.
#4
J.K.S. BOYLES
SAFE WORKPLACE ASSOCIATION
REDPATH

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 10:49:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_1699.te Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes 1999 Northern Co-Op

Road data, segment # 1: McK west

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west

Angle1 Angle2 : 45.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 45.00 deg Angle2 : 75.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 20.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK centre

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK centre

Angle1 Angle2 : -45.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: McK east

Car traffic volume	7767	veh/TimePeriod
Medium truck volume	126	veh/TimePeriod
Heavy truck volume	207	veh/TimePeriod
Posted speed limit	50	km/h
Road gradient	0	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 3: McK east

Angle1 Angle2	-75.00 deg	-45.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	35.00 m	
Receiver height	1.50 m	
Topography	2	(Flat/gentle slope; with barrier)
Barrier angle1	-75.00 deg	Angle2 : -45.00 deg
Barrier height	7.00 m	
Barrier receiver distance	20.00 m	
Source elevation	1.00 m	
Receiver elevation	0.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

Segment # 1: McK west

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

ROAD (0.00 + 35.94 + 0.00) = 35.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	75	0.31	63.60	0.00	-4.81	-8.76	0.00	0.00	-14.09	35.94

Segment Leq : 35.94 dBA

..gment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 54.17 + 0.00) = 54.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	63.60	0.00	-6.11	-3.32	0.00	0.00	0.00	54.17

..egment Leq : 54.17 dBA

Segment # 3: McK east

Source height = 1.26 m

..arrier height for grazing incidence

Source eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

..OAD (0.00 + 34.53 + 0.00) = 34.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	-45	0.25	63.60	0.00	-4.59	-8.57	0.00	0.00	-15.91	34.53

..egment Leq : 34.53 dBA

Total Leq All Segments: 54.28 dBA

..OTAL Leq FROM ALL SOURCES: 54.28

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 10:41:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_16fut.te Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes future Northern Co-Op

Road data, segment # 1: McK west

Car traffic volume	: 20304	veh/TimePeriod
Medium truck volume	: 317	veh/TimePeriod
Heavy truck volume	: 529	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 1: McK west

Angle1 Angle2	: 45.00 deg	75.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 45.00 deg	Angle2 : 75.00 deg
Barrier height	: 6.00 m	
Barrier receiver distance	: 20.00 m	
Source elevation	: 1.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
Reference angle	: 0.00	

Road data, segment # 2: McK centre

Car traffic volume	: 20304	veh/TimePeriod
Medium truck volume	: 317	veh/TimePeriod
Heavy truck volume	: 529	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 2: McK centre

Angle1 Angle2	: -45.00 deg	45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

ad data, segment # 3: McK east

Car traffic volume	: 20304	veh/TimePeriod
Medium truck volume	: 317	veh/TimePeriod
avy truck volume	: 529	veh/TimePeriod
sted speed limit	: 50	km/h
Road gradient	: 0	%
ad pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 3: McK east

gle1 Angle2	: -75.00 deg	-45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
rface	: 1	(Absorptive ground surface)
ceiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
pography	: 2	(Flat/gentle slope; with barrier)
rrier angle1	: -75.00 deg	Angle2 : -45.00 deg
Barrier height	: 7.00 m	
rrier receiver distance	: 20.00 m	
urce elevation	: 1.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
ference angle	: 0.00	

Results segment # 1: McK west

Source height = 1.26 m

rrier height for grazing incidence

Source eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

OAD (0.00 + 40.03 + 0.00) = 40.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	75	0.31	67.70	0.00	-4.81	-8.76	0.00	0.00	-14.10	40.03

egment Leq : 40.03 dBA

esults segment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 58.27 + 0.00) = 58.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	67.70	0.00	-6.11	-3.32	0.00	0.00	0.00	58.27

egment Leq : 58.27 dBA

Results segment # 3: McK east

Source height = 1.26 m

arrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

ROAD (0.00 + 38.63 + 0.00) = 38.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	-45	0.25	67.70	0.00	-4.59	-8.57	0.00	0.00	-15.91	38.63

Segment Leq : 38.63 dBA

Total Leq All Segments: 58.38 dBA

TOTAL Leq FROM ALL SOURCES: 58.38

CHAMPLAIN ST.
CARTIER ST.
McKEOWN AVE.
75°
75°
120 m
100 m
CAR CARE
CENTRE

```
_'AMSON 5.0        COMPREHENSIVE REPORT        Date: 17-05-1999 11:04:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

 .lename: r5_1699.te          Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes 1999 Oakdale Rear Yards


Road data, segment # 1: Mck west
--------------------------------
 ar traffic volume  :  7767 veh/TimePeriod
 edium truck volume :   126 veh/TimePeriod
Heavy truck volume  :   207 veh/TimePeriod
Posted speed limit  :    50 km/h
 oad gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

 ata for Segment # 1: Mck west
-----------------------------
Angle1   Angle2             :   0.00 deg    70.00 deg
 ood depth                  :      0        (No woods.)
 o of house rows            :      0
Surface                     :      1        (Absorptive ground surface)
Receiver source distance    : 100.00 m
 eceiver height             :   1.50 m
Topography                  :      1        (Flat/gentle slope; no barrier)
Reference angle             :   0.00

Road data, segment # 2: McK east
--------------------------------
 ar traffic volume  :  7767 veh/TimePeriod
 edium truck volume :   126 veh/TimePeriod
Heavy truck volume  :   207 veh/TimePeriod
Posted speed limit  :    50 km/h
 oad gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

 ata for Segment # 2: McK east
-----------------------------
Angle1   Angle2             : -70.00 deg    0.00 deg
 ood depth                  :      0        (No woods.)
 o of house rows            :      0
Surface                     :      1        (Absorptive ground surface)
Receiver source distance    : 100.00 m
 eceiver height             :   1.50 m
Topography                  :      1        (Flat/gentle slope; no barrier)
Reference angle             :   0.00
```

egment # 1: Mck west

Source height = 1.26 m

ROAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

egment Leq : 45.03 dBA

Segment # 2: McK east

Source height = 1.26 m

OAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

egment Leq : 45.03 dBA

Total Leq All Segments: 48.04 dBA

OTAL Leq FROM ALL SOURCES: 48.04

: AMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:07:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

: lename: r5_16fut.te Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes future Oakdale Rear Yd

Road data, segment # 1: Mck west

:r traffic volume : 20304 veh/TimePeriod
:edium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
:oad gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

:ata for Segment # 1: Mck west

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
: of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
:eceiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

:oad data, segment # 2: McK east

Car traffic volume : 20304 veh/TimePeriod
:edium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
:oad gradient : 0 %
:oad pavement : 1 (Typical asphalt or concrete)

:ata for Segment # 2: McK east

Angle1 Angle2 : -70.00 deg 0.00 deg
Wood depth : 0 (No woods.)
: of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
:eceiver height : 1.50 m
:opography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

ɜegment # 1: Mck west

Source height = 1.26 m

.OAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

egment Leq : 49.13 dBA

Segment # 2: McK east

Source height = 1.26 m

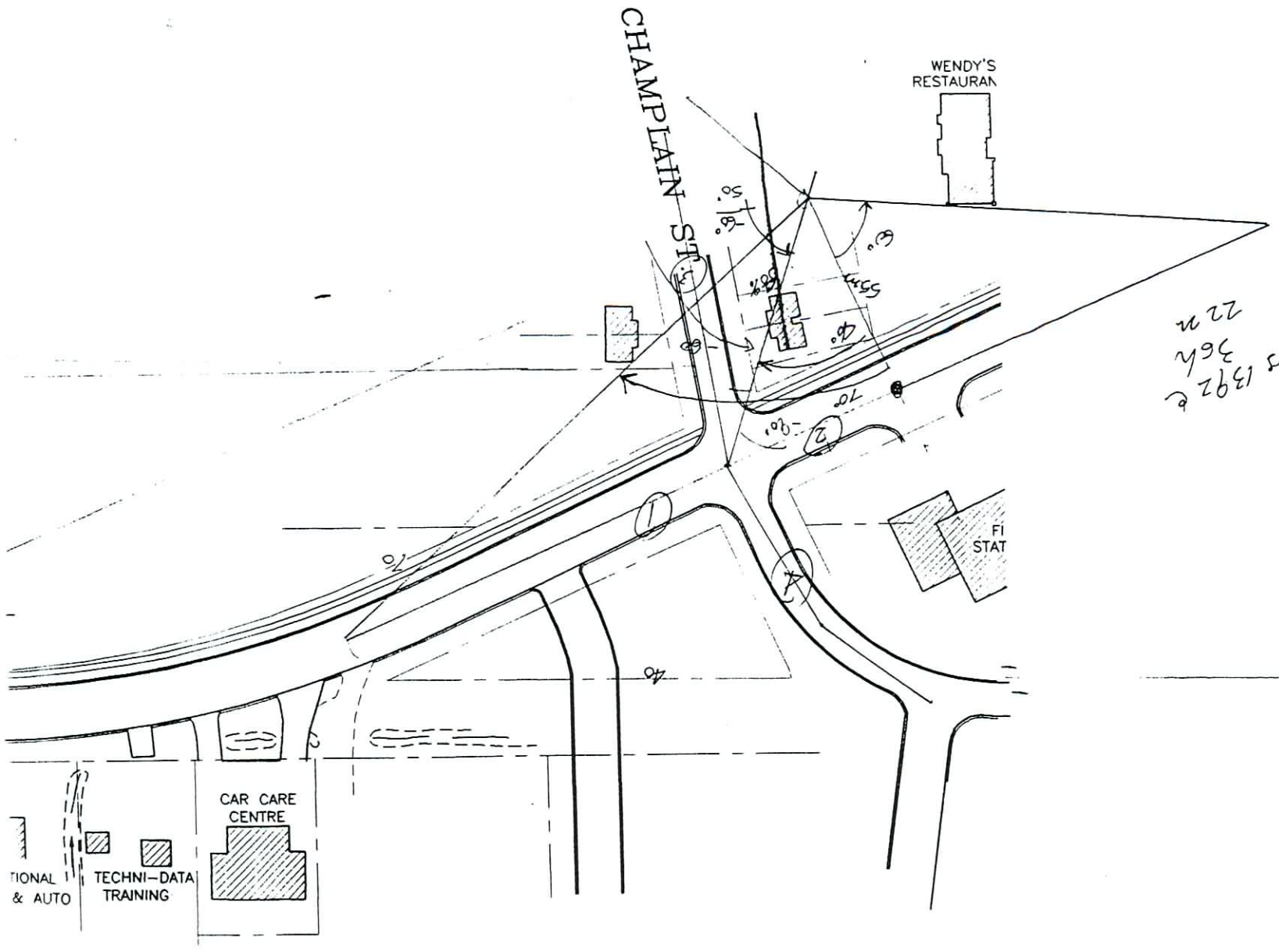
OAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

egment Leq : 49.13 dBA

Total Leq All Segments: 52.14 dBA

OTAL Leq FROM ALL SOURCES: 52.14



cars 1392 e
36h
22n

#6
Received
Rear Champlain

TAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:12:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16fut.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes future Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 40.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 80 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
Heavy truck volume : 670 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : 0.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 30.00 deg Angle2 : 40.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

oad data, segment # 3: mck east 1
---
ar traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
eavy truck volume : 670 veh/TimePeriod
osted speed limit : 50 km/h
Road gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1
---
ngle1 Angle2 : -60.00 deg 0.00 deg
wood depth : 0 (No woods.)
No of house rows : 0
urface : 1 (Absorptive ground surface)
eceiver source distance : 65.00 m
Receiver height : 1.50 m
opography : 1 (Flat/gentle slope; no barrier)
eference angle : 0.00

Road data, segment # 4: Champ north
---
ar traffic volume : 2970 veh/TimePeriod
Medium truck volume : 36 veh/TimePeriod
eavy truck volume : 27 veh/TimePeriod
osted speed limit : 50 km/h
Road gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Champ north
---
ngle1 Angle2 : -60.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 60.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

ad data, segment # 5: Champ south

Car traffic volume	: 3123	veh/TimePeriod
Medium truck volume	: 27	veh/TimePeriod
.avy truck volume	: 36	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
›ad pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 5: Champ south

ıgle1 Angle2	: -70.00 deg	-60.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
ırface	: 1	(Absorptive ground surface)
Receiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
›pography	: 1	(Flat/gentle slope; no barrier)
ɛference angle	: 0.00	

egment # 1: mck west 1

Source height = 1.26 m

OAD (0.00 + 42.95 + 0.00) = 42.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.66	67.70	0.00	-9.37	-9.43	0.00	-5.95	0.00	42.95

egment Leq : 42.95 dBA

Segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

ROAD (51.46 + 33.91 + 0.00) = 51.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	30	0.66	68.74	0.00	-9.37	-7.91	0.00	0.00	0.00	51.46
30	40	0.31	68.74	0.00	-7.38	-12.82	0.00	0.00	-14.64	33.91

Segment Leq : 51.54 dBA

Segment # 3: mck east 1

Source height = 1.26 m

ROAD (0.00 + 52.84 + 0.00) = 52.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	0	0.66	68.74	0.00	-10.57	-5.33	0.00	0.00	0.00	52.84

Segment Leq : 52.84 dBA

Segment # 4: Champ north

Source height = 0.97 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.97	1.50	1.63	1.63

ROAD (0.00 + 34.51 + 0.00) = 34.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	60	0.38	57.21	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.51

Segment Leq : 34.51 dBA

Segment # 5: Champ south

Source height = 1.03 m

ROAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36.53

Segment Leq : 36.53 dBA

Total Leq All Segments: 55.59 dBA

TOTAL Leq FROM ALL SOURCES: 55.59

TAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:44:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16_99.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes 1999 Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume	: 7767 veh/TimePeriod	
Medium truck volume	: 126 veh/TimePeriod	
Heavy truck volume	: 207 veh/TimePeriod	
Posted speed limit	: 50 km/h	
Road gradient	: 0 %	
Road pavement	: 1 (Typical asphalt or concrete)	

Data for Segment # 1: mck west 1

Angle1 Angle2	: 40.00 deg	70.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 1	
House density	: 80 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 30.00 m	
Receiver height	: 1.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: mck west 2

Car traffic volume	: 12528 veh/TimePeriod	
Medium truck volume	: 198 veh/TimePeriod	
Heavy truck volume	: 324 veh/TimePeriod	
Posted speed limit	: 50 km/h	
Road gradient	: 0 %	
Road pavement	: 1 (Typical asphalt or concrete)	

Data for Segment # 2: mck west 2

Angle1 Angle2	: 0.00 deg	40.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 55.00 m	
Receiver height	: 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 30.00 deg	Angle2 : 40.00 deg
Barrier height	: 6.00 m	
Barrier receiver distance	: 30.00 m	
Source elevation	: 1.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
Reference angle	: 0.00	

Road data, segment # 3: mck east 1

Car traffic volume	12528	veh/TimePeriod
Medium truck volume	198	veh/TimePeriod
Heavy truck volume	324	veh/TimePeriod
Posted speed limit	50	km/h
Road gradient	0	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 3: mck east 1

Angle1 Angle2	-60.00 deg	0.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	65.00 m	
Receiver height	1.50 m	
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

Road data, segment # 4: Champ north

Car traffic volume	2920	veh/TimePeriod
Medium truck volume	36	veh/TimePeriod
Heavy truck volume	27	veh/TimePeriod
Posted speed limit	50	km/h
Road gradient	0	%
Road pavement	1	(Typical asphalt or concrete)

Data for Segment # 4: Champ north

Angle1 Angle2	-60.00 deg	60.00 deg
Wood depth	0	(No woods.)
No of house rows	0	
Surface	1	(Absorptive ground surface)
Receiver source distance	35.00 m	
Receiver height	1.50 m	
Topography	2	(Flat/gentle slope; with barrier)
Barrier angle1	-60.00 deg	Angle2 : 60.00 deg
Barrier height	5.00 m	
Barrier receiver distance	10.00 m	
Source elevation	1.00 m	
Receiver elevation	0.00 m	
Barrier elevation	0.00 m	
Reference angle	0.00	

ad data, segment # 5: Champ south

ar traffic volume	: 3123	veh/TimePeriod
edium truck volume	: 27	veh/TimePeriod
avy truck volume	: 36	veh/TimePeriod
sted speed limit	: 50	km/h
oad gradient	: 0	%
ad pavement	: 1	(Typical asphalt or concrete)

ata for Segment # 5: Champ south

gle1 Angle2	: -70.00 deg	-60.00 deg
ood depth	: 0	(No woods.)
o of house rows	: 0	
rface	: 1	(Absorptive ground surface)
ceiver source distance	: 35.00 m	
eceiver height	: 1.50 m	
pography	: 1	(Flat/gentle slope; no barrier)
ference angle	: 0.00	

egment # 1: mck west 1

Source height = 1.26 m

AD (0.00 + 42.97 + 0.00) = 42.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.66	63.60	0.00	-5.00	-9.43	0.00	-6.20	0.00	42.97

gment Leq : 42.97 dBA

Segment # 2: mck west 2

Source height = 1.26 m

rrier height for grazing incidence

Source ight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

)AD (48.31 + 30.75 + 0.00) = 48.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	30	0.66	65.59	0.00	-9.37	-7.91	0.00	0.00	0.00	48.31
30	40	0.31	65.59	0.00	-7.38	-12.82	0.00	0.00	-14.64	30.75

Segment Leq : 48.38 dBA

egment # 3: mck east 1

Source height = 1.26 m

OAD (0.00 + 49.68 + 0.00) = 49.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	0	0.66	65.59	0.00	-10.57	-5.33	0.00	0.00	0.00	49.68

egment Leq : 49.68 dBA

Segment # 4: Champ north

Source height = 0.98 m

arrier height for grazing incidence

Source eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.98	1.50	1.64	1.64

OAD (0.00 + 34.47 + 0.00) = 34.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	60	0.38	57.17	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.47

egment Leq : 34.47 dBA

Segment # 5: Champ south

Source height = 1.03 m

OAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36.53

egment Leq : 36.53 dBA

Total Leq All Segments: 52.76 dBA

OTAL Leq FROM ALL SOURCES: 52.76

APPENDIX 3

VISUAL PAVEMENT INSPECTION AND GEOTECHNICAL REVIEW

Merlex Engineering Ltd.

4351

MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

RECEIVED
FEB 1 1999

Reference No. 99/02/99009

February 12, 1999

Northland Engineering Ltd.
1850 Bond Street
North Bay, Ontario
P1B 8G5

Attention: Mr. Dave Richards, P. Eng.

Re: Preliminary Visual Assessment
McKeown Avenue

Dear Sir:

As per your letter of authorization dated February 9, 1999, we have carried out the preliminary visual field review of pavement condition on McKeown Avenue from Algonquin Avenue to Gormanville Road and present our findings and comments in this brief letter report.

VISUAL PAVEMENT REVIEW

On February 10, 1999, a visual pavement review was carried out by our Pavement Designer, Mr. Howie Pattenden, and his comments and observations are contained on Enclosure No. 1.

For this commentary, McKeown Avenue has been broken down into four sections.

Section 1 - Hwy 11 (Algonquin Ave.) to Cartier Street (4 lane section)

Section 2 - Cartier Street to McNamara Avenue (2 lane section)

Section 3 - McNamara Avenue to 50 m past west entrance to MTO

Section 4 - 50 m west of west entrance to MTO to Gormanville Road

We have carried out a review of past geotechnical investigations, undertaken by our firm, for various developments to the north and south of the McKeown Avenue right of way, between Algonquin and Gormanville Road. The subgrade conditions, based on this desk review, vary from silt and clay deposits underlying surficial organic layers to fine sands with varying silt content to silty fine sands. The groundwater table was generally recorded at a shallow depth below existing grade on the previous investigation.

COMMENTS

Based on the available historical information (old design pavement structure cross section) and our visual assessment of the existing pavement surface conditions, we have the following comments dealing with reconstruction for the above noted road.

Section 1 - Algonquin Ave. to Cartier Street

The road section between Highway 11 (Algonquin) to Cartier Street is curb and gutter with four lanes. It is understood that this section was reconstructed around 1992 with 140 mm of asphalt overlying 150 mm of Granular A followed by 600 mm of Granular B Type I. Perforated drains (150 mmø) were installed below both the north and south curbs.

This section of road has responded relatively well over the last 7 years. One minor dip was observed at a catch basin lead on the outside eastbound lane. This is probably due to the presence of granular trench backfill within the depth of frost penetration (i.e. non-uniform subgrade cross section). To rehabilitate this section of road, a dig out may be considered at the location of this storm sewer lateral. The remainder of road

rehabilitation could consist of milling off 50 mm of existing asphalt and repaving with 50 mm HL4 modified.

Section 2 - Cartier Street to McNamara

This section of road is predominantly two lanes with curb and gutter. It is understood that it was constructed around 1979 and that the pavement structure consisted of 80 mm of HL4 asphalt underlain by 150 mm of Granular A and 375 mm of Granular B Type I with trenched in 150 mmø perforated subdrains below the curb.

A visual review indicated moderate to transverse cracking of an intermittent nature with few slight alligator cracks. Slight wheel track rutting was also observed.

This section of road has stood up relatively well for the last 20 years with selective resurfacing. We therefore suggest that reconstruction could consist of in-place full depth processing, a granular lift of some 200 mm to 300 mm of Granular A followed by 130 mm of asphalt pavement consisting of 40 mm HL4 modified, 50 mm of heavy duty upper binder and 50 mm heavy duty lower binder be considered for this section of road. It is likely that the subdrain system will also have to be replaced. If profile grade cannot be increased by this amount, it will then be necessary to carry out an excavation to reconstruct the pavement structure to a section of 130 mm asphalt, 150 Granular A and 600 mm Granular B Type I with subdrains both sides.

Section 3 - McNamara to 50 m west of west entrance to MTO

It is understood that a typical section of McKeown Avenue between Gormanville and McNamara dated 1978 consisted of 125 mm of asphalt underlain by 150 mm of Granular A and 300 mm of Granular B Type I. The section between McNamara and west of MTO

exhibits moderate wheel track rutting in front of Lucky 13 with moderate distortions and poor drainage between Lucky 13 and the west entrance to the MTO building. There is no ditch to the north side of McKeown Avenue between Lucky 13 and the MTO. Some selective resurfacing has been carried out over this area in the past years.

A geotechnical investigation carried out for the Lucky 13 indicated that the subgrade conditions probably consist of silt and clays. It is probable that the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to higher traffic load during the latter part of its life.

To correct this section it will probably be necessary to excavate to allow reconstruction of a pavement structure consisting of 130 mm of asphalt, 150 mm of Granular A and 600 mm of Granular B Type I with 150 mmø perforated drain both north and south to ensure proper drainage of subgrade.

Section 4 - 50 m west of MTO west Entrance to Gormanville Road

There are two areas where slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking have been observed and must be investigated. The remaining portion of this section of McKeown Avenue can probably be rehabilitated with a milling off of 50 mm and repaving with 50 mm HL4 modified.

General

If widening is required, the above pavement sections must be carried across for the new lanes.

CLOSURE

Merlex Engineering Ltd. has carried out a visual pavement condition survey combined with a desktop review of geotechnical conditions in the McKeown Avenue area. The comments contained in this report are intended to be used only for preliminary estimating purposes. A detailed field investigation involving sampled boreholes and laboratory testing, etc., must be carried out to further delineate the cause of distresses as identified in this report. Following a detailed investigation and laboratory test program, a more specific pavement design can be compiled.

We trust the enclosed comments are sufficient for your initial preliminary purposes. Should you have any queries or if we could be of further assistance, please do not hesitate to contact the undersigned.

Yours very truly,

MERLEX ENGINEERING LTD.

M.A. Merleau, P. Eng.

MAM/cl

Encl.

99009 - Visual and Historical Assessment Report

VISUAL PAVEMENT REVIEW

McKeown Avenue (from Algonquin Avenue to Gormanville Road)
carried out on February 10, 1999

Area A - Algonquin Ave. to Cartier Street (4 Lane Section)

- Longitudinal cracks in each inside lane from improper paving.
- Moderate intermittent cracks.
- Moderate frost heave in eastbound lane over sewer lateral, east of Champlain St.
- Slight few longitudinal meander and midlane cracking.

Area B - Cartier Street to McNamara (2 lane section)

- Moderate transverse cracking intermittent.
- Slight few alligator cracking.
- Slight wheel track rutting.
- Few sections with poor surface drainage.
- Slight to moderate longitudinal meander and midlane cracking.
- Moderate wheel track rutting (front of Lucky 13).
- Moderate distortion and poor drainage between Lucky 13 and MTO Building.
- Some selective resurfacing has been carried out.

Area C - McNamara to Gormanville Road

- Moderate distortion and alligator cracking (MTO west entrance W'ly 50 m).
- Moderate intermittent transverse cracking.
- Slight few alligator cracking.
- Slight to moderate wheel track rutting between two curves.
- Moderate intermittent C/L cracking.
- Moderate distortion between two curves.
- Slight few longitudinal meander midlane cracking.

APPENDIX 4

MCKEOWN AVENUE TRAFFIC STUDY

Algonquin Avenue to Gormanville Road

McKeown Avenue Traffic Study

Algonquin Avenue to Gormanville Road

prepared for

the City of North Bay



by

Tranplan Associates

October 1999



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1. INTRODUCTION

In 1997-98 the City of North Bay conducted a traffic study of the McKeown Avenue/Josephine Street area. The final report, entitled "McKeown Avenue / Josephine Street Traffic Study, June 1998" presented the findings of the study together with detailed recommendations for improvements to McKeown Avenue between Algonquin Avenue and Champlain Street. In summary, the report recommended that, within the study area, McKeown Avenue be widened from four lanes to five lanes, providing a centre fifth lane for two-way left turns, along with right turn tapers at selected locations, improvements to the Algonquin Avenue intersection and new traffic signals at Josephine Street.

Subsequently the City decided to conduct a similar traffic study for the section of McKeown Avenue from Champlain Street west to Gormanville Road. Due to the size of the study area and the extent of its impact, the project was undertaken as a Schedule C Municipal Environmental Assessment, with the associated traffic study undertaken as one of the technical background reports in support of the EA process. This report documents the traffic study which has been carried out for McKeown Avenue between Champlain Street and Gormanville Road. Together with the previous report for the section between Algonquin Avenue and Champlain Street, these two reports form the supporting technical traffic reports for the Class Environmental Assessment for McKeown Avenue between Algonquin Avenue and Gormanville Road.

The study conclusions and recommendations are presented in the next section (Chapter 2). Chapter 3 describes the existing conditions in the study area; Chapter 4 describes the projected future traffic volumes in the corridor; Chapter 5 evaluates the impact of the projected traffic on the existing road network and identifies the necessary improvements.

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

2.1 Findings from 1998 Traffic Study McKeown Avenue/Josephine Street

In response to expected development in the Josephine Street area, the City carried out an earlier study, "McKeown Avenue/Josephine Street Traffic Study - June 1998", which dealt with McKeown Avenue from Algonquin Avenue to Champlain Street. Along with improvements at the McKeown Avenue/Algonquin Avenue intersection (northbound double left turn and the addition of one lane on the McKeown Avenue and Airport Road approaches), the study recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). These improvements were to coincide with development of the vacant lands along Josephine Street and the nearby McKeown Avenue.

The current study supports the 1998 Study recommendations.

2.2 Champlain Street to Gormanville Road Existing Level of Service

From Champlain Street to Gormanville Road, McKeown Avenue is currently operating at an acceptable Level of Service, with the exception of the McKeown Avenue/Gormanville Road intersection where one movement, the left turn from McKeown to go south on Gormanville, is experiencing long delays at peak hours (see Exhibit 3.2). The McKeown Avenue /Gormanville Road intersection is close to the point of warranting traffic signals; with traffic signals, the intersection would operate at a very good Level of Service.

It is recommended that the intersection of McKeown Avenue and Gormanville Road be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

An analysis of Police accident reports confirms earlier findings from the 1998 study that the McKeown Avenue/Champlain Street intersection and McKeown Avenue at the Tim Hortons entrance are high accident locations (see Exhibits 3.2 and 3.3, and Table 3.1). The accident

frequency indicates problems at these locations in the existing road network even though the traffic capacity (Level of Service) is satisfactory.

It is recommended that the 1998 study recommendations be implemented at the McKeown Avenue/Champlain Street intersection (left turn lanes and left turn signal phasing) and on McKeown Avenue at the Tim Hortons entrance (consolidation of entrances and left turn storage lane, with traffic signals as new development occurs).

2.3 Future Development in the McKeown Avenue Corridor 2004 and Longer Term Future

McKeown Avenue between Algonquin Avenue and Gormanville Road is expected to see major development pressure over the next 15-20 years (see Table 4.1). For planning purposes it has been assumed that by 2004 the corridor will have approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, several new restaurant developments, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building, and development of a new hospital complex on 30-40 acres of land west of Gormanville Road.

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (mostly on Education Centre Lowlands), 500 new residential units, more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

2.4 Projected Growth in Traffic 2004 and Longer Term Future

Based on the projected development scenarios, future levels of traffic have been estimated for 2004 and a longer term planning horizon. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour. An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed. This new

traffic has been assigned to the existing road network based on the observed directional orientation of today's traffic (see Exhibit 4.2) and the results in 2004 are 65% and 100% increases in traffic at the east and west ends of McKeown Avenue respectively (see Exhibits 5.1 and 5.2). The ultimate (full development) traffic volumes are estimated to be 100% and 200% higher than today's traffic at the east and west ends respectively.

The impact of the added traffic in 2004 will be reduced Levels of Service ("D" and "E" at the key entry points and "E" and "F" at most internal locations - see Exhibit 5.3) if no improvements are made to the roads. With no road improvements and full development, the Levels of Service are almost all reduced to "F" (see Exhibit 5.4).

2.5 McKeown Avenue from Champlain Street to Gormanville Road Required Number of Through Lanes

Based on the projected traffic volumes along McKeown Avenue between Champlain Street and Gormanville Road, two through lanes in each direction will provide sufficient capacity over the planning period to full development. The section between Cartier Street and McNamara Street will require widening by 2004; between McNamara Street and Gormanville Road, one through lane in each direction may continue to be satisfactory through 2004, but will need widening within five years after 2004, with the section from McNamara Street to the Provincial Government Building being more critical.

It is recommended that two through lanes in each direction be adopted as the design standard for McKeown Avenue.

2.6 McKeown Avenue from Champlain Street to Gormanville Road Turning Lanes

Left turn storage lanes are currently required at Champlain Street, Cartier Street, McNamara Street and at the Ontario Government Building entrances. With the expected new development by 2004, left turn storage lanes will also be required at driveways between Champlain Street and Cartier Street and between Cartier Street and McNamara Street. Since

the tapers of these left turn storage lanes will overlap, a continuous centre two-way left turn lane should be provided from Champlain Street to the west side of the Ontario Government Building driveways. Between the Ontario Government Building and Gormanville Road, it would be possible to taper from five lanes to four lanes, but since the four lane section would only be approximately 100 metres long between tapers, it is proposed that the five lane section be carried through to Gormanville Road.

Right turn tapers or right turn channelizations would be desirable on McKeown Avenue at both approaches to Champlain Street, at Cartier Street, at McNamara Street and at the east entrance to the Ontario Government Building. These should only be provided if it can be done without adverse impact on pedestrians and adjacent properties.

It is recommended that the centre two-way left turn lane, which was previously recommended between Algonquin Avenue and Champlain Street, be continued through to Gormanville Road, and that consideration be given to providing right turn tapers or channelizations at Champlain Street (both approaches), at Cartier Street, at McNamara Street, and at the east entrance to the Ontario Government Building.

2.7 McKeown Avenue/Gormanville Road /College Drive Intersection

It is expected that the McKeown Avenue/Gormanville Road intersection will warrant traffic signals within the next few years. If the McKeown Avenue approach to the intersection is widened at the same time as the signals are installed, the intersection should operate at a very good Level of Service for a number of years. As the area approaches full development, the approaches to the intersection would require further improvements; however, full development may coincide with the construction of the new North Bay Bypass, which includes a new grade separated alignment for Gormanville Road with significant imrovements in traffic capacity.

It is recommended that traffic signals be installed at the McKeown Avenue/Gormanville Road intersection when the volumes reach the minimum warrant level, and that the McKeown Avenue approach to the intersection be widened before the signals are installed.

2.9 Gormanville Road /Highway 17 Intersection

The Gormanville Road/Highway 17 intersection is currently operating at a satisfactory Level of Service ("C"). By 2004 this will drop to "D", but widening both Gormanville Road approaches by one lane would maintain the Level of Service at "C". By full development, the Level of Service would again drop to "D", but full development is expected to coincide with the realignment of the Bypass and the grade separation of its new intersection with Gormanville Road, which would produce significant improvements in capacity.

2.10 Sidewalks

The expected traffic volumes and intensity of development along McKeown Avenue will justify a sidewalk along both sides of the road.

It is recommended that as development /redevelopment takes place, provision should be made for a sidewalk along the south side of McKeown Avenue.

3. EXISTING CONDITIONS

3.1 McKeown Avenue

Between Algonquin Avenue and Cartier Street, McKeown Avenue is a four lane undivided roadway with an urban cross-section (curb and gutter and storm sewers); west of Cartier Street, McKeown Avenue becomes a two lane roadway with curb and gutter. The speed limit is 50 km/h. There is a sidewalk along the north side between Algonquin Avenue and the west entrance to the Provincial Government Building west of McNamara Street.

Traffic signals are located at the Algonquin Avenue (Highway 11) intersection and at the Champlain Street intersection; a STOP sign faces McKeown Avenue traffic at Gormanville Road. The Algonquin Avenue intersection has channelized right turn lanes (and left turn storage lanes on Algonquin Avenue); there are no turning lanes or channelizations along McKeown Avenue between Algonquin Avenue and Gormanville Road.

3.2 Gormanville Road

Gormanville Road is an important north-south through road linking Main Street to McKeown Avenue/College Drive with a signalized intersection at Highway 17. North of McKeown Avenue, Gormanville Road is a cul-de-sac providing access to local properties (primarily OPP Buildings, MTO maintenance facilities and Nipissing University Residence). On both sides of Highway 17 (Eloy Road to McKeown Avenue), Gormanville Road is a four-lane roadway; north of McKeown Avenue and south of Eloy Road, it tapers to a two-lane roadway. The speed limit is 50 km/h.

3.3 College Drive

College Drive is a two-lane roadway which links McKeown Avenue and Gormanville Road up the escarpment to Nipissing University/Canadore College and the residential area north of the Education Centre. The posted speed limit on the escarpment is 70 km/h. Its intersection with Gormanville Road includes a channelized free flow right turn movement.

3.4 Existing Traffic Volumes

Exhibit 3.1 shows recent traffic count data for the study area for a morning and afternoon peak hour. The date and time of each count is indicated; some of the counts were recorded by City staff, while others were recorded byTranplan personnel. The detailed count sheets are included in Appendix A.

3.5 Accident Records

Detailed accident reports were made available by North Bay City Police for those accidents falling under their jurisdiction during 1996, 1997 and 1998. The Ministry of Transportation provided a computerized listing summarizing key elements of accident reports from the O.P.P. at the Algonquin Avenue (Highway 11)/McKeown Avenue (Airport Road) intersection and at the Highway 17/Gormanville Road intersection for the years 1995, 1996 and 1997. Table 3.1 summarizes the number of accidents at selected intersections and indicates the accident rate at the intersection for all accidents and for personal injury accidents. Exhibits 3.2, 3.3 and 3.4 show collision diagrams for the City data; Exhibits 3.5 and 3.6 shows collision diagrams reconstructed from the MTO data.

Table 3.1 summarizes the number of accidents and the accident rate at selected intersections; all data is over a three year period, except for the Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection, where four years of data was reviewed (21 months before reconstruction was completed in the Fall of 1996 and 27 months after reconstruction).

The highest number of accidents and the highest accident rates are at the Highway 17 /Gormanville Road intersection (22 collisions in total, or 1.3 collisions per million vehicles entering the intersection, with 10 personal injury accidents, or 0.6 personal injury accidents per million vehicles entering the intersection). Exhibit 3.6 shows a collision diagram for the 22 accidents reported at the Highway 17/Gormanville intersection from 1995 through 1997 prior to its reconstruction; fourteen of the 22 involved left turns, which should be reduced by the recent improvements to the intersection (the intersection was rebuilt with significant changes in the signal phasing during 1998 and 1999.

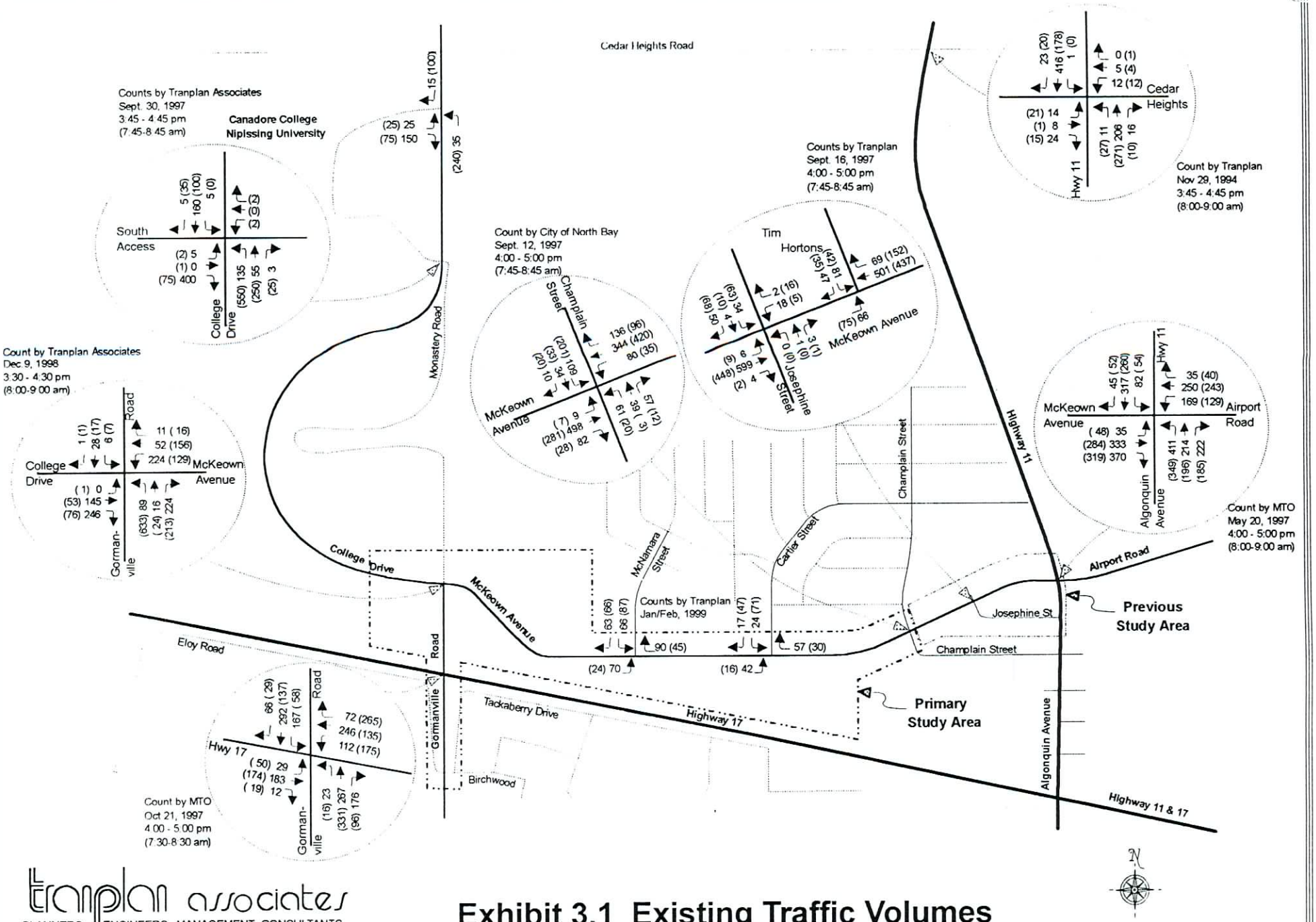


Exhibit 3.1 Existing Traffic Volumes

tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Table 3.1 Accident Rates at Selected Intersections

Intersection	Total No. of Accidents (3 yrs)	Accident Rate[1] (all accidents per million vehicles)	Personal Injury Accidents (3 yrs)	Accident Rate[2] (injury accidents per million vehicles)
McKeown Avenue /Champlain Street	16	1.2	5	0.4
McKeown Avenue /McNamara Street	5	0.5	0	0.0
McKeown Avenue /Gormanville Road	5	0.4	3	0.2
McKeown Avenue /Tim Horton's Entrance	12	0.9	1	0.1
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) Before Reconstruction 1995-1996 (21 months)	19	1.3	4	0.3
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) After Reconstruction 1996-1998 (27 months)	12	0.7	6	0.3
Highway 17 /Gormanville Road	22	1.3	10	0.6

1 No. of accidents (all reported accidents) per million vehicles entering the intersection.

2 No. of personal injury accidents per million vehicles entering the intersection.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection experienced a similar high accident rate before it was reconstructed in 1996; after reconstruction, total collisions dropped from 1.3 to 0.7 collisions per million vehicles entering the intersection, but the personal injury accident rate did not show any improvement. Exhibit 3.5 shows the collision diagrams for the intersection before and after its reconstruction. During the 21 month period before reconstruction was completed, 19 collisions were reported (four involved personal injury); during the 27 months after reconstruction, 12 collisions were reported (six involved personal injury). It would appear that the reconstruction (including changes to the traffic signals) has been responsible for a 50% drop in the total number of collisions at this intersection, although the number of personal injury accidents has not dropped.

The McKeown Avenue/Champlain Street intersection has a high accident rate similar to the two MTO intersections before they were reconstructed (1.2 total collisions and 0.4 personal injury collisions per million vehicles entering the intersection). Exhibit 3.3 shows a collision diagram for the accidents at Champlain Street. Sixteen accidents occurred at the signalized Champlain Street intersection over the three year period, with the majority involving left turns from McKeown Avenue into Champlain Street (six westbound and three eastbound). Two accidents involved left turns from Champlain Street out onto McKeown Avenue, and three involved right angle collisions between McKeown Avenue and Champlain Street traffic. The high incidence of accidents at Champlain Street appears to be related to the absence of left turn storage lanes on McKeown Avenue and the lack of left turn phases in the signal timing.

The Tim Horton's driveway is the only other City intersection with a high accident rate (0.9 accidents per million vehicles entering the intersection). Exhibit 3.2 shows these accidents in collision diagram form. Twelve accidents occurred at the Tim Horton's driveway, with eleven of these being almost identical, involving a westbound vehicle along McKeown Avenue colliding with a vehicle making a left turn out from the Tim Horton's driveway. In comparison, only three similar collisions have been reported at the driveway adjacent to the McDonald's Restaurant. The significant incidence of accidents at the Tim Horton's driveway, appears to be the result of several factors, including the high volume of left turns and conflicting movements at this unsignalized location along McKeown Avenue, sight restrictions created by high volumes of

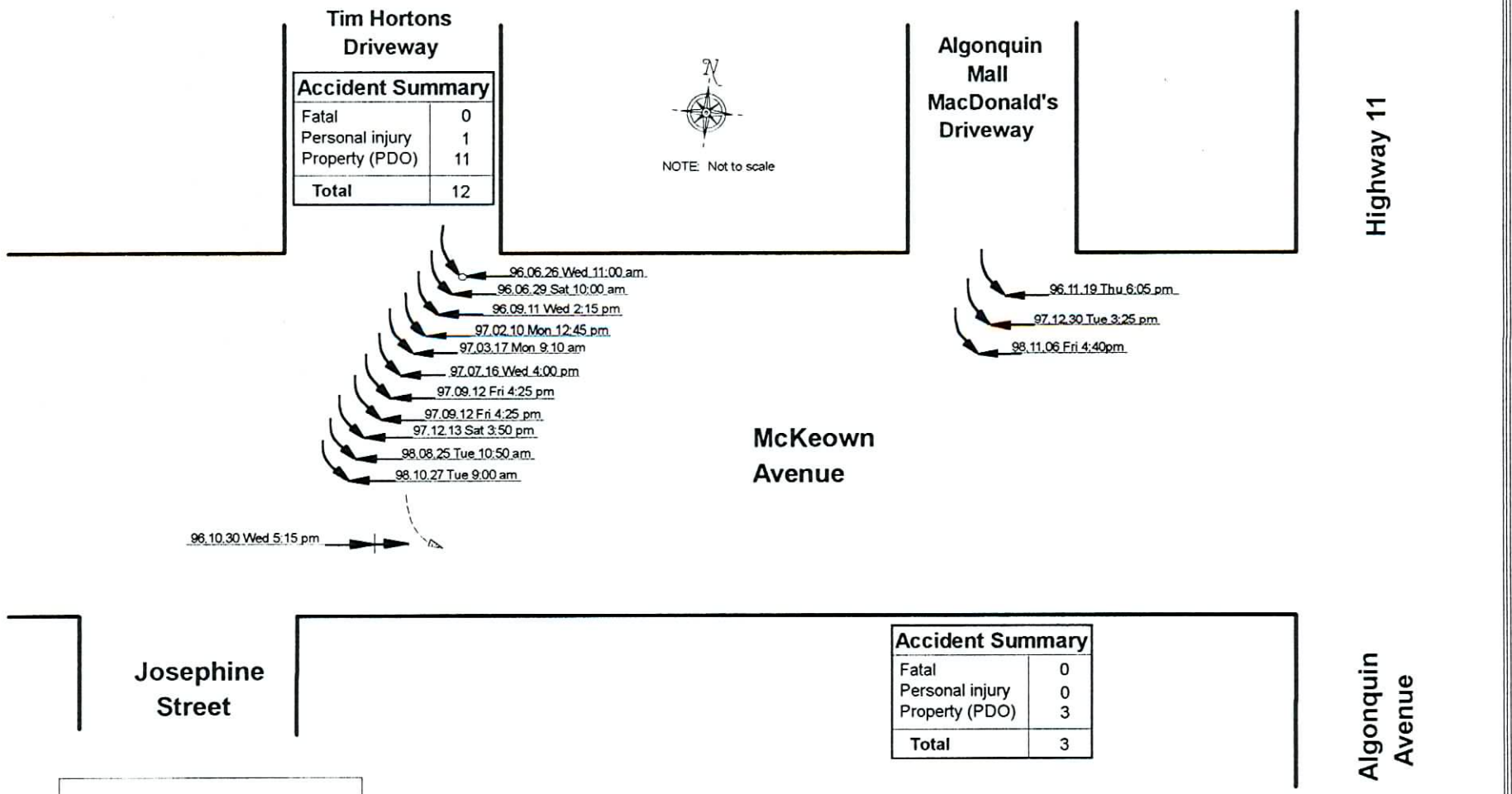


EXHIBIT 3.2
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Josephine St to Algonquin Ave

Trans plan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel (705) 522-0272 Fax (705) 522-1733

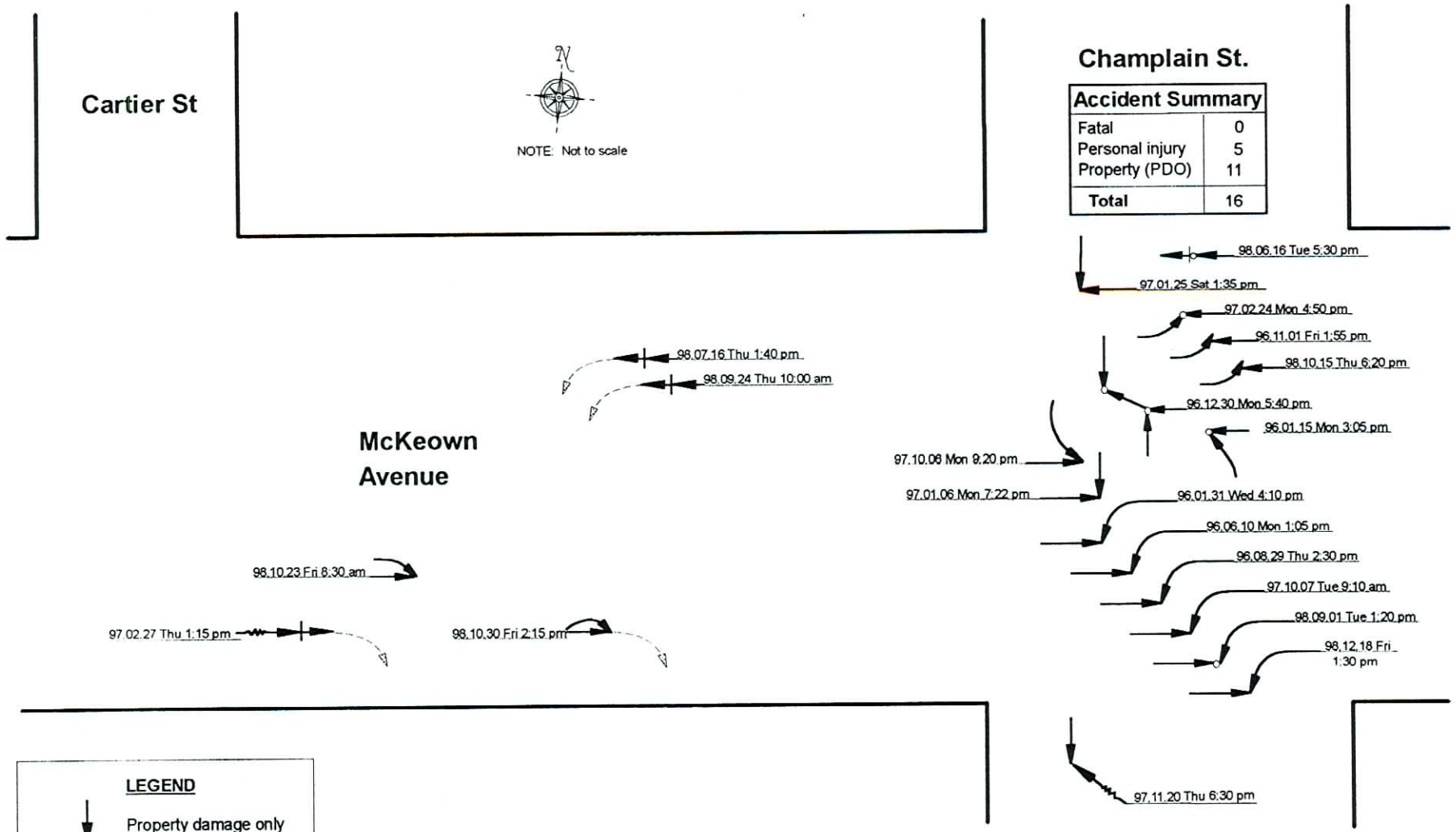


EXHIBIT 3.3
COLLISION DIAGRAM (1996-1998)
McKEOWN AVENUE
Cartier St to Champlain St

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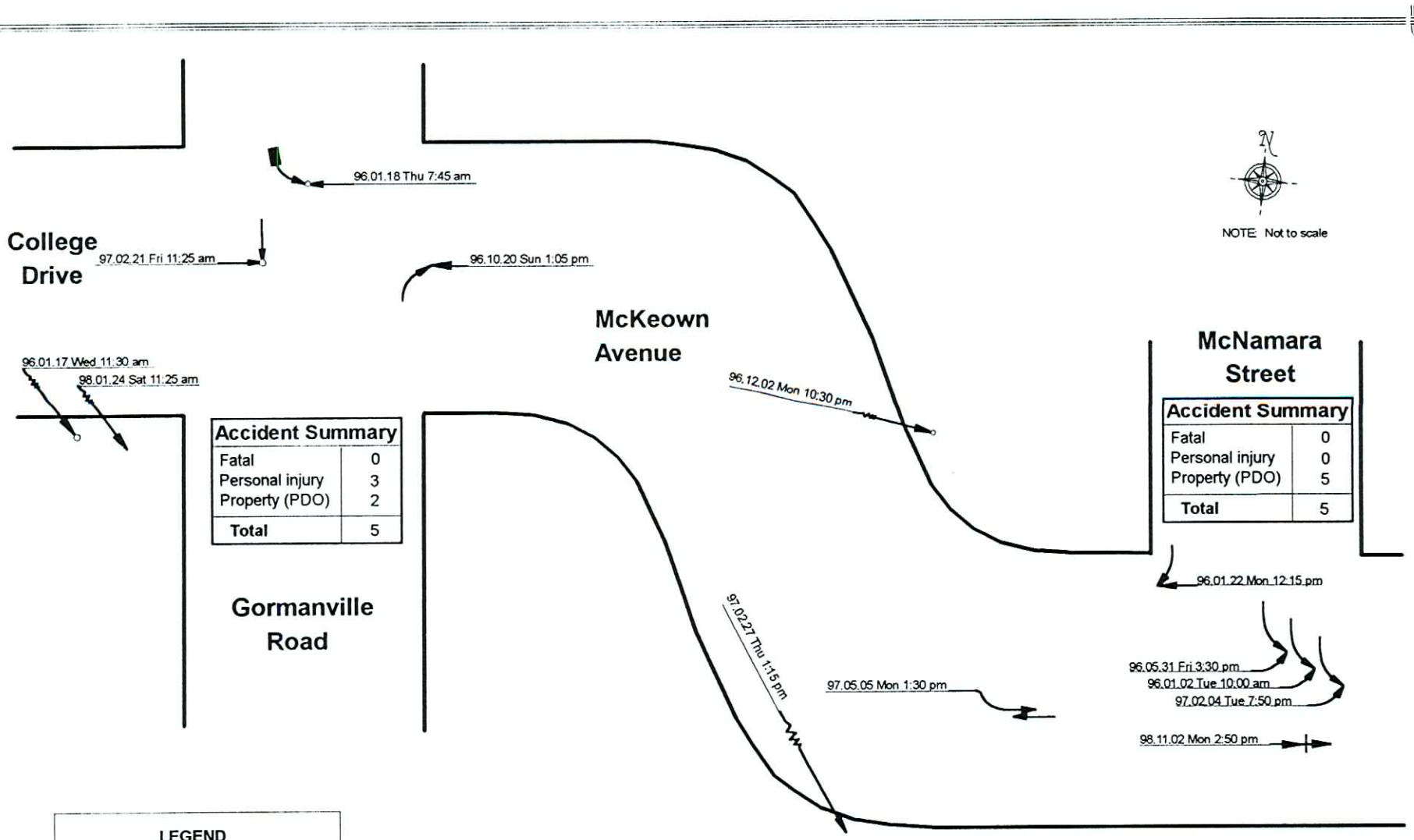
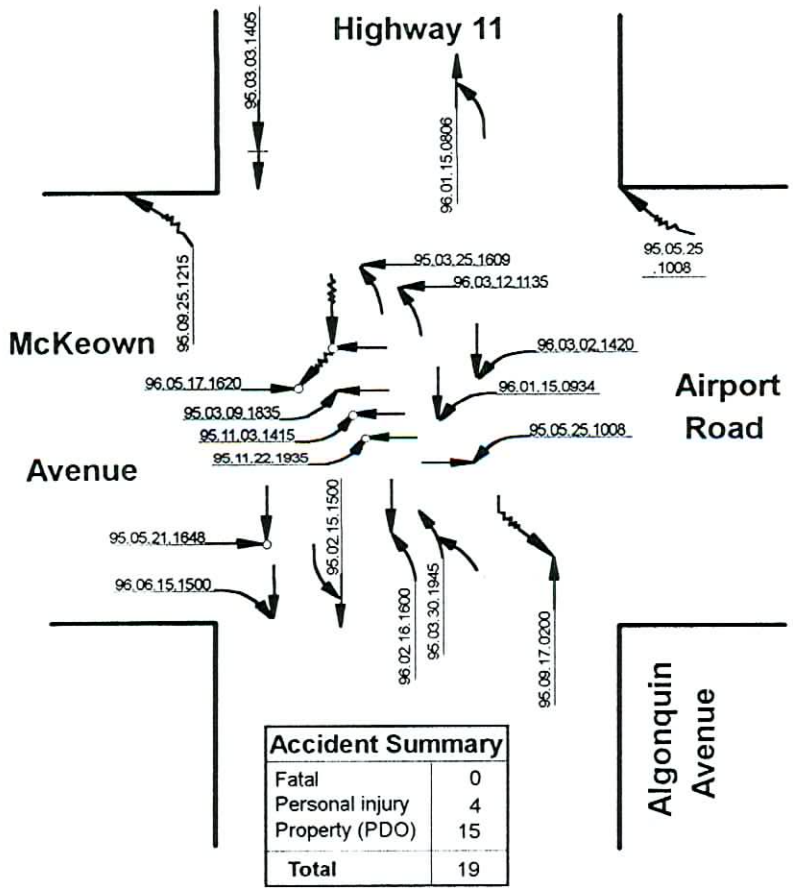


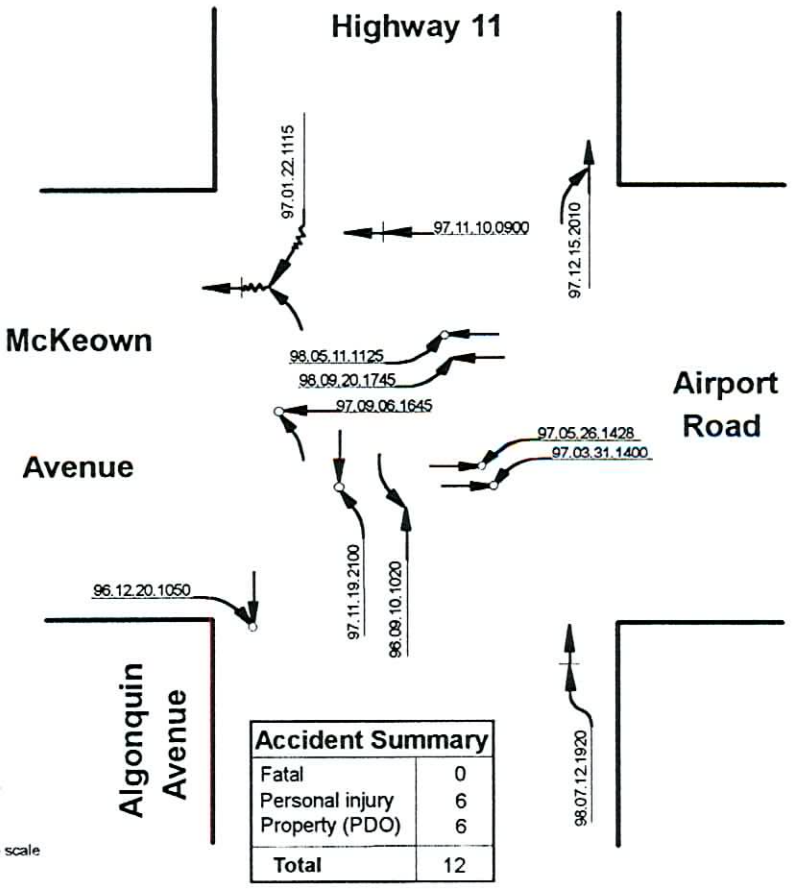
EXHIBIT 3.4
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Gormanville Rd to McNamara St

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Accident Summary	
Fatal	0
Personal injury	4
Property (PDO)	15
Total	19

NOTE: Not to scale



Accident Summary	
Fatal	0
Personal injury	6
Property (PDO)	6
Total	12

(a) Before Reconstruction 1995-96 (21 months)

NOTE: Collisions reconstructed from MTO computerized listings of coded data. Not based directly on OPP reports.

(a) After Reconstruction 1996-98 (27 months)

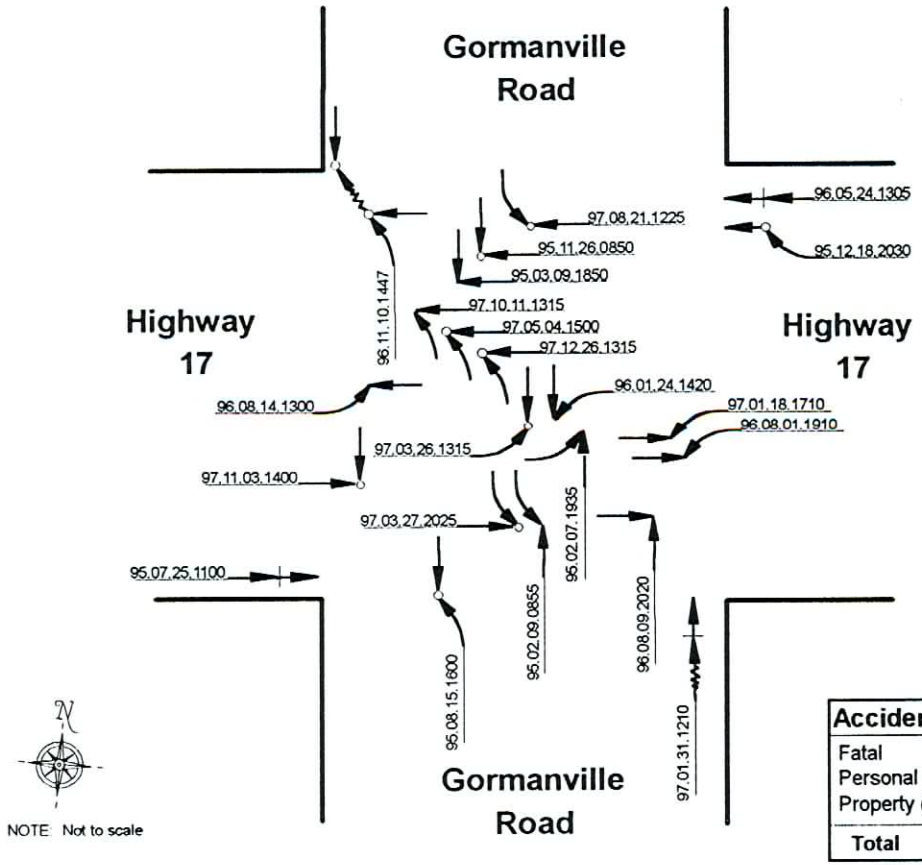
NOTE: Collisions reported in 1996 and 1997 reconstructed from MTO computerized listings of coded data. 1998 collisions based on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.5
COLLISION DIAGRAMS
McKeown Avenue at Highway 11

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Accident Summary	
Fatal	0
Personal injury	10
Property (PDO)	12
Total	22

NOTE: Collisions reconstructed from MTO computerized listings of coded data. Not based directly on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.6
COLLISION DIAGRAM 1995-1997
Gormanville Road at Highway 17

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Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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westbound vehicles in the curb lane along McKeown Avenue turning right into the Tim Hortons driveway, and the congestion/confusion created by the proximity of the two driveways on either side of Tim Hortons.

Exhibit 3.4 shows the accidents reported at the McNamara Street and at the Gormanville Road intersections. Only five collisions occurred at the Gormanville Road intersection over the three year period, with the same number at the McNamara Street intersection. There is not a significant accident problem in this section of McKeown Avenue.

3.6 Existing Level of Service

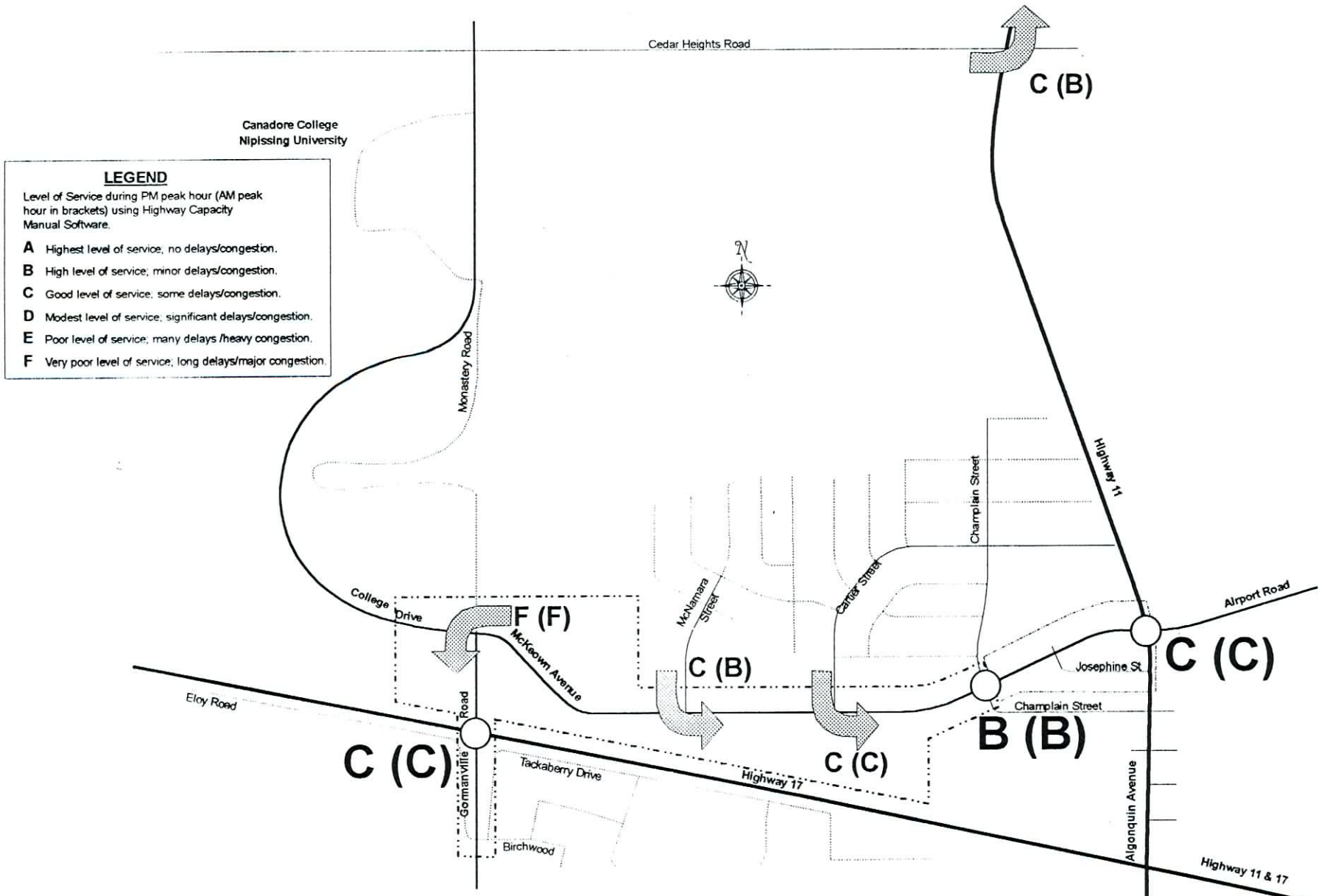
The traffic volumes shown in Exhibit 3.1 were assessed against the capacity of the intersections using the Highway Capacity Manual software. The Levels of Service[3] during weekday morning and afternoon peak hours are shown in Exhibit 3.7.

All intersections were found to be operating at a good Level of Service ("C" or better) except for the Gormanville/McKeown intersection where the westbound to southbound left turn is currently operating at Level of Service "F" in the morning and afternoon peak hours. All other movements at this unsignalized intersection are operating at Level of Service "B" or better.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection was calculated to be operating at Level of Service "C" during the AM and PM peak hours. The McKeown Avenue/Champlain Street intersection was found to be operating at Level of Service "B" during both AM and PM peak hours.

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[3] Level of Service (LOS) is commonly used in traffic engineering to describe the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing amounts of congestion with "F" representing a complete breakdown in traffic flow. Level of Service "C" and "D" are commonly used as design standards. The Highway Capacity Manual software for signalized and unsignalized intersections was used to calculate the Levels of Service.



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PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849 1500 Fax (905) 849-8164
Sudbury: Tel (705) 522 0277 Fax (705) 522-1733

Exhibit 3.7 Existing Level of Service

3.7 Turning Lanes

The previous study for the McKeown Avenue/Josephine Street area identified a need at the present time for left turn storage lanes at the driveway adjacent to the McDonald's Restaurant, at the driveway on the east side of the Tim Hortons, at Josephine Street (marginal), and at Champlain Street. Allowing for tapers, it was concluded that a continuous centre fifth lane should be provided between Algonquin Avenue and Champlain Street. Right turn tapers were also identified as being desirable wherever they can be accommodated without adverse impact on pedestrians and adjacent properties.

The current study examined the intersections west of Champlain Street to Gormanville Road. Left turn storage lanes are warranted at Cartier Street, McNamara Street and at Gormanville Road. Left turn lanes are also warranted at the McKeown Avenue driveway entrances to the Ontario Government Building, the Redpath Group complex and the Canadian Tire store.

The distance between Champlain Street and Cartier Street is approximately 375 metres; the tapers for the left turn lanes from Champlain Street and Cartier Street would end approximately 125 metres apart. The distance between Cartier Street and McNamara Street is approximately 350 metres; the tapers for the left turn lanes would end approximately 100 metres apart. The distance between McNamara Street and the Ontario Government Building west driveway is approximately 250 metres; the tapers for the left turn lanes would run into each other.

4. FUTURE TRAFFIC LEVELS

The planning for the traffic requirements for the area has been based on analysing the following two scenarios:

i) five year horizon (2004) assuming the level of development/redevelopment in the McKeown Avenue corridor that is considered by City Planning officials to be realistic for planning purposes (see Table 4.1).

ii) 15-20 year horizon ("full development" scenario) assuming all foreseeable development/redevelopment in the McKeown Avenue corridor (see Table 4.1).

The expected new development within five years includes approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, five new restaurant developments, 50 new houses above the escarpment, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building (former MTO Building), and development of a new hospital complex on 30-40 acres of land west of Gormanville Road[4].

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (200,000 square feet on College Lowlands), 500 new residential units (350 single family homes above the escarpment), two more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

4.1 Trip Generation by New Development/Redevelopment

The traffic impact of the two development scenarios has been estimated using trip generation rates provided in the Institute of Transportation Engineers' (ITE) Trip Generation Manual. There were two exceptions: growth factors (1.5% per annum) were applied to estimate growth in traffic Canadore College and Nipissing University, and Tranplan files were used for estimating trip generation by the hospital complex

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[4] If the Hospital does not select this site for its new building, it is expected that the lands will be developed with commercial retail and residential uses. Depending on the proportion of retail uses, the lands may generate approximately the same amount of traffic as the Hospital, or significantly more.

Table 4.1: Projected Changes in Land Use in Study Area

Description of Lands	Size (Approx.)	Assumed New Development /Redevelopment	Estimated Timing
1. McKeown Avenue from Algonquin Avenue to Champlain Street plus Josephine Street	Approx. 7 acres	22,500 sq ft of new retail; 15,000 sq ft of new offices; new fast food restaurant	0-5 yrs
2. McKeown Avenue from Champlain Street to Cartier Street	16 acres	110,000 sq ft of new retail; two new fast food restaurants	0-5 yrs
	5 acres	35-40,000 sq ft of new retail;	5-20 yrs
3. McKeown Avenue from Cartier Street to McNamara Street	2 acres	20-25,000 sq ft of new retail	0-5 yrs
	3 acres	30-40,000 sq ft of new retail;	5-20 yrs
4. McKeown Avenue from McNamara Street to Gormanville Road	2.5 acres	Two new fast food restaurants	0-5 yrs
	5 acres	Motel; two new restaurants	5-20 yrs
5. College Drive below Escarpment (Education Centre Lowlands)	30+ acres	Hospital complex	0-5 yrs
	30 acres	200,000 sq ft of new retail; 150 new residential units	5-20 yrs
6. College Drive above Escarpment		Canadore College/Nipissing University enrolment increase of 1.5% per annum	0-20 yrs
		50 new single family housing units	0-5 yrs
		350 new single family housing units	5-20 yrs

NOTE: Assumptions about future development have been made for planning purposes only, and do not necessarily reflect any specific knowledge of the intentions of the landowners.

(ITE trip rates for hospitals do not appear to be representative of Canadian/Ontario conditions).

Table 4.2 shows the projected trip generation by the new development/redevelopment included in the two scenarios. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour (800 inbound and 1,200 outbound). An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed.

4.2 Directional Orientation of New Traffic

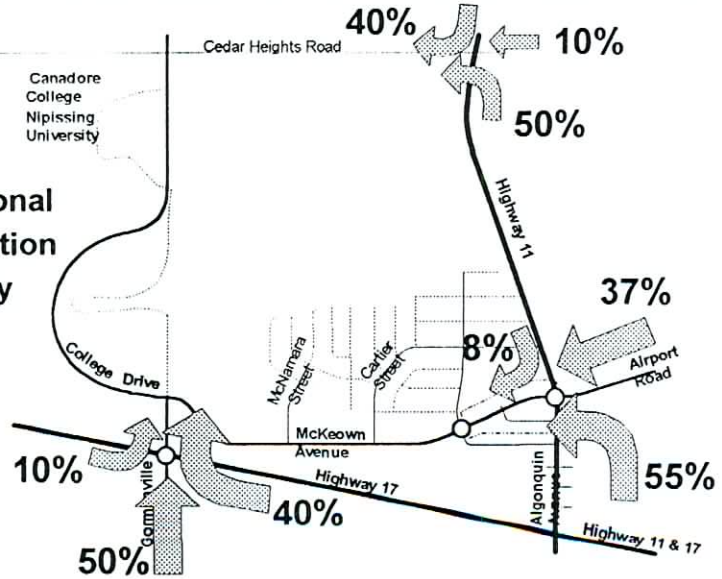
The directional orientation of the new traffic was based on observed movements at existing driveways and intersections along McKeown Avenue, including the key entry points at Algonquin Avenue and Gormanville Road (see Exhibit 4.1). A proportion of the overall traffic was assigned to the Cedar Heights/Highway 11 access route (50% of the new residential development on the escarpment, 15% of the new traffic to the University/College, and less than 10% of the other traffic to the corridor).

In the case of trips to the east end of the corridor (east of Champlain Street), 70% were assigned to approach from Algonquin Avenue; west of Champlain Street, the proportion was reduced to 60%. Of the trips which approach Nipissing University /Canadore College from the south (i.e. excluding the 15% that come via Cedar Heights Road), 80% come from Gormanville Road, as opposed to the 20% from McKeown Avenue. The Hospital and other developments on the Education Centre Lowlands are also expected to attract 80% of their traffic via Gormanville Road.

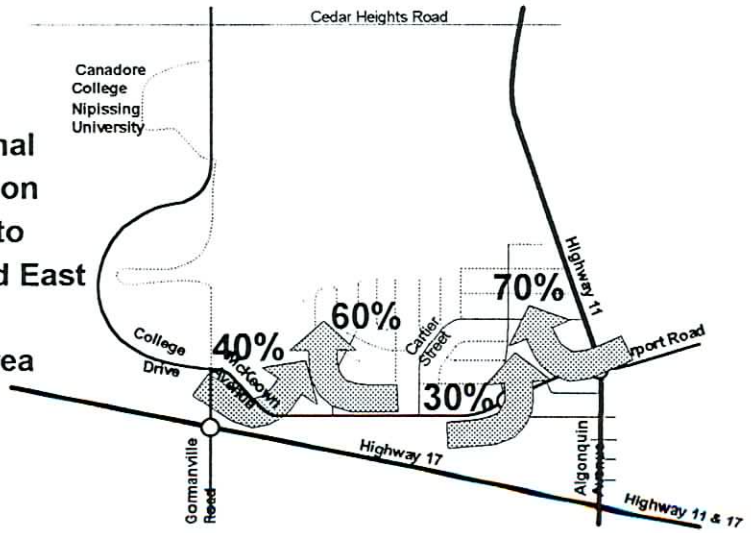
4.3 Growth in Background Traffic in the Study Area

Background traffic is defined as the traffic which passes through study area intersections, but which has neither an origin or a destination within the study area. Background traffic would include vehicles travelling through the study area along

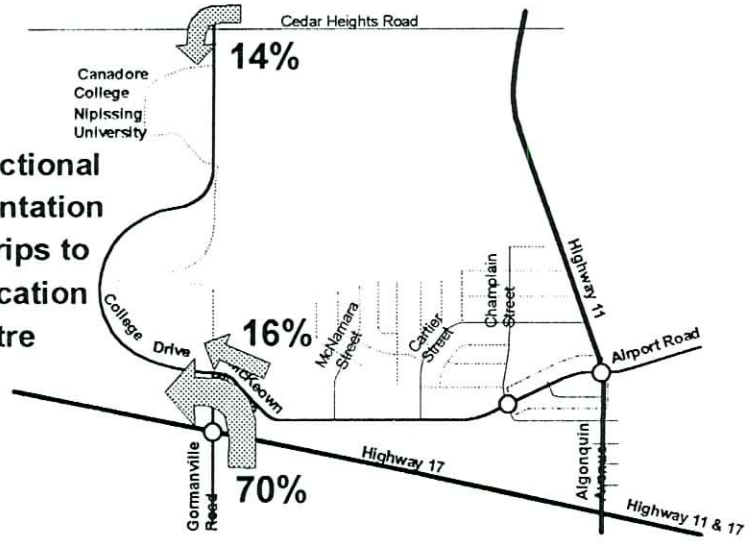
a) Directional Orientation at Study Area Entry Points



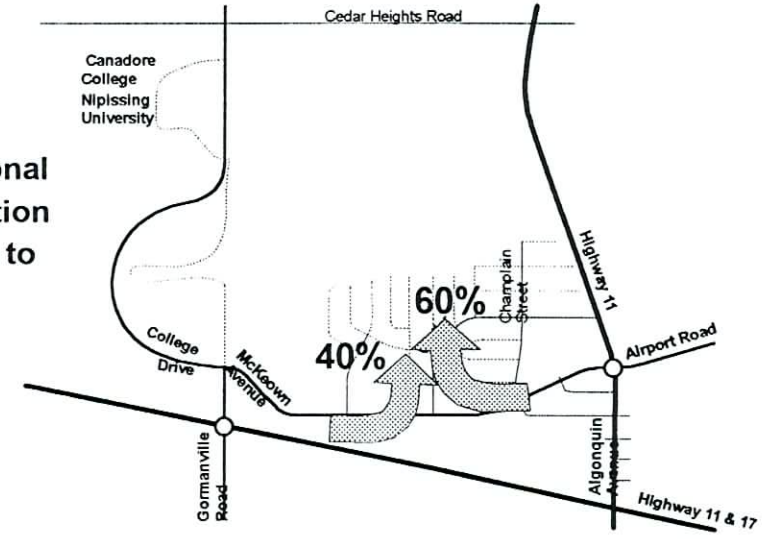
c) Directional Orientation of Trips to West and East Ends of Study Area



a) Directional Orientation of Trips to Education Centre



d) Directional Orientation of Trips to Cartier Street



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Exhibit 4.1 Existing Trip Orientation

Table 4.2 ESTIMATED NEW TRIP GENERATION BY CHANGES IN LAND USE

PROJECTED CHANGES IN LAND USE			WITHIN 5 YEARS								6 - 20 YEARS							
LOCATION	EXISTING USE	ASSUMED NEW USE /CHANGE IN USE	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips		
				Total	In	Out		Total	In	Out		Total	In	Out		Total	In	Out
McKeown Avenue Algonquin to Champlain (including Josephine)	Undeveloped	22,500 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	43 **34**	27 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **97**	126 **105**								
	Undeveloped	15,000 sq ft offices (ITE TGM #710)	Driveway traffic	**48**	**43**	**5**	Driveway traffic	**51**	**9**	**42**								
	Undeveloped	Restaurant - 2,500 sq ft (ITE TGM #834)	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**								
McKeown Avenue Champlain to Cartier	Light industrial	110,000 sq ft retail (ITE TGM #815)	Driveway traffic Less pass-by traffic Less existing ind. traffic	240 192 **168**	151 121 **106**	89 71 **62**	Driveway traffic Less pass-by traffic Less existing ind. traffic	480 384 **364**	240 184 **174**	240 200 **190**								
	Undeveloped	2 restaurants-2,500 sq ft each (ITE TGM #834)	Driveway traffic Less pass-by traffic	280 **188**	143 **96**	137 **92**	Driveway traffic Less pass-by traffic	80 **54**	42 **28**	38 **26**								
	50% undeveloped 50% light industrial	38,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	120 96 **86**	73 59 **52**	47 37 **34**	Driveway traffic Less pass-by traffic Less existing ind. traffic	500 400 **385**	250 200 **195**	250 200 **190**
McKeown Avenue Cartier to McNamara	Undeveloped	25,000 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	44 **34**	26 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **101**	126 **101**								
	Light industrial	40,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	100 80 **60**	63 50 **35**	37 30 **25**	Driveway traffic Less pass-by traffic Less existing ind. traffic	380 304 **279**	198 152 **142**	182 152 **137**
McKeown Avenue McNamara to Gormanville	Undeveloped	3 fast food restaurants (ITE TGM #834)	Driveway traffic Less pass-by traffic	420 **281**	214 **144**	206 **138**	Driveway traffic Less pass-by traffic	270 **181**	140 **94**	130 **87**	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**
	Undeveloped	One sit down restaurant (ITE TGM #832)									Driveway traffic Less pass-by traffic	74 **59**	38 **30**	36 **29**	Driveway traffic Less pass-by traffic	65 **52**	36 **29**	29 **23**
	Undeveloped	Motel (ITE TGM #320)									Driveway traffic	**50**	**19**	**32**	Driveway traffic	**50**	**28**	**22**
College Drive Education Centre Lowlands	Undeveloped	Hospital complex (Tranplan library)	Driveway traffic	**750**	**575**	**175**	Driveway traffic	**750**	**225**	**525**	Driveway traffic	**150**	**100**	**50**	Driveway traffic	**200**	**75**	**125**
	Undeveloped	200,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic	250 **225**	158 **142**	93 **83**	Driveway traffic Less pass-by traffic	1000 **900**	500 **432**	500 **468**
	Undeveloped	150 residential units (ITE TGM #221)									Driveway traffic	**75**	**15**	**60**	Driveway traffic	**92**	**61**	**31**
College Drive Above Escarpment	Existing Colleg /University	Assume enrolment growth of 1.5% p.a.	New traffic after 5 yrs	**100**	**85**	**15**	New traffic after 5 yrs	**60**	**15**	**45**	New traffic 6-20 yrs	**200**	**170**	**30**	New traffic 6-20 yrs	**120**	**30**	**90**
	Undeveloped	400 residential units (ITE TGM #210)	50 D.U.'s within 5 yrs	**44**	**11**	**33**	50 D.U.'s within 5 yrs	**57**	**36**	**21**	350 more D.U.'s	**250**	**60**	**190**	350 more D.U.'s	**330**	**210**	**120**
TOTAL				**1785**	**1175**	**610**		**1980**	**810**	**1170**		**1249**	**670**	**579**		**2468**	**1233**	**1235**

Note: Numbers may not add up exactly due to rounding.

Algonquin Avenue/Highway 11, Airport Road, Highway 17, and the southerly portion of Gormanville Road without turning onto McKeown Avenue or College Drive.

All background traffic has been assumed to grow at approximately 2% per annum (i.e. 10% growth in background traffic by 2004 and 30% growth in background traffic by the time of full development.

4.4 Pass-by Trips/Linked Trips

Based on information contained in the Institute of Transportation Engineers Trip Generation Manual, pass-by trips can comprise 50% of all traffic to a fast food restaurant and 25% of all trips to a retail mall. Pass-by trips consist of cars stopping at the development as they drive past it; these trips do not add traffic to the major road network, but may add, or shift turning movements along the major road.

Linked trips consist of people making two or more stops within the site. For example, a person working in the general area may drive to the site at lunch time to do their weekly banking and to have lunch at one of the restaurants. These two trips (one to the bank and the other to the restaurant) are only one additional vehicle trip on the roads and at the entrances.

This study has assumed that pass-by trips make up 33% of fast food restaurant traffic and 20% of retail mall traffic. No pass-by traffic has been assumed in the case of other land uses.

5. ANALYSIS OF FUTURE TRAFFIC VOLUMES

5.1 Combined Site and Background Traffic

Exhibit 5.1 shows the total afternoon peak hour traffic volumes as they currently exist and as projected to 2004 and at the time of Full Development. Exhibit 5.2 shows the same information for the morning peak hour. Exhibit 5.3 shows the computed Level of Service at key locations in 2004 if the expected development/redevelopment takes place and the existing roads are not improved. Exhibit 5.4 shows the Level of Service at the same locations with Full Development if no improvements are made to the road system.

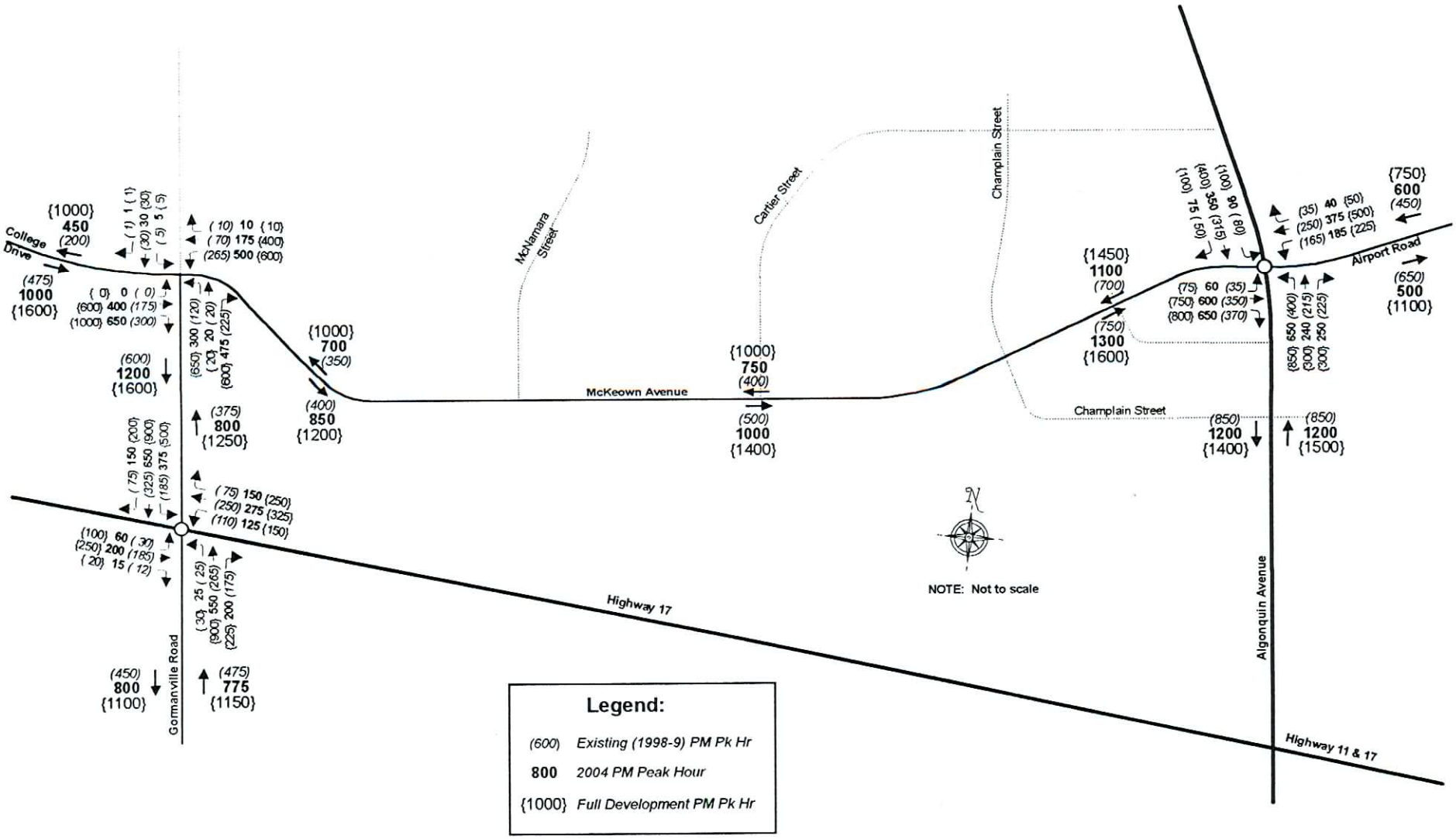
As shown in Exhibit 5.3, the Level of Service would deteriorate to "D" and "E" levels at several locations, including the two main access points, and internal unsignalized intersections would be faced with Level of Service "F" for most left turns from side streets. By Full Development (Exhibit 5.4) most locations are reduced to Level of Service "F".

5.2 McKeown Avenue at Algonquin Avenue

The McKeown Avenue-Airport Road/Algonquin Avenue-Highway 11 intersection is currently operating satisfactorily at Level of Service "C". By 2004 it is projected that the intersection will be operating at Level of Service "E" in the afternoon peak hour. However, converting the existing northbound lanes on Algonquin Avenue to a double left turn would maintain the intersection at Level of Service "C-D" through 2004. With Full Development, Level of Service "C-D" can be maintained by widening McKeown Avenue and Airport Road by one lane on their approaches to Algonquin Avenue.

5.3 McKeown Avenue from Algonquin Avenue to Champlain Street

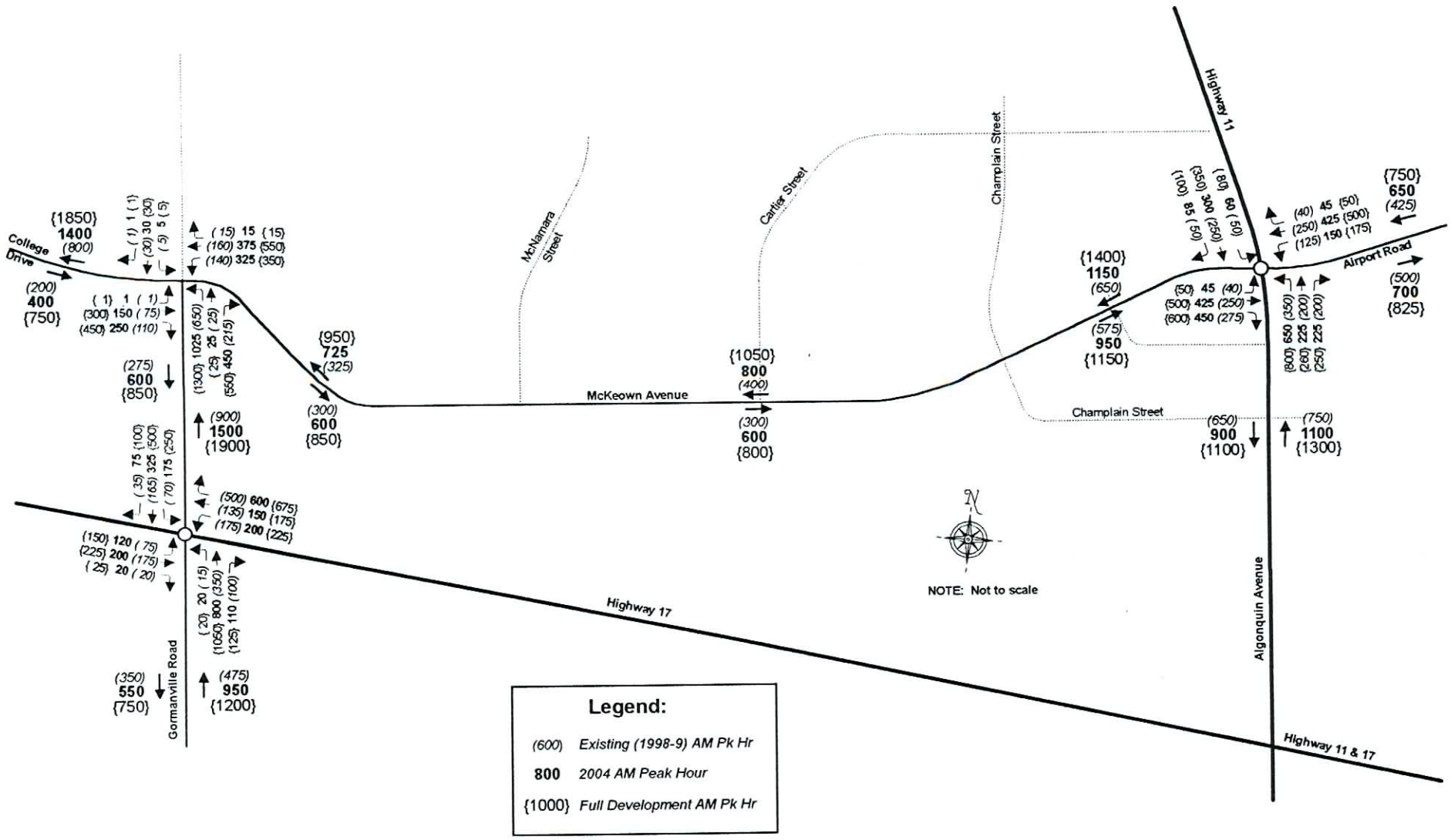
The earlier study "McKeown Avenue/Josephine Street Traffic Study" dealt with



tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 5.1 Projected Afternoon Peak Hour Traffic

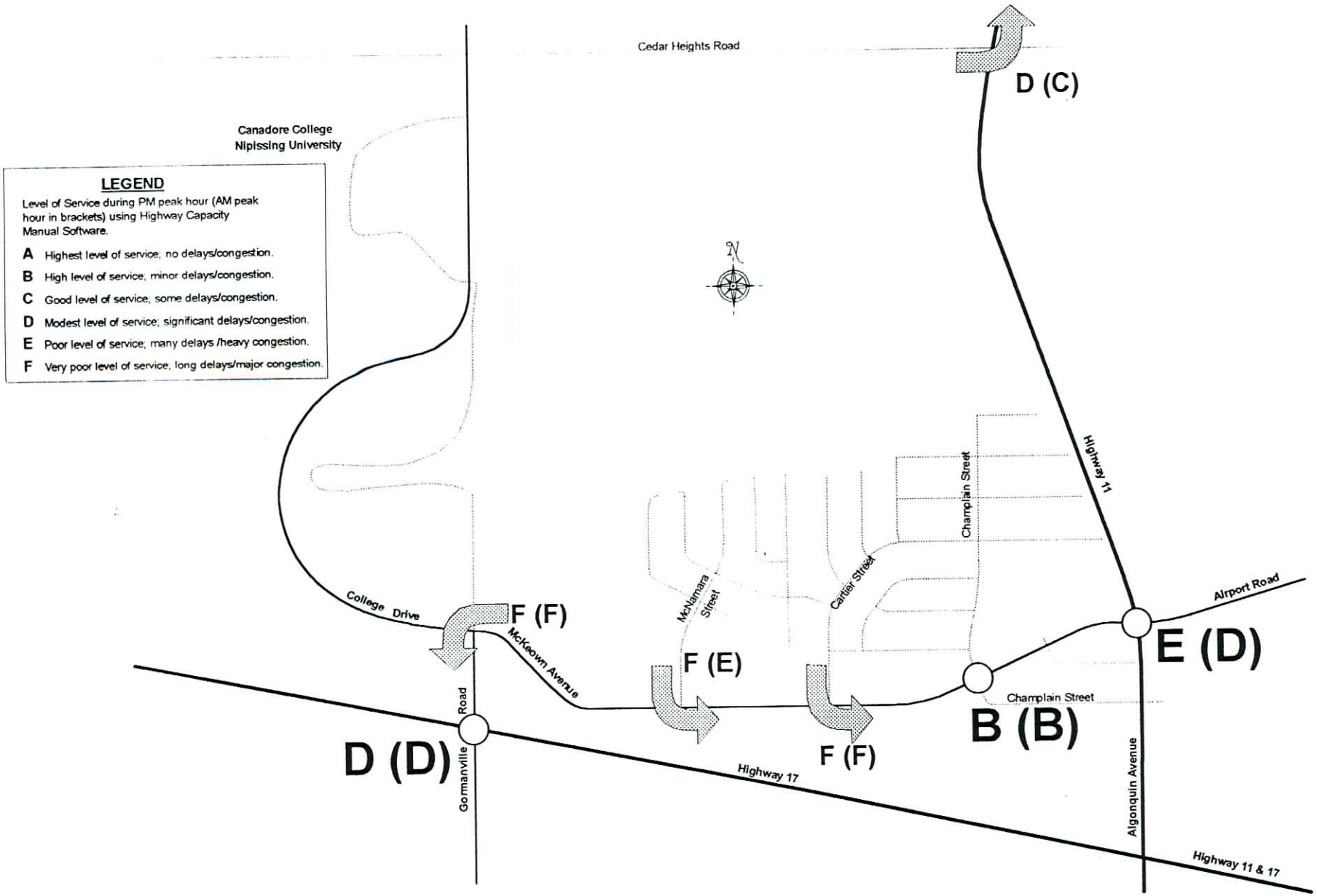
Existing, 2004 and Full Development



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
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Exhibit 5.2 Projected Morning Peak Hour Traffic

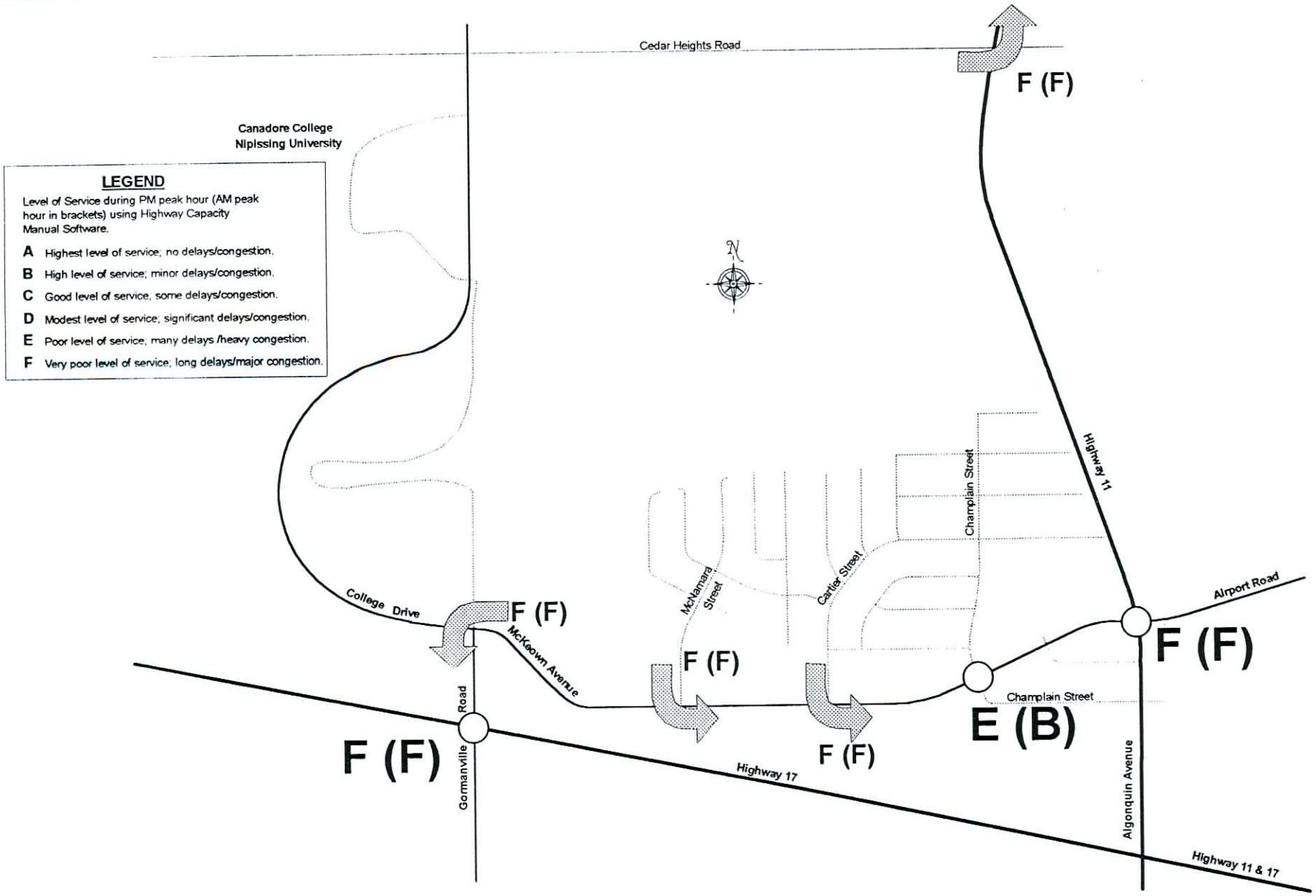
Existing, 2004 and Full Development



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 5.3 Projected Level of Service - 2004

(2004 Traffic With Existing Roadways)



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Exhibit 5.4 Projected Level of Service at Full Development

Existing Roadways with Traffic at Full Development Levels

Table 5.1
Summary of Intersection Analysis
Using Highway Capacity Manual Software

Location Time of Day	1999 Existing Conditions			2004 Projected Development			Full Development (approx 2015 - 2020)		
	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio
Gormanville Rd / Highway 17									
i) Existing roads (as built)									
AM Peak Hour	C	18.5	0.6	D	35.8	1.0	F	n/a	>1.0
PM Peak Hour	C	15.1	0.5	D	35.0	0.9	F	n/a	>1.0
ii) Gormanville Rd approaches widened									
AM Peak Hour				C	19.1	0.7	D	25.1	0.9
PM Peak Hour				C	20.7	0.7	D	28.3	1.0
McKeown Ave (College Dr) / Gormanville Rd									
i) Existing roads with traffic signals									
AM Peak Hour	B	11.5	0.7	F	n/a	>1.0	F	n/a	>1.0
PM Peak Hour	B	8.7	0.5	F	n/a	>1.0	F	n/a	>1.0
ii) McKeown approach widened to 2 lanes									
AM Peak Hour				B	14.4	0.7	F	n/a	>1.0
PM Peak Hour				C	15.5	0.9	F	n/a	>1.0
iii) NB, WB and EB approaches widened*									
AM Peak Hour							C	19.4	0.9
PM Peak Hour							C	18.5	0.8
McKeown Ave (Airport Rd) / Algonquin Ave									
i) Existing road configuration									
AM Peak Hour	C	15.9	0.5	D	26.3	0.8	F	n/a	>1.0
PM Peak Hour	C	15.8	0.6	E	52.8	1.0	F	n/a	>1.0
ii) Algonquin Ave NB double left turn**									
AM Peak Hour				C	19.8	0.6	F	n/a	>1.0
PM Peak Hour				C	23.7	0.8	F	n/a	>1.0
iii) McKeown/Airport widening by one lane***									
AM Peak Hour				C	17.4	0.6	C	20.5	0.7
PM Peak Hour				C	19.6	0.7	C	24.8	0.9
McKeown Ave/Champlain Street									
i) Existing road configuration									
AM Peak Hour	B	8.4	0.4	B	9.0	0.6	B	10.1	0.6
PM Peak Hour	B	8.9	0.4	B	13.1	0.6	E	53.7	1.0
ii) Left turn lanes added to McKeown Ave									
PM Peak Hour							B	10.6	0.8
Cedar Heights Rd / Hwy 11 (unsignalized)									
- left turns from Cedar Heights to Hwy 11 N									
AM Peak Hour	B	8.7		C	13.4		F	47.9	
PM Peak Hour	C	11.2		D	20.7		F	614.8	
McNamara St/McKeown Ave (unsignalized)									
- left turns from McNamara to McKeown EB									
AM Peak Hour	B	9.4		E	38.5		F	530.0	
PM Peak Hour	C	11.3		F	163.6		F	>999.9	
Cartier St/McKeown Ave (unsignalized)									
- left turns from Cartier to McKeown EB									
AM Peak Hour	C	10.4		F	97.5		F	>999.9	
PM Peak Hour	C	12.3		F	72.0		F	>999.9	

Note * College Dr approach widened by one lane, McKeown Ave approach widened to two lanes, Gormanville Rd NB approach widened by one lane

Note ** Algonquin Ave NB approach changed to two left turn lanes and one through lane.

Note *** McKeown Avenue and Airport Road approaches widened by one lane (plus double left turn lane on Algonquin Ave NB)

McKeown Avenue from Algonquin Avenue to Champlain Street. It recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). The current study supports those recommendations.

5.4 McKeown Avenue at Gormanville Road

The existing unsignalized intersection is currently operating with lengthy queues and delays for westbound McKeown Avenue traffic turning left to proceed south on Gormanville Road during peak hours. The current traffic volumes were compared against the minimum warrants for traffic signals and the key portion of the warrant is shown in Exhibit 5.5. Conditions are at 93% of the minimum standard for traffic signals. It is expected that growth within the corridor will justify traffic signals in the near future (one to five years).

Consideration was given to potential benefits from realigning the intersection to provide through movements from Gormanville Road to College Drive or to McKeown Avenue. Preliminary designs were prepared and a traffic analysis of the alternatives was carried out. Due to a combination of geometric design reasons and traffic efficiency, it was determined that the existing intersection configuration is preferred.

With traffic signals and the existing roads (configuration and number of lanes), the intersection would operate at Level of Service "B". By 2004 the Level of Service would drop to "F", but can be improved to "B-C" readily by widening the McKeown Avenue approach from one lane to two lanes. With Full Development the intersection would again be reduced to Level of Service "F"; a further widening of the McKeown Avenue approach to three lanes and the widening of the College Drive and Gormanville Road approaches by one lane would allow the intersection to operate at Level of Service "C" through the long term.

B.2.03.08 TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signals for roadways with two or more lanes.

Major street ..... *Gormanville Road* No. of lanes *1/2*
Minor street ..... *McKeown Avenue*

FREE FLOW CONDITIONS (RURAL) ☐
RESTRICTED FLOW CONDITIONS (URBAN) ☑

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100 % SATISFIED - YES ☐ NO ☑
80 % SATISFIED - YES ☑ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT								
APPROACH LANES	1		2 OR MORE		HOUR ENDING								
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	0830	0930	1230	1330	1430	1530	1630	1730	TOTAL ACROSS
A. ALL APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)	975	950	900	950	725	850	1050	820	
	100% FULFILLED				100%	100%	100%	100%			100%		500%
	80% FULFILLED								80%	80%		80%	240%
	ACTUAL % IF BELOW 80% VALUE												0%
												TOTAL DOWN	740% / 8 = 93%
B. MINOR STREET BOTH APPROACHES	120* (95)*	170* (135)*	120* (95)*	170* (135)*	350	340	400	500	350	500	675	475	TOTAL ACROSS
	100% FULFILLED				100%	100%	100%	100%	100%	100%	100%	100%	800%
	80% FULFILLED												0%
	ACTUAL % IF BELOW 80% VALUE												0%
												TOTAL DOWN	800% / 8 = 100%

SECTIONAL PERCENT

* FOR 'T' INTERSECTIONS THESE VALUES SHOULD BE INCREASED BY 50%

2 - DELAY TO CROSS TRAFFIC

100 % SATISFIED - YES ☐ NO ☐
80 % SATISFIED - YES ☐ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT								
APPROACH LANES	1		2 OR MORE		HOUR ENDING								
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐									TOTAL ACROSS
A. MAJOR STREET BOTH APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)									
	100% FULFILLED												
	80% FULFILLED												
	ACTUAL % IF BELOW 80% VALUE												
												TOTAL DOWN	/ 8 =
B. TRAFFIC CROSSING MAJOR STREET	50 (40)	75 (60)	50 (40)	75 (60)									TOTAL ACROSS
	100% FULFILLED												
	80% FULFILLED												
	ACTUAL % IF BELOW 80% VALUE												
												TOTAL DOWN	/ 8 =

SECTIONAL PERCENT

Exhibit 5.5: Traffic Signal Warrant Form - McKeown Avenue at Gormanville Road

5.5 Gormanville Road at Highway 17

The Gormanville Road/Highway 17 intersection is currently operating at Level of Service "C". By 2004 the Level of Service would drop to "D" if no improvements are made. If Gormanville Road is widened by one lane on both approaches, Level of Service "C" would be maintained. With Full Development, the Level of Service would again drop to "D".

It is anticipated that in the longer term future, as part of the realignment of the North Bay Bypass, Gormanville Road will be grade separated from Highway 17 along a more westerly alignment. This plan would deal with the capacity requirements and provide satisfactory Levels of Service into the long term future.

5.6 McKeown Avenue at Cartier Street and McNamara Street

At current levels of traffic, left turn lanes are warranted at both Cartier Street and McNamara Street for vehicles turning into both streets from mcKeown Avenue. The left turns out from both side streets are currently operating at satisfactory Levels of Service ("B" and "C"). As volumes increase along McKeown Avenue, the left turns out will become more difficult and by 2004 it is projected that they will be at Level of Service "E" and "F" during peak hours. Neither location will warrant traffic signals; it is expected that Champlain Street will act as the safety valve - neighbourhood motorists will increase their use of Champlain Street, particularly when exiting towards the east.

In the longer term, benefits may be possible from future development particularly on the south side of McKeown Avenue. While the prospects do not appear to be promising in the near term, there may be future opportunities to combine signalized access to a new development with either Cartier Street or McNamara Street.

5.7 McKeown Avenue Between Champlain Street and Cartier Street

It is expected that there will be several significant new developments within this block

by 2004 and more in the longer term. While not all the expected development will require direct driveway access from McKeown Avenue, at least one or two major new driveways can be expected. The driveways will require left turn storage lanes and when these storage lanes and their tapers are combined with the requirements at Champlain Street and at Cartier Street, the result is a continuous centre fifth lane on McKeown Avenue from Champlain Street to Cartier Street.

5.8 McKeown Avenue Between Cartier Street and McNamara Street

This section of McKeown Avenue currently has a two-lane cross-section which carries approximately 8,000 vehicles per day. By 2004 this volume is expected to double to approximately 16,000 vehicles per day. This volume is beyond the capacity of a two-lane roadway operating in an urban environment with intersecting streets, private driveways, transit and school buses and pedestrian traffic. Two through lanes in each direction will be required in this section.

It is expected that there will be at least two significant new developments in this block by 2004 with one or two major new driveways. At least one of the driveways (probably both) will require a left turn storage lane; when the storage lane and its tapers are combined with the requirements at Cartier Street and McNamara Street, the result is a continuous centre turning lane from Cartier Street to McNamara Street (i.e. a five lane section).

5.9 McKeown Avenue Between McNamara Street and Gormanville Road

McKeown Avenue between McNamara Street and Gormanville Road also has a two-lane cross-section; it carries approximately 7,000 vehicles per day. The volume is expected to reach approximately 14,000 vehicles per day by 2004 and is expected to continue to grow to approximately 20,000 vehicles per day by the time Full Development is reached. The 14,000 volume is not beyond the capacity of a two-lane roadway in an area with limited access and side friction, but would require four lanes in an urban area with relatively large turning movements and high side friction. While

this road section from McNamara Street to Gormanville Road will eventually need to be four lanes (most likely within ten years), the project can be deferred for a few years and/or implemented in stages (first from McNamara Street to the Ontario Government Building, second from the Government Building to Gormanville Road). The timing will be somewhat dependent on the speed of development on the Education Centre lands (especially the Hospital and the retail commercial uses).

As previously noted the existing traffic volumes warrant a left turn storage lane on McKeown Avenue at McNamara Street and at the Provincial Government Building Entrances. The tapers from these two turning lanes overlap and a continuous centre turning lane should be provided from McNamara Street to the west entrance to the Ontario Government Building.

While it is expected that there will be some significant new developments on the vacant lands between Gormanville Road and Hopper Motors, there may not be any new driveways west of the Government Building. If there are no new driveways, it would be possible to stop the continuous centre turning lane at the Government Building west entrance; if there is a major new driveway west of the Government Building, the centre turning lane should be continued through to Gormanville Road.

5.10 College Drive

The lane configuration of College Drive will need to be assessed as the plans for the Education Centre lands become clearer and when the Ministry of Transportation has firmer plans for the North Bay Bypass. It is likely, however, that the section of College Drive between Gormanville Road and the access points to the lands below the escarpment will need to be four laned (plus turning lanes) as development occurs.

5.11 Sidewalks

The projected future traffic volumes along McKeown Avenue, and the level of pedestrian activity which can be expected due to adjacent residential areas and the City

bus route usage, appear to justify a sidewalk along both sides of McKeown Avenue. The existing sidewalk is along the north side. Construction of a sidewalk along the south side could be phased over a number of years as development/redevelopment takes place along the south side of the road.

APPENDIX A

INTERSECTION ANALYSIS REPORTS
(Highway Capacity Manual)

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	50	174	19	175	135	265	16	331	96	58	137	29
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	18.0A	29.0P			Green	5.0A	28.0A		
Yellow/AR	5.0	5.0			Yellow/AR	5.0	5.0		

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	354	1770	0.158	0.200	21.4	C	17.2	C
	T	1155	3725	0.176	0.310	16.3	C		
	R	488	1574	0.043	0.310	15.6	C		
WB	L	354	1770	0.548	0.200	24.6	C	20.6	C
	T	1155	3725	0.136	0.310	16.1	C		
	R	488	1574	0.603	0.310	20.4	C		
NB	LTR	993	3311	0.521	0.300	19.2	C	19.2	C
SB	L	251	1770	0.255	0.400	12.7	B	12.9	B
	TR	714	1784	0.258	0.400	13.0	B		

Intersection Delay = 18.5 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.556

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M204A.HC9
Area Type: Other 3-16-99 AM
Comment: 2004

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	120	200	20	200	150	600	20	800	110	175	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	*				NB	Left		*		
Thru		*				Thru		*		
Right		*				Right		*		
Peds		*				Peds	*	*		
WB Left	*				SB	Left	*	*		
Thru		*				Thru	*	*		
Right		*				Right	*	*		
Peds		*				Peds	*	*		
NB Right					EB	Right				
SB Right					WB	Right	*			
Green	14.0A	35.0P			Green		8.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR		4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

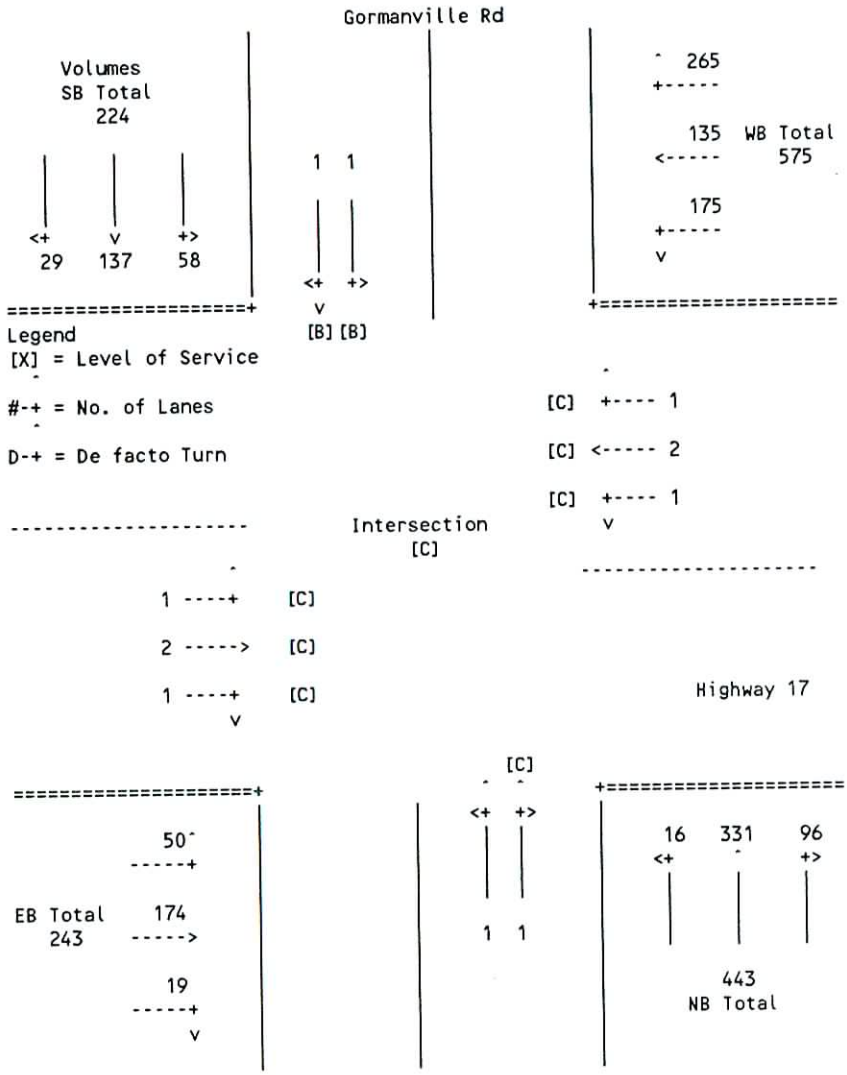
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.551	0.136	30.7	D	21.5	C
	T	1217	3619	0.191	0.336	16.7	C		
	R	529	1574	0.042	0.336	15.9	C		
WB	L	241	1770	0.920	0.136	56.6	E	36.8	D
	T	1217	3619	0.144	0.336	16.4	C		
	R	701	1574	0.951	0.445	35.6	D		
NB	LTR	1076	3198	1.009	0.336	46.7	E	46.7	E
SB	L	212	1770	0.915	0.445	44.4	E	24.1	C
	TR	793	1780	0.560	0.445	15.2	C		

Intersection Delay = 35.8 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.968

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M204A.HC9
Area Type: Other 3-16-99 AM
Comment: 2004

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1 <	
Volumes	120	200	20	200	150	600	20	800	110	175	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru		*			Thru	*		
Right		*			Right	*		
Peds		*			Peds	*		
WB Left	*				SB Left	*		
Thru		*			Thru	*		
Right		*			Right	*		
Peds		*			Peds	*		
NB Right					EB Right			
SB Right					WB Right	*		
Green	14.0A	35.0P			Green	8.0A	35.0A	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.551	0.136	30.7	D	21.5	C
	T	1217	3619	0.191	0.336	16.7	C		
	R	529	1574	0.042	0.336	15.9	C		
WB	L	241	1770	0.920	0.136	56.6	E	36.8	D
	T	1217	3619	0.144	0.336	16.4	C		
	R	701	1574	0.951	0.445	35.6	D		
NB	LTR	1076	3198	1.009	0.336	46.7	E	46.7	E
SB	L	212	1770	0.915	0.445	44.4	E	24.1	C
	TR	793	1780	0.560	0.445	15.2	C		

Intersection Delay = 35.8 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.968

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development - no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru		*			Thru	*		
Right		*			Right	*		
Peds		*			Peds	*	*	
WB Left	*				SB Left	*	*	
Thru		*			Thru	*	*	
Right	*	*			Right	*	*	
Peds		*			Peds	*	*	
NB Right					EB Right			
SB Right					WB Right	*		
Green	14.0A	30.0P			Green	12.0A	36.0A	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

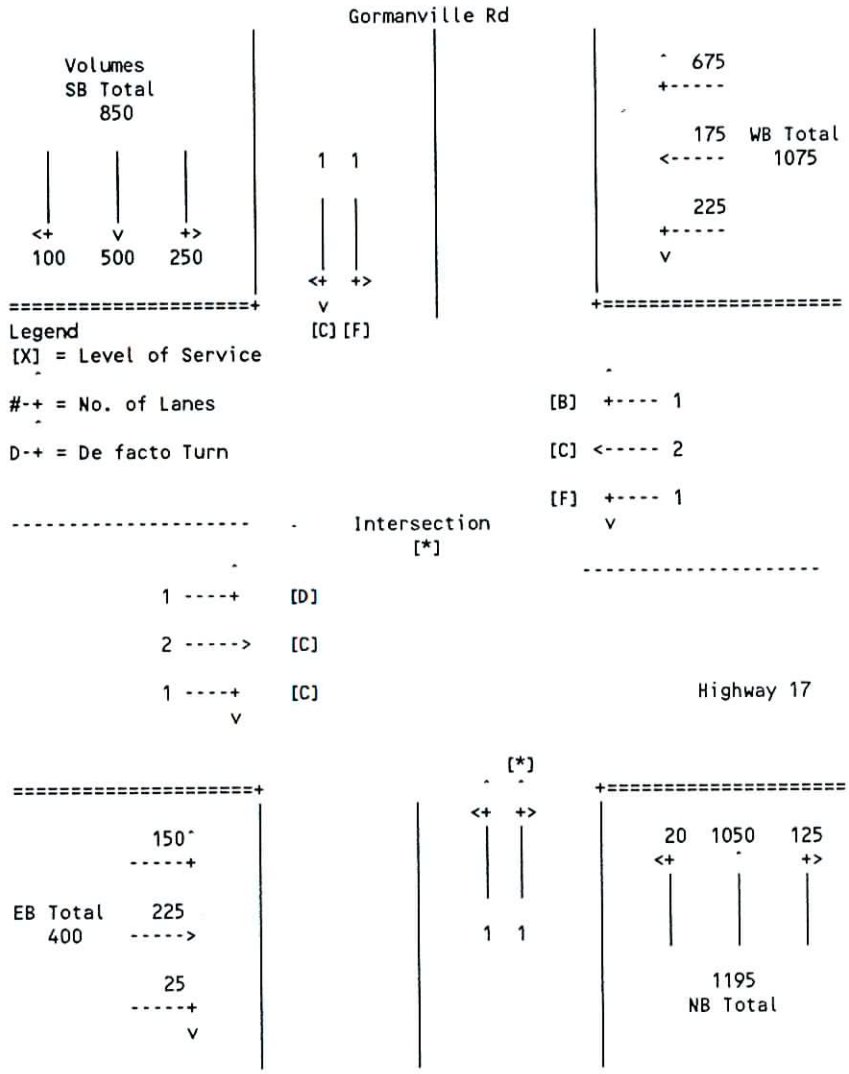
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.692	0.136	34.8	D	24.9	C
	T	1053	3619	0.249	0.291	19.3	C		
	R	456	1566	0.061	0.291	18.2	C		
WB	L	241	1770	1.036	0.136	86.4	F	30.1	D
	T	1053	3619	0.194	0.291	18.9	C		
	R	940	1566	0.798	0.600	14.4	B		
NB	LTR	1060	3067	1.316	0.345	*	*	*	*
SB	L	277	1770	1.004	0.491	63.7	F	31.1	D
	TR	876	1784	0.762	0.491	17.5	C		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDAI.HC9

Area Type: Other 3-16-99 AM

Comment: Full development - ~~no improvements~~ Gormanville Rd. wideaed

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2	1	1	2	<
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*							
Thru		*						
Right		*						
Peds		*						
WB Left	*							
Thru		*						
Right	*	*						
Peds		*						
NB Right								
SB Right								
Green	18.0A	16.0P						
Yellow/AR	4.0	5.0						

NB Left						*		
Thru						*		
Right						*		
Peds					*	*		
SB Left					*	*		
Thru					*	*		
Right					*	*		
Peds					*	*		
EB Right								
WB Right					*			
Green					15.0A	43.0A		
Yellow/AR					4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

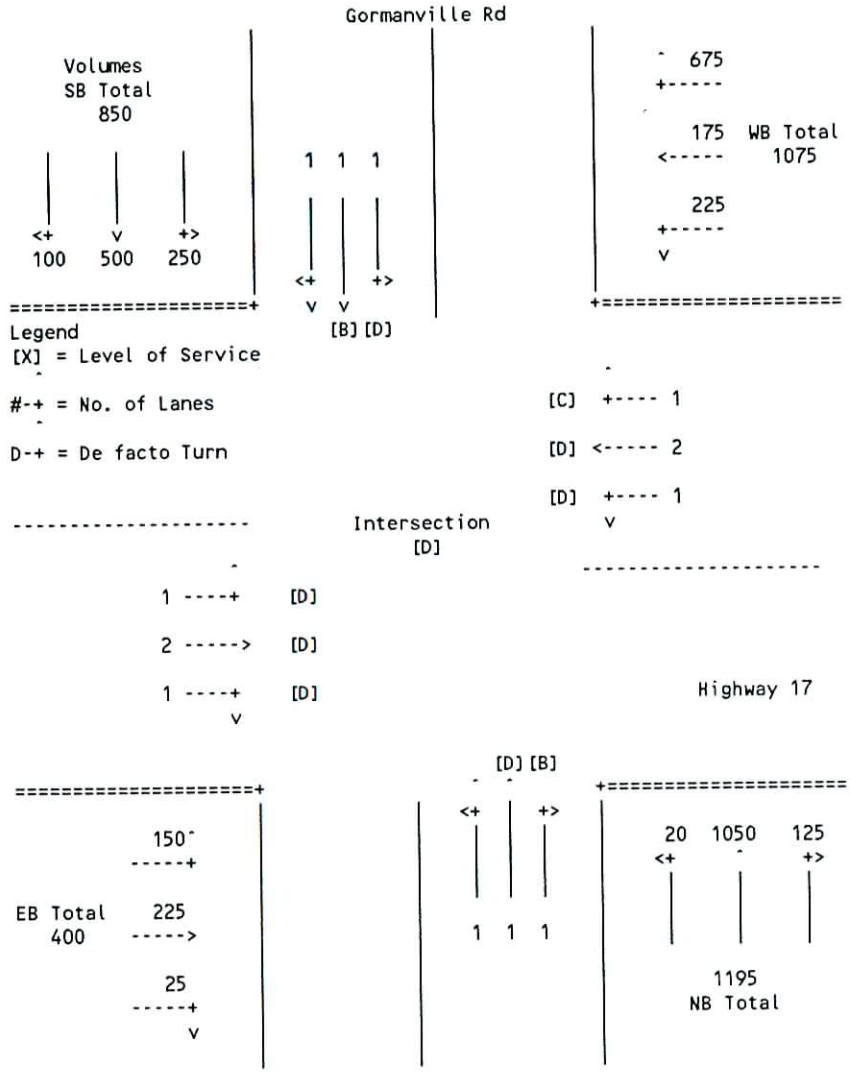
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	306	1770	0.546	0.173	28.4	D	27.5	D
	T	592	3619	0.442	0.164	27.2	D		
	R	256	1566	0.109	0.164	25.3	D		
WB	L	306	1770	0.818	0.173	39.1	D	27.0	D
	T	592	3619	0.344	0.164	26.5	D		
	R	840	1566	0.893	0.536	23.2	C		
NB	LT	1310	3203	0.952	0.409	31.4	D	29.6	D
	R	630	1541	0.220	0.409	13.7	B		
SB	L	325	1770	0.855	0.582	33.6	D	15.1	C
	TR	2093	3598	0.334	0.582	7.8	B		

Intersection Delay = 25.1 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.919

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2XP.HC9
Area Type: Other 3-16-99 PM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	30	185	12	110	250	75	25	265	175	185	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*	*			NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*	*			SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	7.0A	38.0P			Green	7.0A	40.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

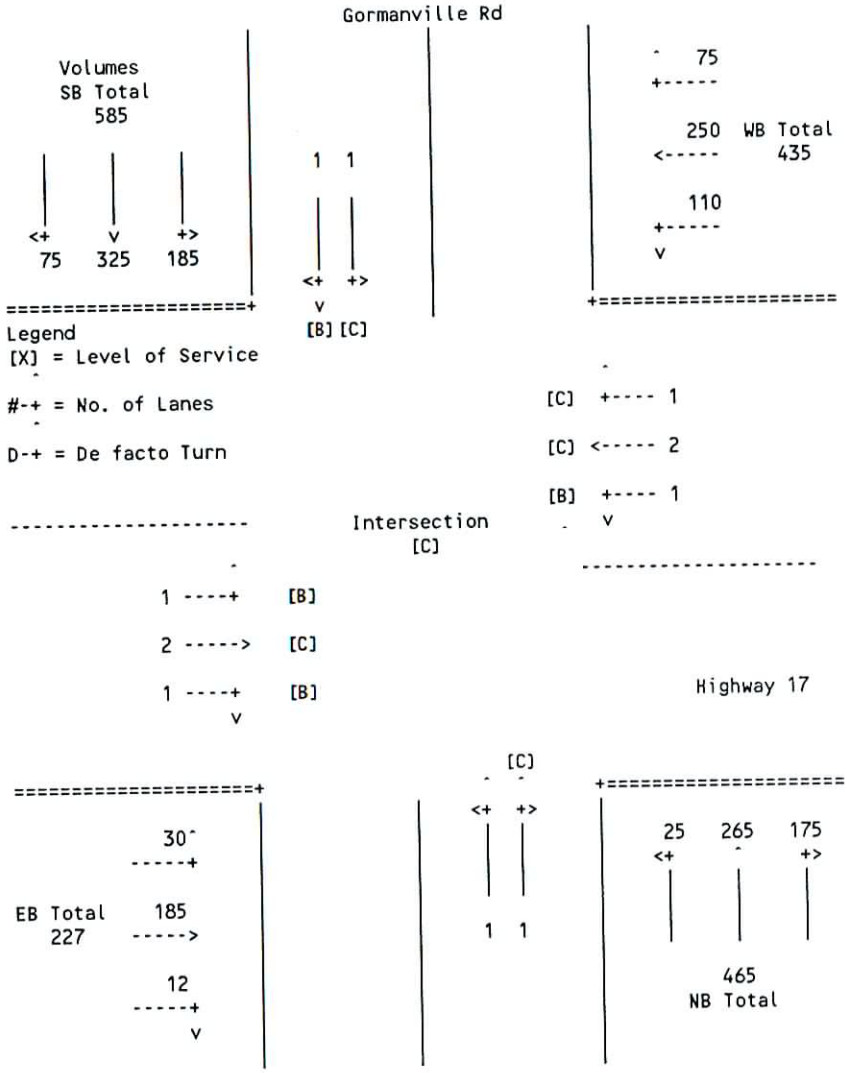
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	437	1770	0.076	0.464	10.5	B	14.6	B
	T	1355	3725	0.159	0.364	15.3	C		
	R	572	1574	0.023	0.364	14.5	B		
WB	L	500	1770	0.244	0.464	11.1	B	14.4	B
	T	1355	3725	0.216	0.364	15.6	C		
	R	572	1574	0.145	0.364	15.2	C		
NB	LTR	1077	2820	0.503	0.382	17.1	C	17.1	C
SB	L	300	1770	0.687	0.482	15.9	C	14.0	B
	TR	858	1780	0.518	0.482	13.2	B		

Intersection Delay = 15.1 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.463

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M204PI.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 with Gormanville Rd widened by one lane on each approach

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	>	2	1	1	2	<
Volumes	60	200	15	125	275	150	25	550	200	375	650	150
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	14.0A	21.0P			Green	22.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

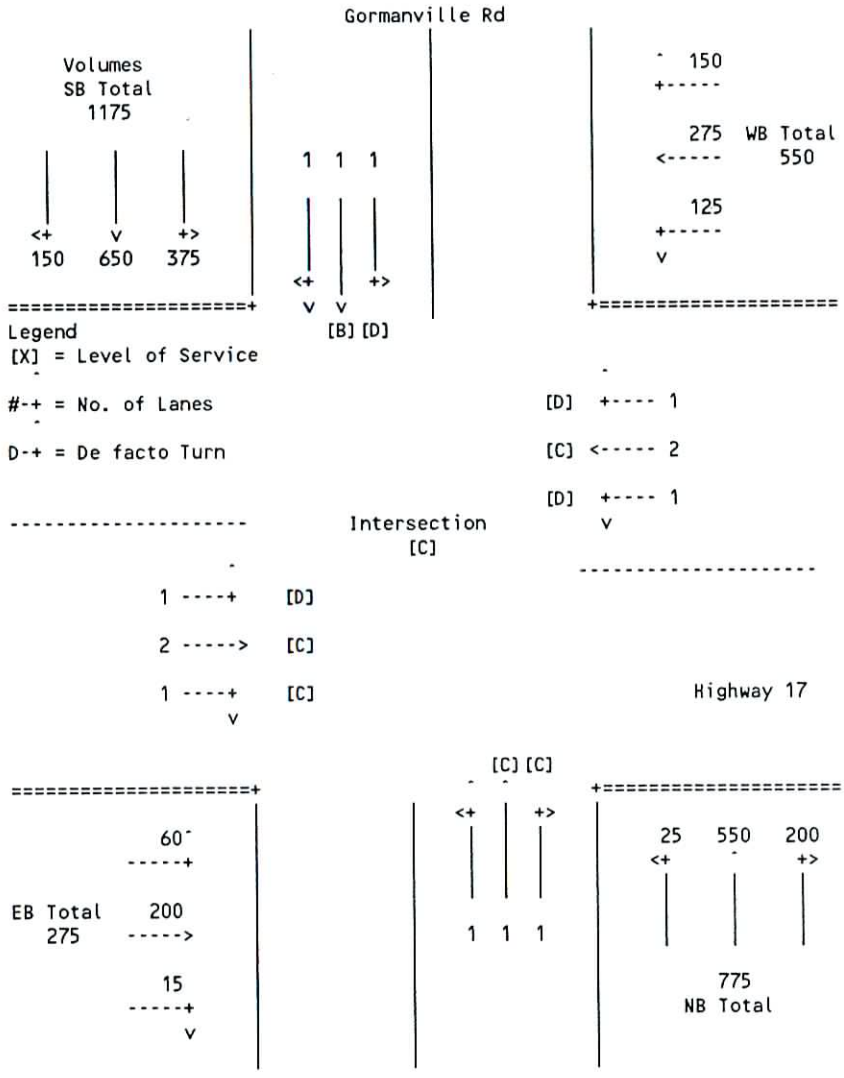
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.278	0.136	27.7	D	24.5	C
	T	779	3725	0.299	0.209	23.8	C		
	R	327	1566	0.052	0.209	22.5	C		
WB	L	241	1770	0.576	0.136	31.2	D	26.4	D
	T	779	3725	0.412	0.209	24.5	C		
	R	327	1566	0.510	0.209	26.0	D		
NB	LT	929	2763	0.722	0.336	22.6	C	21.6	C
	R	518	1541	0.428	0.336	18.6	C		
SB	L	459	1770	0.908	0.573	33.3	D	16.4	C
	TR	2053	3585	0.454	0.573	8.9	B		

Intersection Delay = 20.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.715

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2FDP.HC9
Area Type: Other 3-16-99 PM
Comment: Full development with existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru		*			Thru	*		
Right		*			Right	*		
Peds		*			Peds	*	*	
WB Left	*				SB Left	*	*	
Thru		*			Thru	*	*	
Right		*			Right	*	*	
Peds		*			Peds	*	*	
NB Right					EB Right			
SB Right					WB Right	*		
Green	12.0A	12.0P			Green	22.0A	46.0A	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

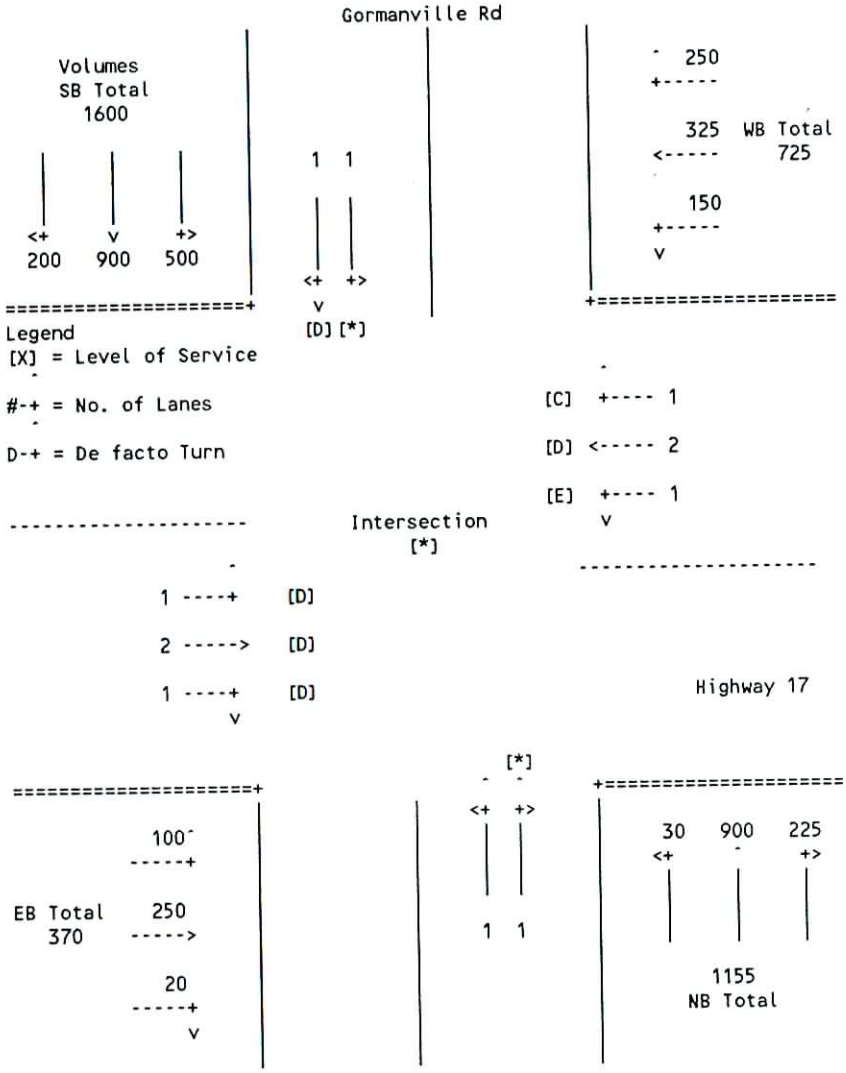
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	209	1770	0.531	0.118	31.5	D	31.0	D
	T	474	3725	0.616	0.127	31.1	D		
	R	199	1566	0.110	0.127	27.5	D		
WB	L	209	1770	0.798	0.118	43.4	E	31.7	D
	T	474	3725	0.799	0.127	36.6	D		
	R	569	1566	0.488	0.364	18.0	C		
NB	LTR	963	2206	1.399	0.436	*	*	*	*
SB	L	438	1770	1.269	0.673	*	*	*	*
	TR	1197	1780	1.020	0.673	36.7	D		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2FDP1.HC9
Area Type: Other 3-16-99 PM
Comment: Full development with Gormanville widened by one lane each side

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	<	1	2	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

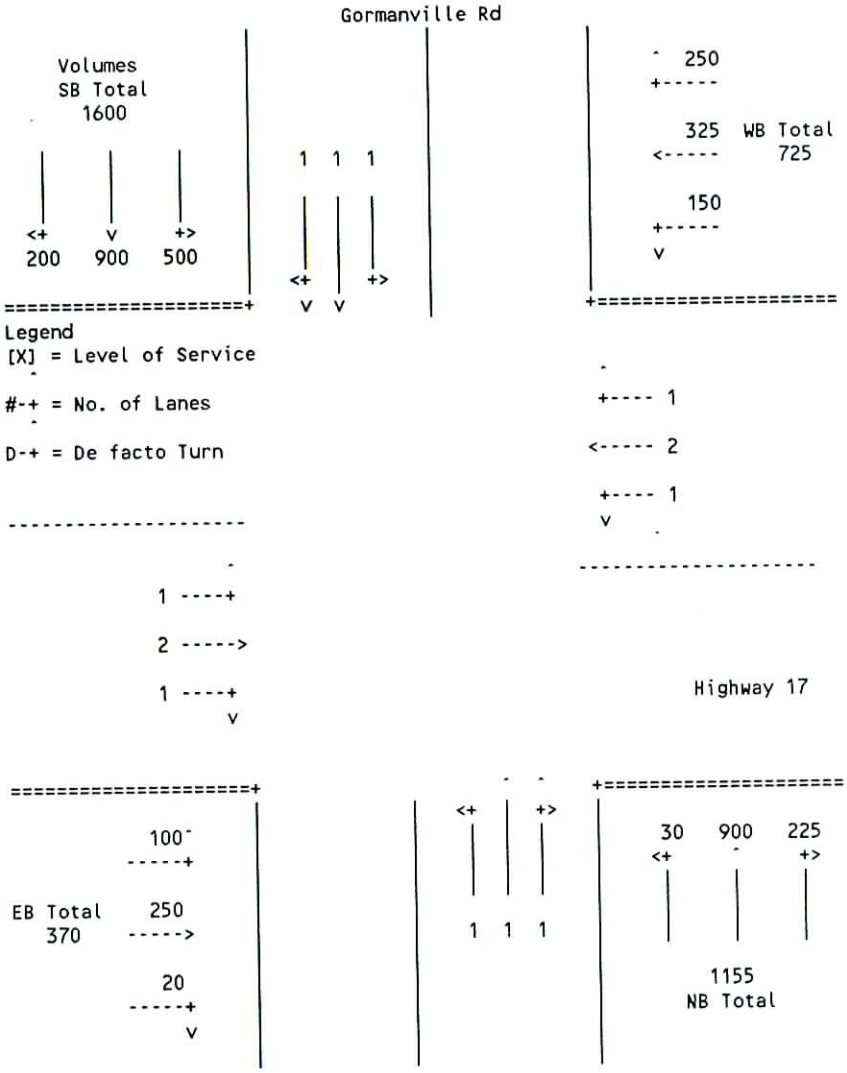
Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*					*		
Thru		*				*		
Right		*				*		
Peds		*				*		
WB Left	*							
Thru		*						
Right		*						
Peds		*						
NB Left						*		
Thru						*		
Right						*		
Peds					*	*		
SB Left					*	*		
Thru					*	*		
Right					*	*		
Peds					*	*		
EB Right								
WB Right					*			
Green	10.0A	14.0P			28.0A	40.0A		
Yellow/AR	4.0	5.0			4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	48	284	319	129	243	40	349	196	185	54	260	52
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4
EB Left		*		
Thru		*		
Right	*	*		
Peds		*		
WB Left	*	*		
Thru	*	*		
Right	*	*		
Peds		*		
NB Right	*	*		
SB Right				
Green	5.0A	24.0A		
Yellow/AR	4.0	5.0		

	5	6	7	8
NB Left	*	*		
Thru		*	*	
Right	*	*	*	
Peds		*	*	
SB Left	*			
Thru			*	
Right	*	*	*	
Peds		*	*	
EB Right	*	*		
WB Right	*	*		
Green	14.0A	18.0A	26.0P	
Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

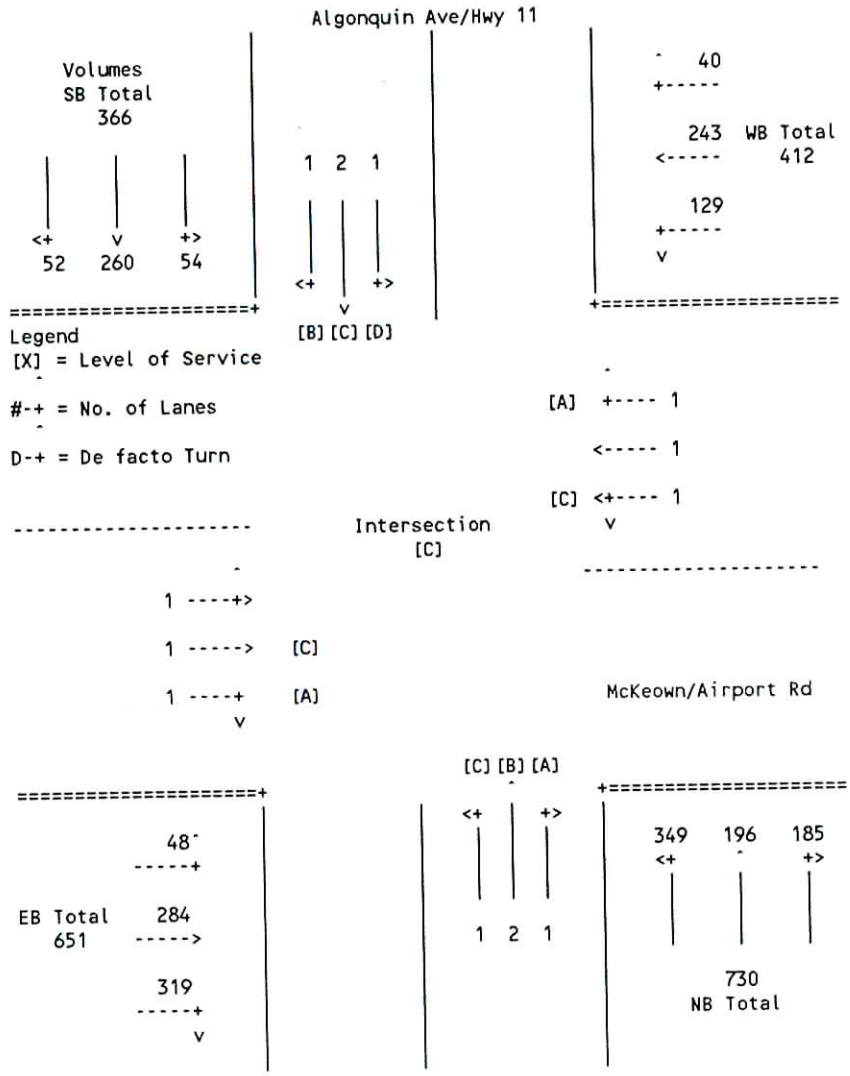
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	668	2828	0.579	0.236	24.9	C	15.1	C
	R	1087	1574	0.326	0.691	4.4	A		
WB	LT	925	2908	0.469	0.318	19.7	C	18.2	C
	R	1087	1574	0.040	0.691	3.5	A		
NB	L	611	1770	0.635	0.345	21.0	C	13.0	B
	T	1678	3619	0.136	0.464	10.9	B		
	R	1531	1574	0.135	0.973	0.0	A		
SB	L	241	1770	0.249	0.136	27.5	D	20.2	C
	T	921	3619	0.329	0.255	21.6	C		
	R	987	1574	0.059	0.627	5.1	B		

Intersection Delay = 15.9 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.492

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304A.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*	*	*	
Green	5.0A	24.0A			Green	14.0A	28.0A	16.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

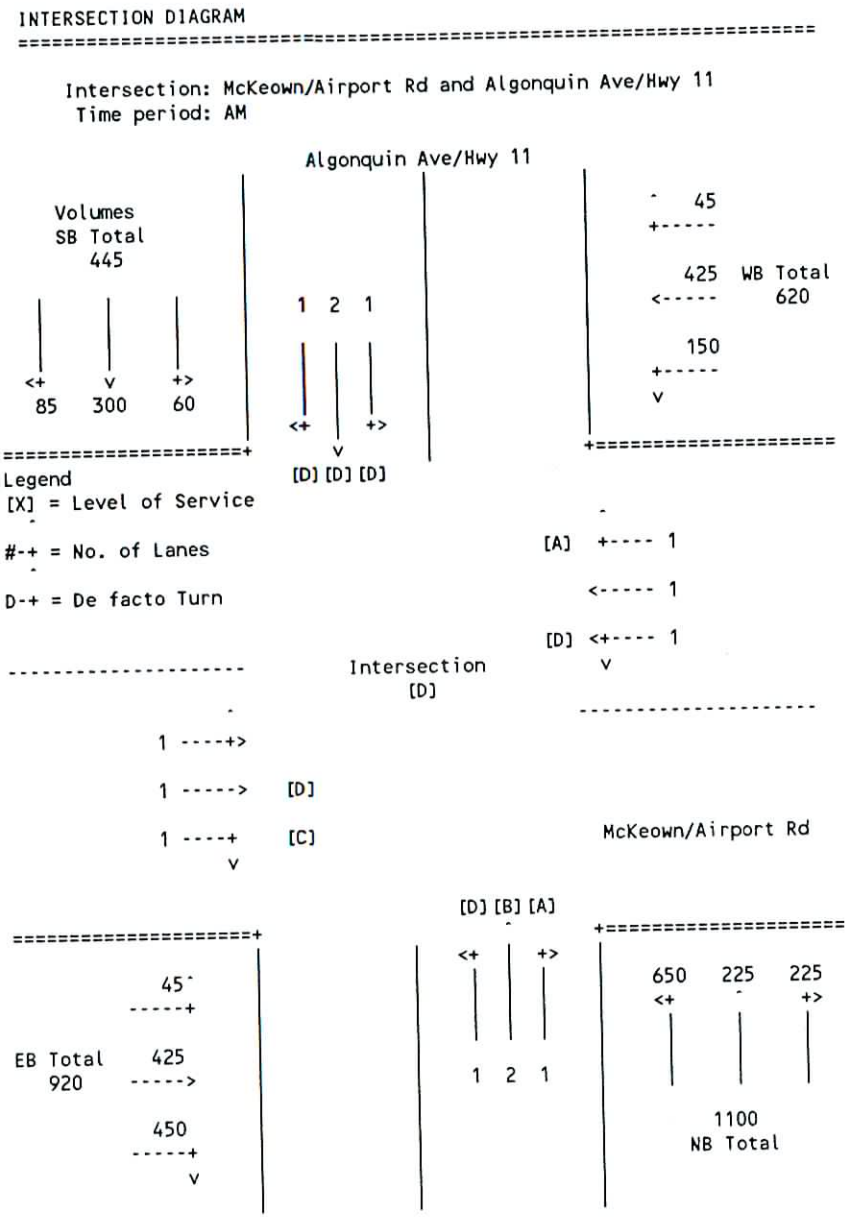
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	603	2551	0.909	0.236	39.1	D	31.7	D
	R	630	1574	0.794	0.400	23.6	C		
WB	LT	807	2535	0.832	0.318	27.7	D	25.7	D
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	772	1770	0.935	0.436	32.4	D	21.3	C
	T	1678	3619	0.156	0.464	11.0	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	241	1770	0.278	0.136	27.7	D	28.2	D
	T	592	3619	0.591	0.164	28.7	D		
	R	258	1574	0.365	0.164	26.8	D		

Intersection Delay = 26.3 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.838

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304AI.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 With ~~no improvements~~ 2 LT lanes on Algonquin NB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*	*	*	
Green	5.0A	30.0A			Green	12.0A	16.0A	24.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

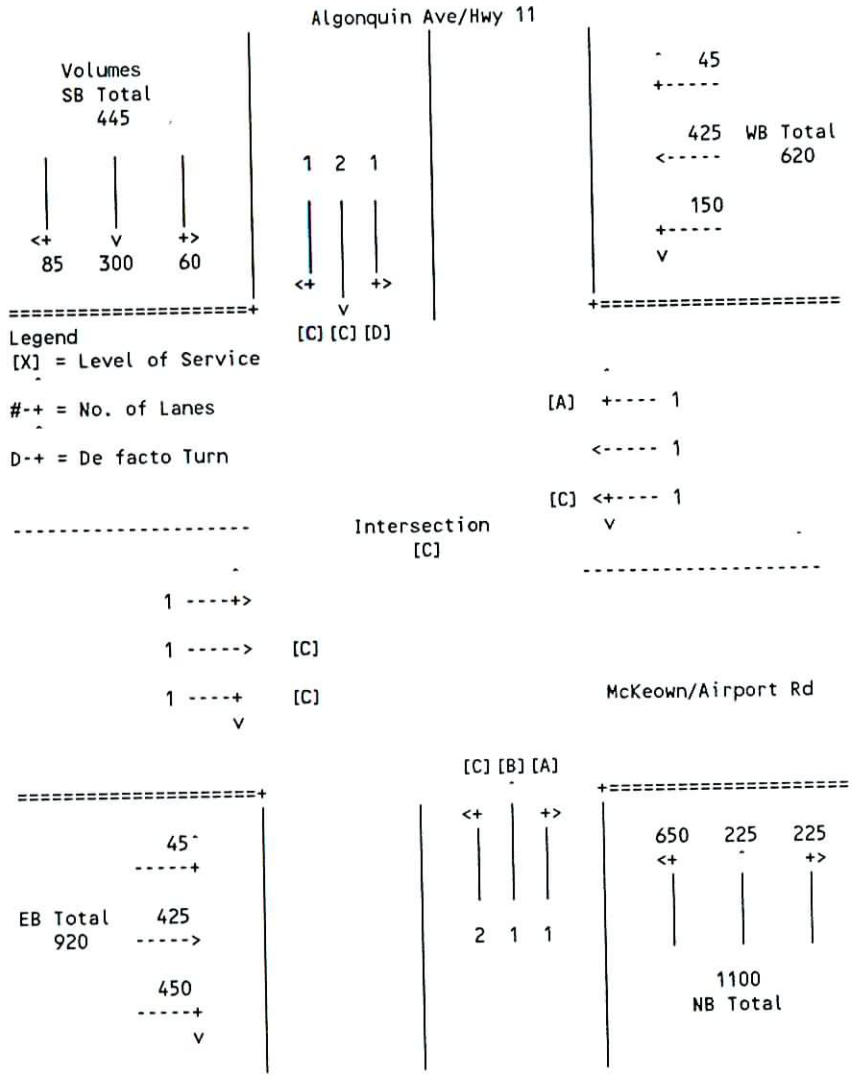
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	757	2602	0.724	0.291	25.0	C	22.3	C
	R	687	1574	0.728	0.436	19.3	C		
WB	LT	945	2535	0.710	0.373	20.8	C	19.3	C
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	1094	3539	0.680	0.309	22.7	C	16.3	C
	T	773	1810	0.323	0.427	13.6	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	209	1770	0.320	0.118	29.0	D	23.7	C
	T	855	3619	0.409	0.236	23.1	C		
	R	372	1574	0.253	0.236	22.1	C		

Intersection Delay = 19.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.623

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M3FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development with NB double left and extra lanes EB and WB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	50	500	600	175	500	50	800	260	250	80	350	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	10.0A	24.0A			Green	16.0A	14.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

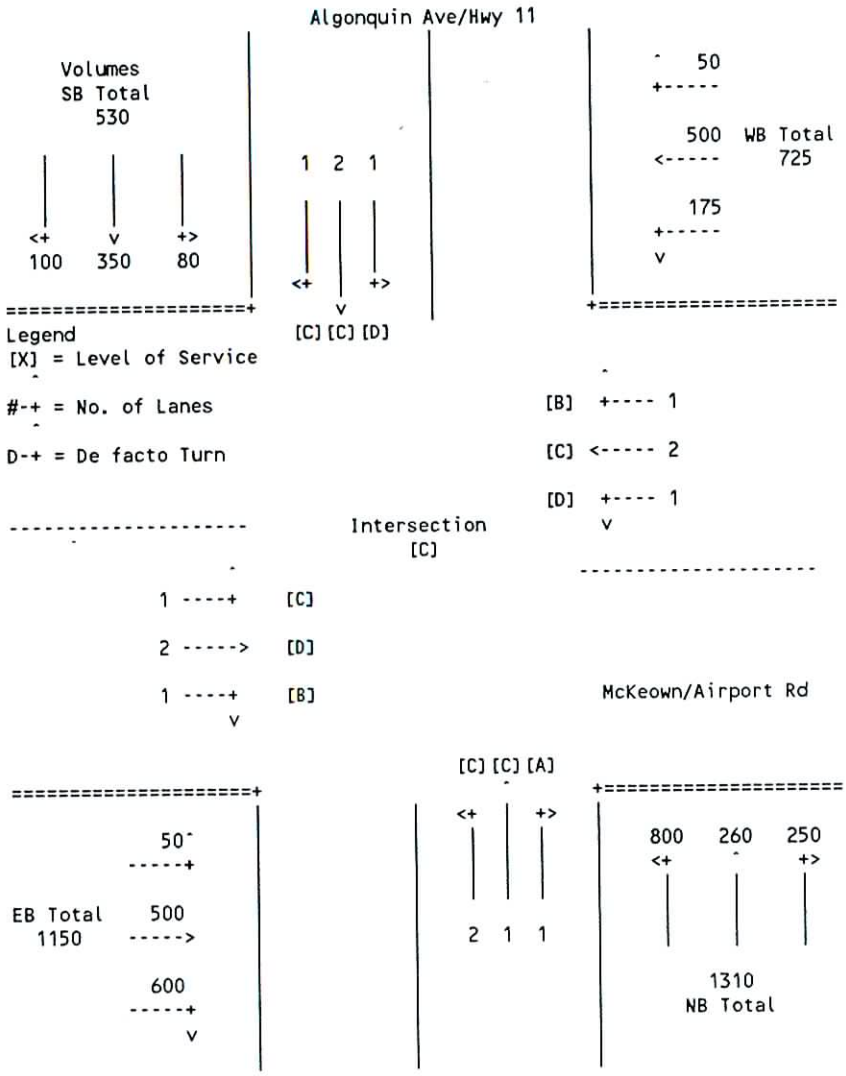
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	126	532	0.445	0.236	24.8	C	18.9	C
	T	880	3725	0.663	0.236	25.9	D		
	R	930	1574	0.717	0.591	12.2	B		
WB	L	245	1770	0.792	0.364	28.2	D	19.1	C
	T	1355	3725	0.431	0.364	17.2	C		
	R	859	1574	0.065	0.545	7.6	B		
NB	L	1158	3539	0.791	0.327	24.4	C	18.1	C
	T	724	1810	0.399	0.400	15.4	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	274	1770	0.325	0.155	27.0	D	24.5	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.310	0.227	23.0	C		

Intersection Delay = 19.4 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.693

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 03-22-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XP.HC9
Area Type: Other 3-16-99 PM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	35	350	375	165	250	35	400	215	225	80	315	50
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

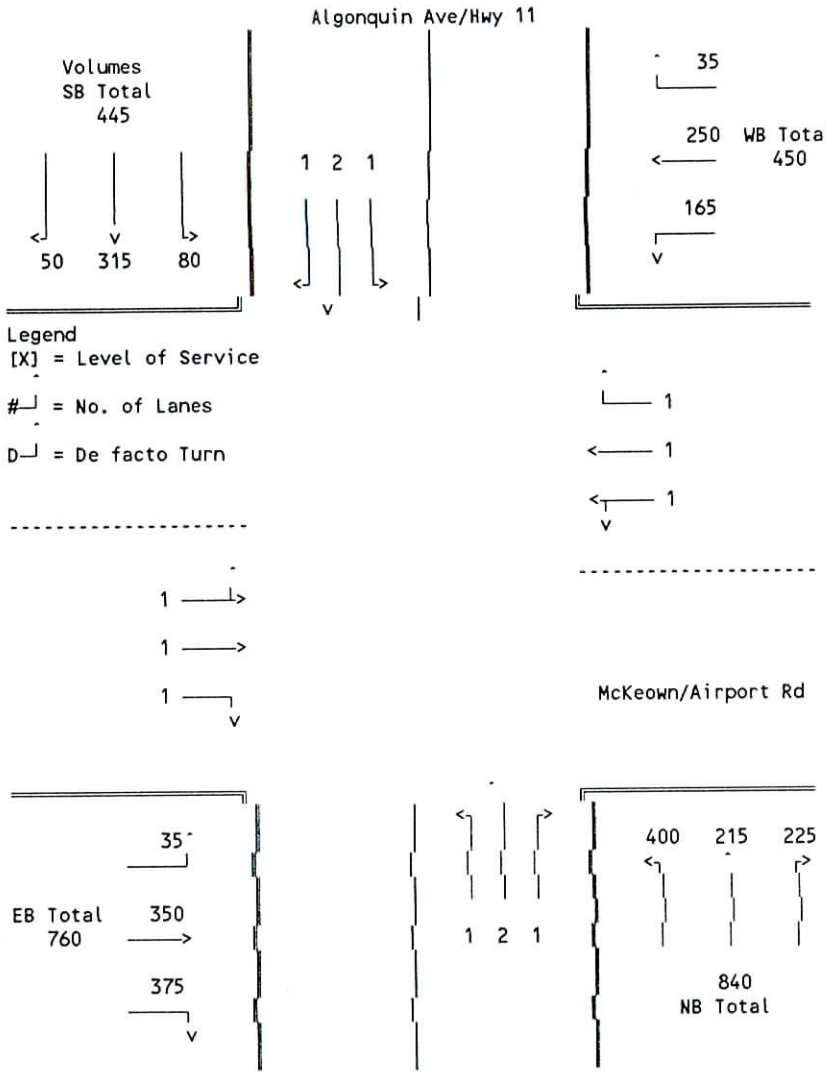
Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	5.0A	22.0A			Green	10.0A	18.0A	20.0P	
Yellow/AR	5.0	5.0			Yellow/AR	3.0	6.0	6.0	

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6 #7

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M304P.HC9
Area Type: Other 3-16-99 PM
Comment: 2004 - existing roads as is

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	10.0A	31.0A			Green	10.0A	26.0A	10.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

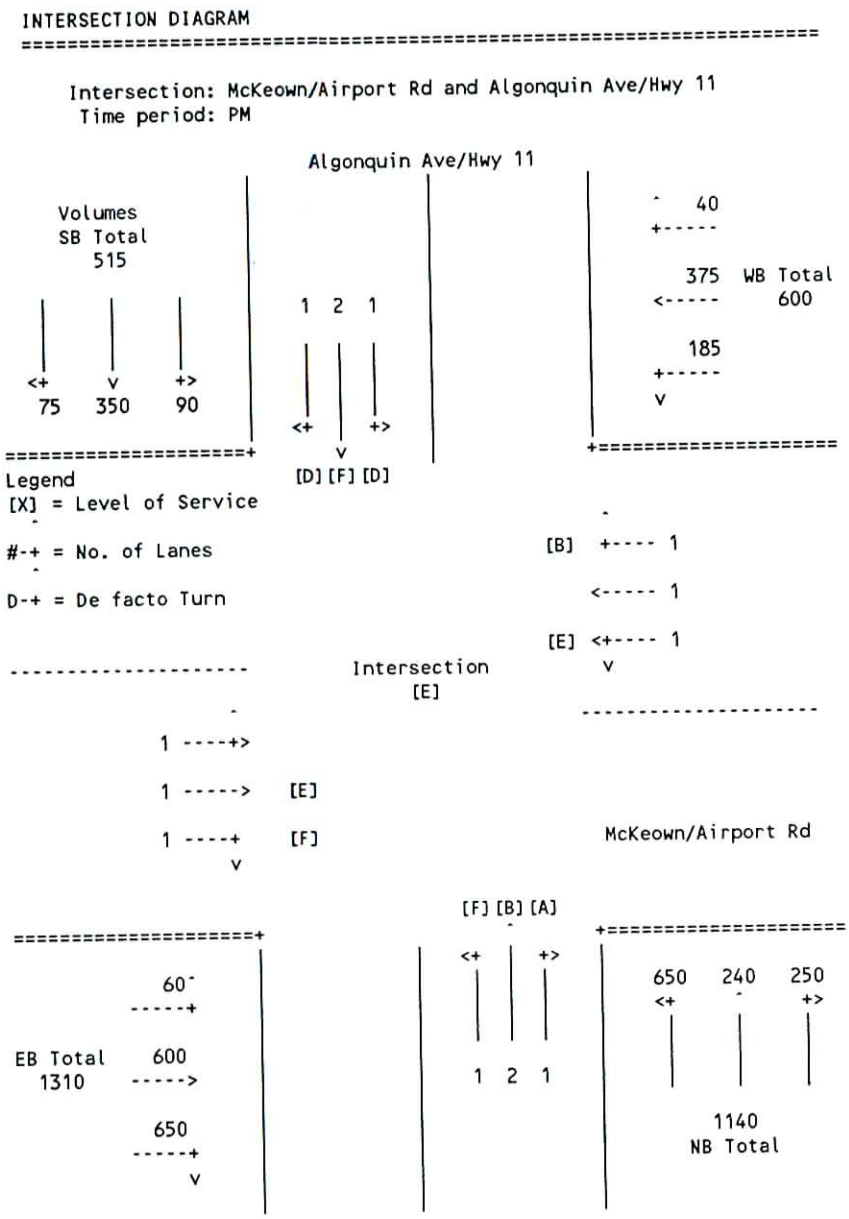
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	779	2598	0.989	0.300	47.1	E	58.2	E
	R	673	1574	1.074	0.427	70.1	F		
WB	LT	637	1492	1.026	0.427	54.7	E	51.7	E
	R	873	1574	0.050	0.555	7.3	B		
NB	L	676	1770	1.068	0.382	69.6	F	42.4	E
	T	1415	3619	0.198	0.391	14.3	B		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	177	1770	0.565	0.100	33.6	D	62.7	F
	T	395	3619	1.033	0.109	76.1	F		
	R	172	1574	0.483	0.109	31.5	D		

Intersection Delay = 52.8 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 1.044

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304P11.HC9

Area Type: Other 3-16-99 PM

Comment: 2004-Algonquin NB changed to double left turn (no other change)

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	6.0A	40.0A			Green	12.0A	10.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

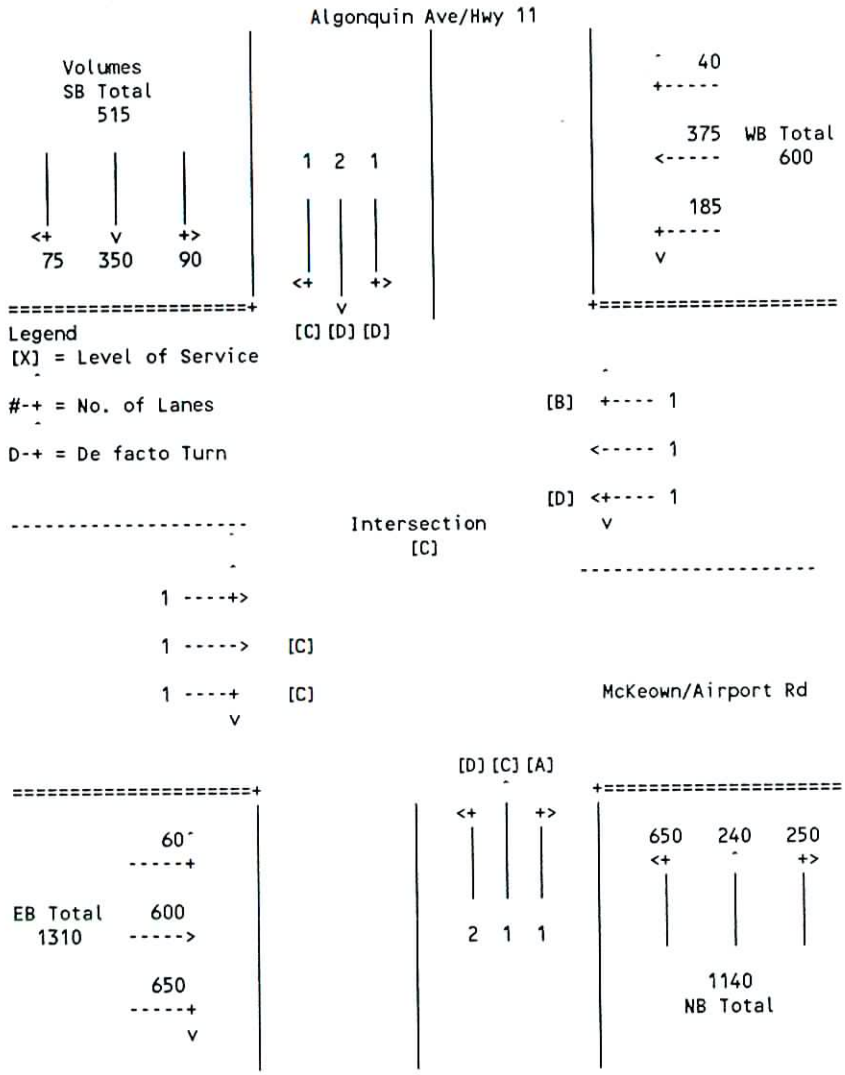
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	994	2603	0.776	0.382	22.0	C	21.9	C
	R	830	1574	0.870	0.527	21.7	C		
WB	LT	705	1492	0.927	0.473	30.9	D	29.3	D
	R	973	1574	0.045	0.618	5.3	B		
NB	L	901	3539	0.826	0.255	29.5	D	21.0	C
	T	592	1810	0.451	0.327	19.2	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	209	1770	0.478	0.118	30.6	D	27.4	D
	T	691	3619	0.591	0.191	27.2	D		
	R	300	1574	0.276	0.191	24.7	C		

Intersection Delay = 23.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.829

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304PI2.HC9

Area Type: Other 3-16-99 PM

Comment: 2004-Algonquin NB double LT + McKeown/Airport widening

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	11.0A	26.0A			Green	18.0A	9.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

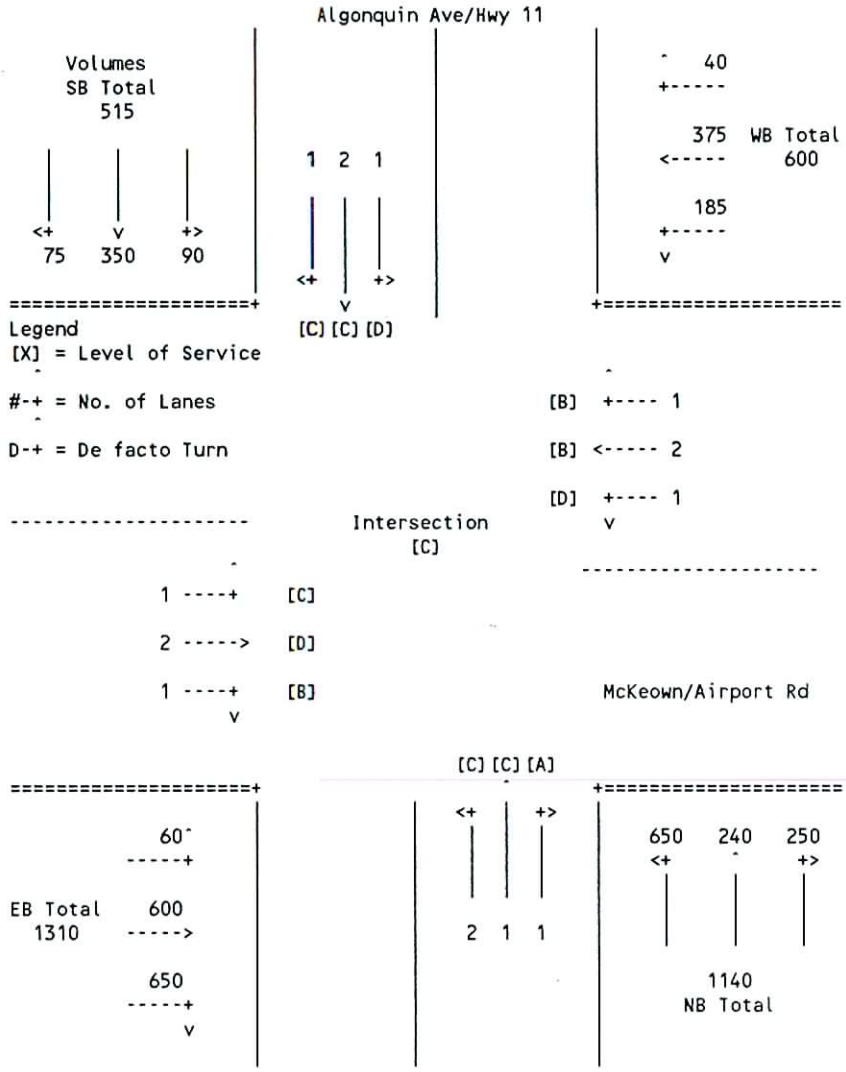
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	180	709	0.371	0.255	22.4	C	20.6	C
	T	948	3725	0.738	0.255	26.5	D		
	R	916	1574	0.788	0.582	14.7	B		
WB	L	261	1770	0.789	0.391	26.7	D	17.9	C
	T	1456	3725	0.301	0.391	15.0	B		
	R	930	1574	0.047	0.591	6.1	B		
NB	L	1062	3539	0.701	0.300	23.5	C	17.2	C
	T	642	1810	0.416	0.355	17.6	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	306	1770	0.327	0.173	26.0	D	24.3	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.232	0.227	22.5	C		

Intersection Delay = 19.6 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.741

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3FDPI.HC9
Area Type: Other 3-16-99 PM
Comment: Full development - McKeown/Airport widened, Algonquin NB 2LT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	75	750	800	225	500	50	850	300	300	100	400	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	13.0A	28.0A			Green	18.0A	9.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

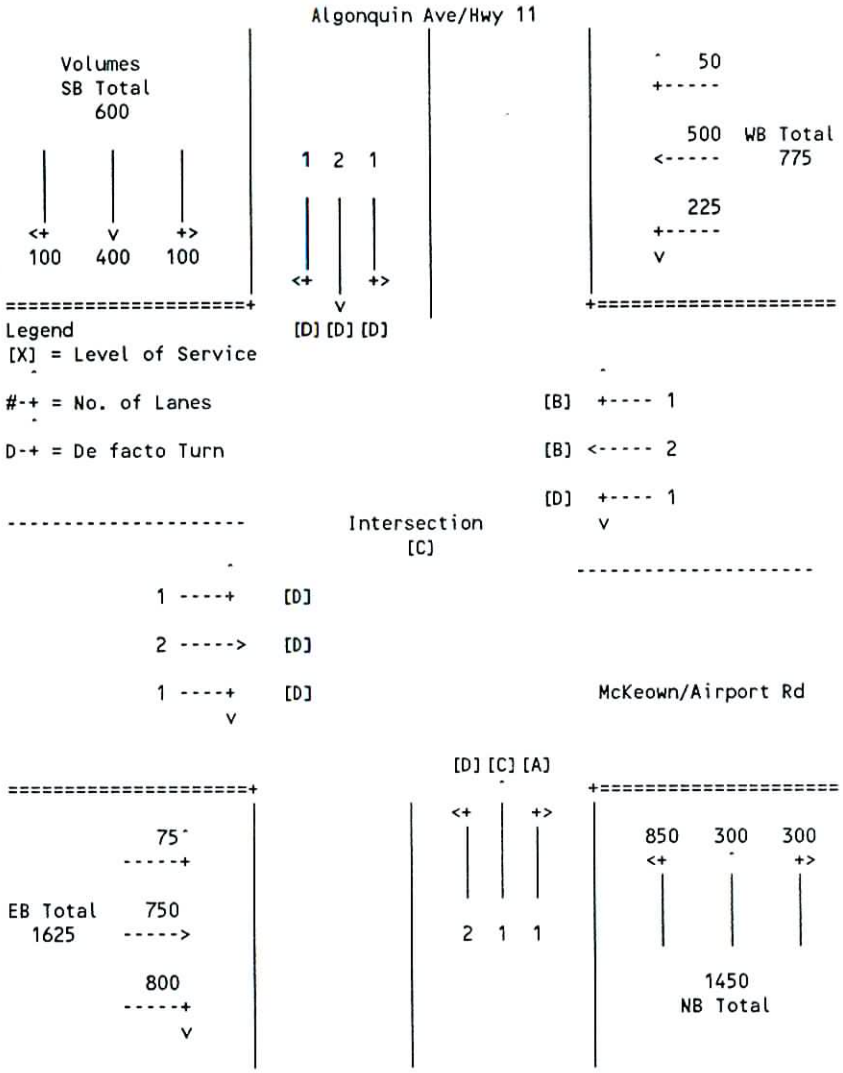
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	145	532	0.572	0.273	26.1	D	27.6	D
	T	1016	3725	0.861	0.273	30.0	D		
	R	944	1574	0.941	0.600	25.4	D		
WB	L	293	1770	0.853	0.427	31.9	D	18.4	C
	T	1592	3725	0.367	0.427	13.9	B		
	R	987	1574	0.057	0.627	5.1	B		
NB	L	1062	3539	0.916	0.300	32.7	D	23.8	C
	T	576	1810	0.578	0.318	21.3	C		
	R	1531	1574	0.217	0.973	0.0	A		
SB	L	306	1770	0.363	0.173	26.3	D	27.7	D
	T	691	3619	0.674	0.191	28.5	D		
	R	300	1574	0.369	0.191	25.4	D		

Intersection Delay = 24.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.894

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4XA.HC9

Area Type: Other 3-16-99 AM

Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	281	28	35	420	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

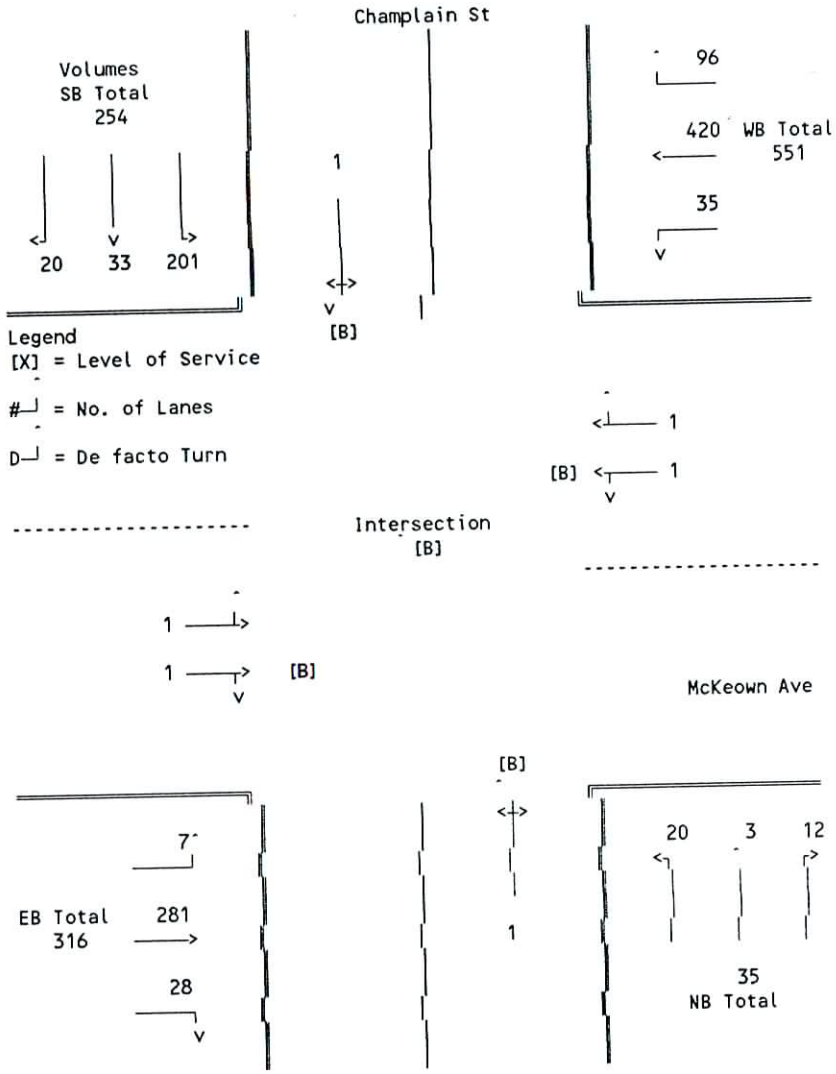
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1399	3279	0.259	0.427	9.0	B	9.0	B
WB	LTR	1971	3519	0.323	0.560	5.8	B	5.8	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 8.4 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.418

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M404A.HC9
Area Type: Other 3-16-99 AM
Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	550	28	35	800	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		*			NB Left *			
Thru		*			Thru *			
Right		*			Right *			
Peds		*			Peds *			
WB Left	*	*			SB Left *			
Thru	*	*			Thru *			
Right	*	*			Right *			
Peds		*			Peds *			
NB Right					EB Right			
SB Right					WB Right			
Green	5.0A	30.0A			Green 25.0A			
Yellow/AR	5.0	5.0			Yellow/AR 5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

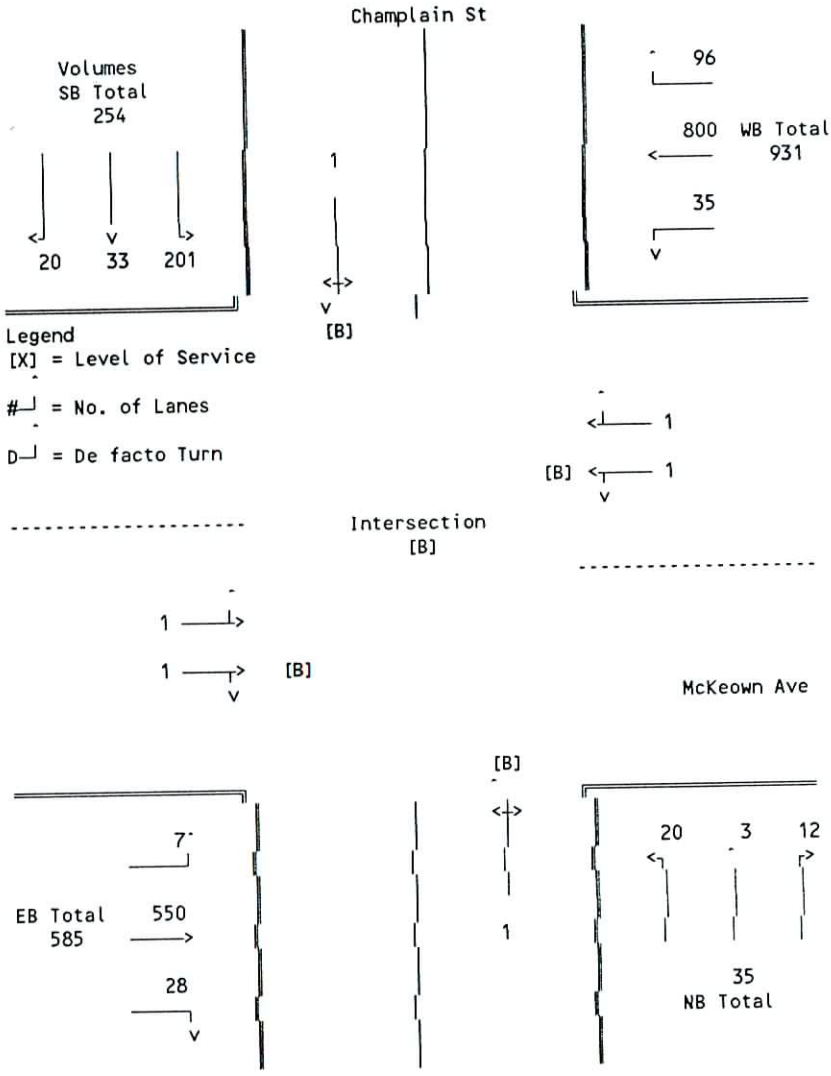
	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1380	3234	0.490	0.427	10.3	B	10.3	B
WB	LTR	1987	3548	0.544	0.560	7.0	B	7.0	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 9.0 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.552

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M4FDA.HC9
Area Type: Other Full development 3-16-99 AM
Comment: ~~2004~~ with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	750	28	35	1000	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		*			NB Left *			
Thru		*			Thru *			
Right		*			Right *			
Peds		*			Peds *			
WB Left	*	*			SB Left *			
Thru	*	*			Thru *			
Right	*	*			Right *			
Peds		*			Peds *			
NB Right					EB Right			
SB Right					WB Right			
Green	5.0A	30.0A			Green 25.0A			
Yellow/AR	5.0	5.0			Yellow/AR 5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

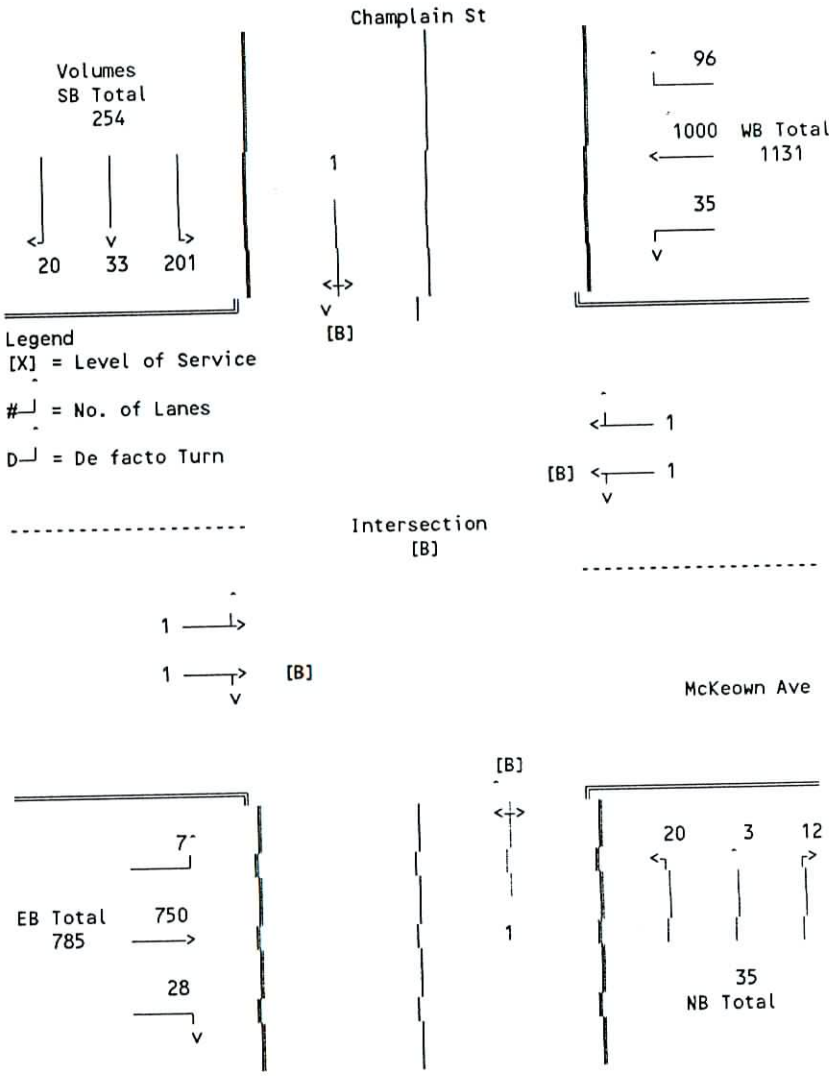
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1386	3248	0.656	0.427	11.9	B	11.9	B
WB	LTR	1973	3524	0.666	0.560	8.1	B	8.1	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 10.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.626

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M404P.HC9
Area Type: Other 3-16-99 PM
Comment: 2004 no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	963	82	80	712	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		*			NB Left *			
Thru		*			Thru *			
Right		*			Right *			
Peds		*			Peds *			
WB Left	*	*			SB Left *			
Thru	*	*			Thru *			
Right	*	*			Right *			
Peds		*			Peds *			
NB Right					EB Right			
SB Right					WB Right			
Green	5.0A	30.0A			Green 25.0A			
Yellow/AR	5.0	5.0			Yellow/AR 5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

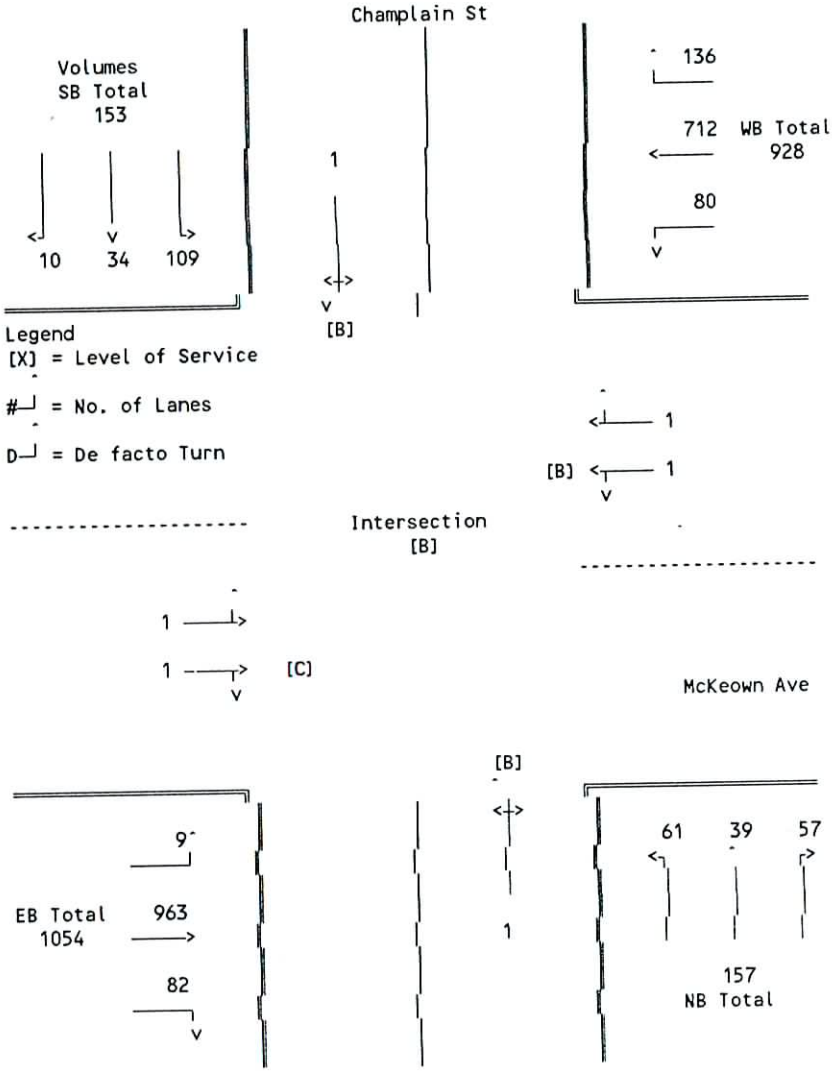
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1391	3260	0.879	0.427	17.6	C	17.6	C
WB	LTR	1589	2838	0.677	0.560	8.4	B	8.4	B
NB	LTR	434	1205	0.376	0.360	11.7	B	11.7	B
SB	LTR	385	1069	0.437	0.360	12.3	B	12.3	B

Intersection Delay = 13.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.583

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M4FDP.HC9
Area Type: Other 3-16-99 PM
Comment: Full Development - existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru	*				Thru	*		
Right	*				Right	*		
Peds	*				Peds	*		
WB Left	*				SB Left	*		
Thru	*				Thru	*		
Right	*				Right	*		
Peds	*				Peds	*		
NB Right					EB Right			
SB Right					WB Right			
Green	69.0A				Green	13.0A		
Yellow/AR	5.0				Yellow/AR	5.0		

Cycle Length: 92 secs Phase combination order: #1 #5

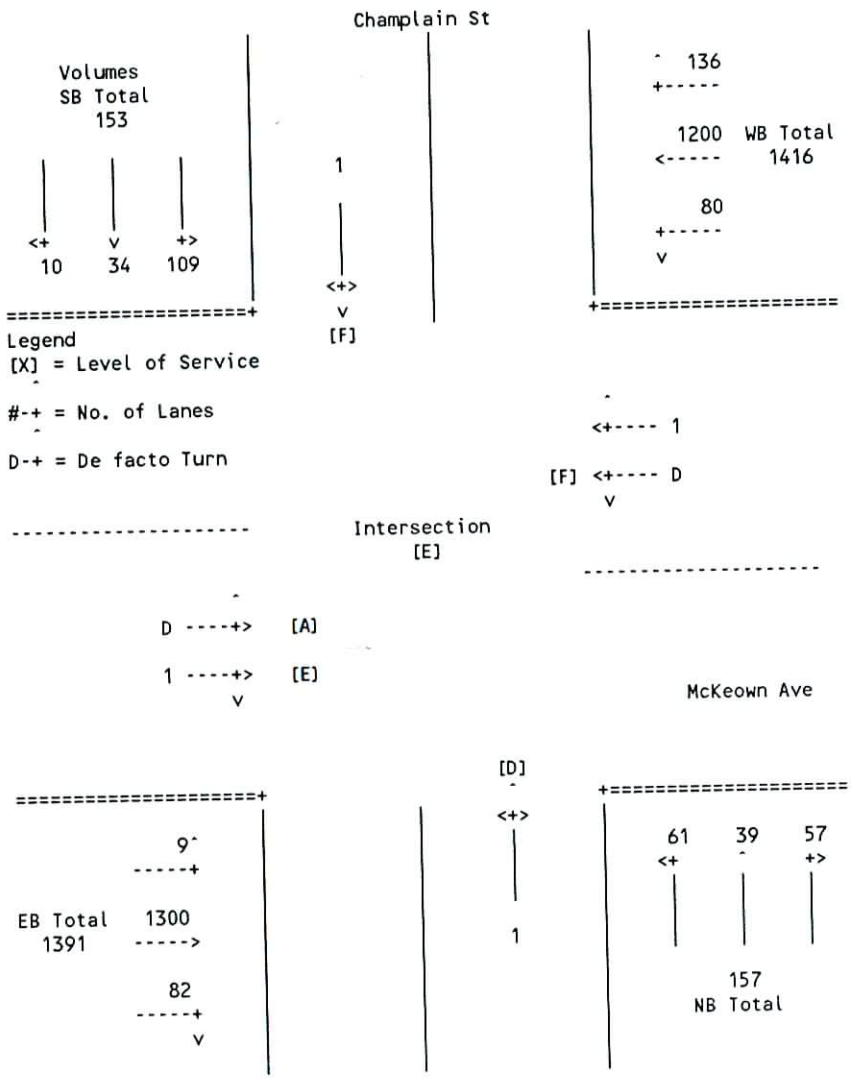
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	DfL	81	105	0.123	0.772	1.7	A	54.8	E
	TR	1401	1816	1.091	0.772	55.2	E		
WB	DfL	81	105	1.098	0.772	126.6	F	48.4	E
	TR	1391	1803	1.062	0.772	43.7	E		
NB	LTR	213	1309	0.764	0.163	33.9	D	33.9	D
SB	LTR	155	952	1.082	0.163	111.3	F	111.3	F

Intersection Delay = 53.7 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 1.096

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M4FDPI.HC9
Area Type: Other 3-16-99 PM
Comment: Full Development - LT lanes on McKeown

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	<		> 1	<		> 1	<
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*				NB Left	*		
Thru	*				Thru	*		
Right	*				Right	*		
Peds	*				Peds	*		
WB Left	*				SB Left	*		
Thru	*				Thru	*		
Right	*				Right	*		
Peds	*				Peds	*		
NB Right					EB Right			
SB Right					WB Right			
Green	45.0A				Green	25.0A		
Yellow/AR	5.0				Yellow/AR	5.0		

Cycle Length: 80 secs Phase combination order: #1 #5

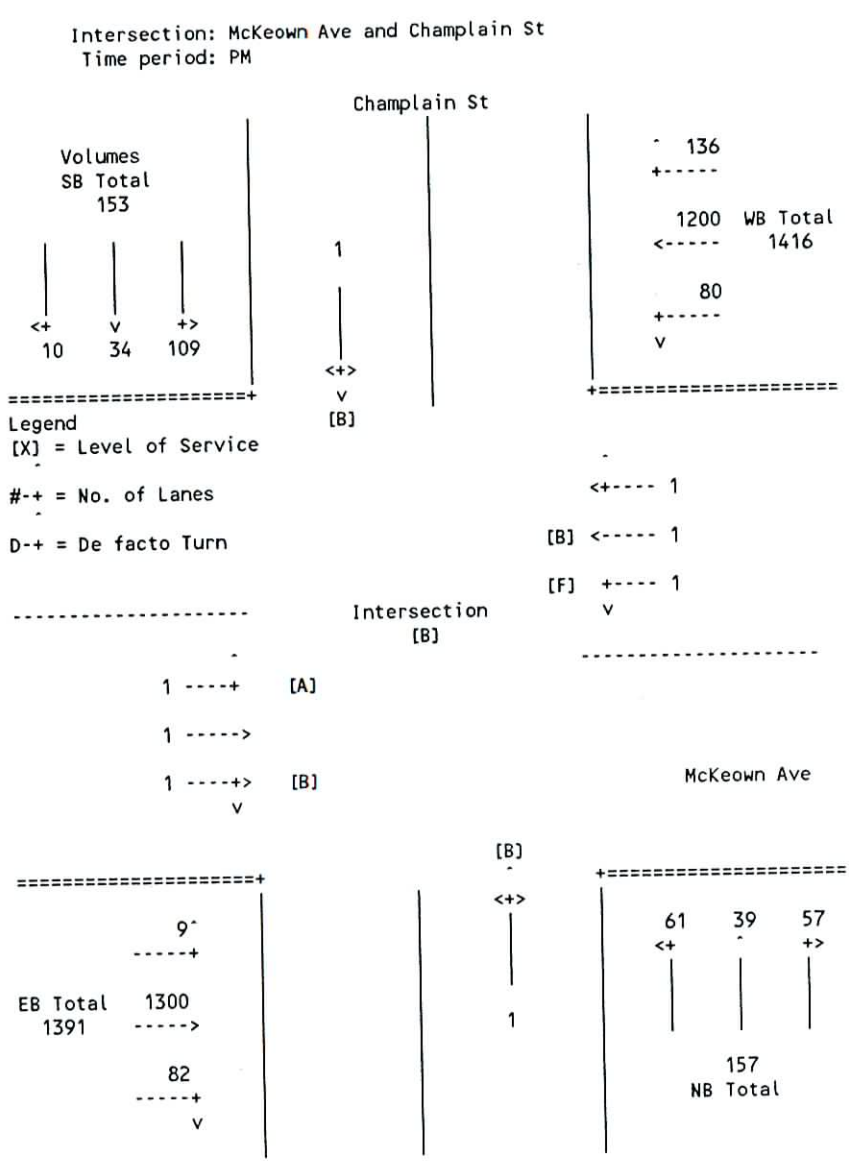
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	93	159	0.107	0.587	4.7	A	8.8	B
	TR	2151	3662	0.746	0.587	8.9	B		
WB	L	93	159	0.953	0.587	66.4	F	11.7	B
	TR	2136	3636	0.727	0.587	8.6	B		
NB	LTR	429	1271	0.380	0.338	13.3	B	13.3	B
SB	LTR	377	1116	0.446	0.338	13.9	B	13.9	B

Intersection Delay = 10.6 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.768

INTERSECTION DIAGRAM



Streets: (N-S) Highway 11 (E-W) Cedar Heights Rd
Major Street Direction.... NS Length of Time Analyzed... 60 (min)
Analyst..... TR Date of Analysis..... 3/17/99
Other Information..... 1999 PM (estimated from 1994 and 1997 counts)
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 2	< 0	0	> 2	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	20	260	20	1	420	30	30	10	30	15	5	1
PHF	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	156	250
Potential Capacity: (pcph)	1154	1034
Movement Capacity: (pcph)	1154	1034
Prob. of Queue-Free State:	1.00	0.97
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	311	500
Potential Capacity: (pcph)	1167	924
Movement Capacity: (pcph)	1167	924
Prob. of Queue-Free State:	1.00	0.97
TH Saturation Flow Rate: (pcphpl)	3400	3400
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.97
Step 3: TH from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	823	818
Potential Capacity: (pcph)	360	362
Capacity Adjustment Factor due to Impeding Movements	0.97	0.97
Movement Capacity: (pcph)	349	351
Prob. of Queue-Free State:	0.98	0.97
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	796	798
Potential Capacity: (pcph)	328	327
Major LT, Minor TH Impedance Factor:	0.94	0.95
Adjusted Impedance Factor:	0.95	0.96
Capacity Adjustment Factor due to Impeding Movements	0.92	0.96
Movement Capacity: (pcph)	301	314

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	36	314	>					
EB	T	12	351	>	457	9.6	0.7	B	9.6
EB	R	36	1034	>					
WB	L	19	301	>					
WB	T	7	349	>	321	12.2	0.2	C	12.2
WB	R	1	1154	>					
NB	L	24	924			4.0	0.0	A	0.3
SB	L	1	1167			3.1	0.0	A	0.0

Intersection Delay = 1.2 sec/veh

APPENDIX 5

PROPERTY REQUIREMENTS

McKeown Avenue Class Environmental Assessment
Alternative B - Property Requirements

City of North Bay (Fire Station No. 2)
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

Canadian Tire Corporation Ltd.
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

J.S. Redpath Holdings Inc. / J.S. Redpath Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Board of Governors of Canadore College
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Management Board Secretariat, Director of Subsidies Branch
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
Alternative B may require a wedge for day lighting.

McKeown Avenue Class Environmental Assessment
Alternative C - Property Requirements

1003130 Ontario Inc. / 881359 Ont. Inc. (Loeb)
a wedge tapering from 3.0 m (approximate) at the east side of the west entrance to Tim Horton's opposite Josephine Street along the McKeown Avenue frontage of the property to provide for a right turn taper into the property. A wedge tapering from 1.0 m to accommodate a return taper on the opposite side of the entrance is also needed with additional width for day lighting at both sides of the entrance.

The existing east entrance to Tim Horton's would be closed with the Alternative 'C' under consideration.

McDonald's Restaurant
A small triangle having a maximum width of approximately 1.2 m tapering from the east side of the existing entrance toward Algonquin Avenue.

Metz Furniture (Leon's)
A 1.0 m to 4.5 m strip tapering from the west edge of the property along the McKeown Avenue toward Algonquin Avenue.

Willis Enterprises Ltd.
A 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Josephine Street intersection.

Ontario Hydro
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the south-west corner of Josephine Street intersection and at the north-west corner of the Champlain Street intersection.

City of North Bay (Fire Station No. 2)
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

Canadian Tire Corporation Ltd.
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

James W. Neil Investments Ltd.
a short wedge from the north west corner of the property, described as the Remainder of Instrument No. 52566 (Techi Data Training) now Instrument No. 91879

J.S. Redpath Holdings Inc./J.S. Redpath Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Management Board Secretariat, Director of Subsidies Branch
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Board of Governors Canadore College
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
additional right-of-way width for day lighting at the Champlain Street intersection.

APPENDIX 6

COST ESTIMATES

COST ESTIMATE SUMMARY
McKeown Avenue

ALTERNATIVES	COST
'A'	$1,060,000.00 *
'B'	$2,780,000.00 *
'C'	$3,400,000.00 *

* Cost does not include improvements to existing storm sewer, sanitary sewer, watermains, utilities and improvements to the Algonquin Avenue/McKeown Avenue intersection.

COST ESTIMATES - ALTERNATIVE 'A'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	10,100	5.50	$55,550.00
2	Hot Mix H.L. 4	t	3,810	55.00	209,550.00
3	Hot Mix Miscellaneous	sq.m	4,005	10.00	40,050.00
4	Granular 'A'	t	5,655	8.50	48,068.00
5	Granular 'B'	t	13,393	5.50	73,662.00
6	Concrete Curb and Gutters	m	1,820	40.00	72,800.00
7	Concrete Sidewalks	sq.m	3,040	38.00	115,520.00
8	150 Diameter Subdrains	m	1,808	16.00	28,928.00
9	Removal of Pavement (Full Depth)	sq.m	9,145	4.50	41,153.00
10	Removal of Pavement (Partial Depth)	t	440	15.00	6,600.00
11	Removal of Concrete Curb and Gutters	m	1,820	10.00	18,200.00
12	Adjusting M.H. and C.B.	Each	39	250.00	9,750.00
13	Light Posts	Each	12	3,000.00	36,000.00
SUB-TOTAL					$755,831.00
14	Contingencies and Engineering (±40%)				$304,169.00
TOTAL					$1,060,000.00

COST ESTIMATES - ALTERNATIVE 'B'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	20,370	5.50	112,035.00
2	Hot Mix H.L. 4	t	7,422	55.00	408,210.00
3	Hot Mix Miscellaneous	sq.m	8,123	10.00	81,230.00
4	Granular `A`	t	10,905	8.50	92,693.00
5	Granular 'B', Type 1	t	28,422	5.50	156,321.00
6	Concrete Curb and Gutters	m	4,012	40.00	160,480.00
7	Concrete Sidewalks	sq.m	3,670	38.00	139,460.00
8	150 Diameter Pipe Subdrains	m	3,110	16.00	49,760.00
9	300 Diameter Storm Sewers	m	355	110.00	39,050.00
10	1200 Diameter M.H.	Each	3	2,000.00	6,000.00
11	1500 Diameter M.H.	Each	3	2,800.00	8,400.00
12	600 x 600 C.B.	Each	43	1,100.00	47,300.00
13	600 x 1450 D.C.B.	Each	17	2,000.00	34,000.00
14	Adjusting M.H. and C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	12,346	4.50	55,557.00
16	Removal of pavement (Partial Depth)	t	557	15.00	8,355.00
17	Removal of Concrete Curb and Gutters	m	3,168	10.00	31,680.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Posts	Each	33	3,000.00	99,000.00
22	Property	Ha	0.24	330,000	79,200.00
SUB-TOTAL					$1,988,048.00
23	Contingencies and Engineering (±40%)				791,952.00
TOTAL					$2,780,000.00

COST ESTIMATES - ALTERNATIVE 'C'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	27,336	5.50	$150,348.00
2	Hot Mix H.L. 4	t	9,487	55.00	521,785.00
3	Hot Mix Miscellaneous	sq.m	7,420	10.00	74,200.00
4	Granular 'A'	t	13,630	8.50	115,855.00
5	Granular 'B' Type 1	t	37,042	5.50	203,731.00
6	Concrete Curb and Gutters	m	6,132	40.00	245,280.00
7	Concrete Sidewalks	sq.m	3,657	38.00	138,966.00
8	150 Diameter Pipe Subdrains	m	4,608	16.00	73,728.00
9	300 Diameter Storm Sewer	m	395	110.00	43,450.00
10	1200 Diameter Manholes	Each	3	2,000.00	6,000.00
11	1500 Diameter Manholes	Each	3	2,800.00	8,400.00
12	600 x 600 Catchbasins	Each	43	1,100.00	47,300.00
13	600 x 1450 Catchbasins	Each	17	2,000.00	34,000.00
14	Adjusting M.H., C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	13,158	4.50	59,211.00
16	Removal of Pavement (Partial Depth)	t	566	15.00	8,490.00
17	Removal of Curb and Gutters	m	4,027	10.00	40,270.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Post	Each	33	3,000.00	99,000.00
22	Property	Ha	0.55	330,000.00	181,500.00
SUB-TOTAL					$2,430,831.00
23	Contingencies and Engineering (±40%)				969,169.00
TOTAL					$3,400,000.00

APPENDIX 1-2

2002 Environmental Study Report Update

The Corporation of the City of North Bay

CLASS ENVIRONMENTAL STUDY REPORT MCKEOWN AVENUE

From Gormanville to Algonquin Avenue updated to include the traffic associated with the Approved Location for the New North Bay Regional Health Centre

Prepared for the City of North Bay

NORTH BAY
ONTARIO · CANADA
Just North Enough to be PERFECT

Addendum - March, 2002

northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

CLASS ENVIRONMENTAL STUDY REPORT

MCKEOWN AVENUE

from Gormanville Road to Algonquin Avenue

NB-98-4351

Revised March 2002

NORTHLAND ENGINEERING (1987) LIMITED
Consulting Engineers & Planners
1850 Bond Street
NORTH BAY, ON, P1B 8G5

Alternative C - Widen McKeown Avenue to 5 lanes from Algonquin Avenue to Gormanville Road

The results of the detailed evaluation of the design alternatives are summarized below:

FACTOR	ALTERNATIVE A Reconstruct Existing 2 Lanes / 4 Lanes	ALTERNATIVE B 4 Traffic Lanes	ALTERNATIVE C 5 Traffic Lanes
Transportation	○	○	●
Safety	○	○	●
Land Use	○	○	●
Socio-Economic Environment	○	○	○
Natural Environment	○	○	●
Cost	●	○	○
Public Preference	○	○	●
Overall Evaluation	Least Preferred ○	○	Most Preferred ●

The technical assessment of the alternatives indicated that Alternative C - Widen McKeown Avenue to Five Lanes was the preferred option and it is the Study Team's Recommended Alternative. The main benefits of a five lane cross-section are the increased transportation capacity and a good operating level of service in support of existing and future development in the study area while providing an improved level of safety. The disadvantages to the environment (e.g. storm sewer outlet construction involving Pinewood Parkway Creek and property requirements) were minor and could be mitigated or were typical of projects of this nature (e.g. construction costs).

The construction cost difference to provide a fifth centre lane for left turns (Alternative C) over a four lane cross-section is approximately $620,000.00. The total construction costs for the recommended Alternative C are $3,400,000.00 not including improvements to existing storm sewers, sanitary sewers, watermain and utilities.

Public participation included regular contact with over 30 City of North Bay department representatives, agency and interest group contacts. All property owners and tenants adjacent to McKeown Avenue were contacted by flyer or by direct correspondence throughout the study. Two Public Information Centres were held which resulted in a combined estimated attendance of 45 individuals.

Overall, public comments received indicated an understanding of the need for road improvements to McKeown Avenue.

This study process will conclude with the placement of the Environmental Study Report on the public record for a minimum 30 day public review period. Notice of Study Completion will be given upon Council acceptance of the study recommendations.

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CHAPTER 1 - INTRODUCTION AND BACKGROUND

1.1 THE ENVIRONMENTAL STUDY REPORT

The Class Environmental Assessment (Class EA) for Municipal Roads Projects (June 1993) is the approved planning procedure designed to ensure that social, economic, and natural environmental effects are considered in the planning of municipal roads projects. Provided that the conditions of the Class EA are met, projects require no further approvals under the Environmental Assessment Act unless the municipality considers the project to have sufficient environmental impact to warrant an individual environmental assessment or unless the Ministry of Environment orders a project to be "*bumped-up*"to follow an individual EA process. The Class EA planning process emphasizes project assessment and public involvement.

The types of projects subject to the Class EA are categorized according to "*Schedules*" as follows:

Schedule A are projects that are limited in scale and have minimal environmental impact. Regular road maintenance and operational improvements fall within this category (eg. resurfacing, signalization).

Schedule B are projects that have the potential for moderate environmental impact (eg. minor road construction). These projects are subject to screening process which requires public contact and discussions with affected agencies.

Schedule C are projects that have the potential for significant environmental impacts (eg. road widening additional lanes). These projects must follow the entire planning process set out in the Class EA which is documented in an Environmental Study Report.

An environmental assessment process, following the requirements for a Schedule "C" project, was conducted to evaluate alternative solutions to problems of the future road requirements for McKeown Avenue in the City of North Bay. The environmental assessment determined that the following improvements were the preferred solutions to the identified inadequacies:

ALTERNATIVE C

- Reconstruct McKeown Avenue to a five lane cross section. There will be 2 through lanes in each direction with a continuous centre fifth lane for left turns from Gormanville Road to Algonquin Avenue. New traffic signals are anticipated at Josephine Street and Gormanville Road. In the future signals may also be required at McNamara Street. The project also includes the reconstruction of the Gormanville intersection with additional turning lanes and channelization.

- This project also recommends improvements to Algonquin Avenue including: two left turn lanes for northbound Algonquin traffic to westbound McKeown Avenue, two northbound through lanes, and other intersection improvements such as turning lanes on the side streets.

These intersection improvements at Algonquin Avenue are considered "*minor*" (Group C) under the Provincial Highways Class Environmental Assessment (1992). As such, inclusion of the work under the higher category documentation of the Municipal Class EA fulfills Environmental Assessment Act obligations without duplication of process.

The improvements described above, and which are explained in detail in Chapters 4 and 5, constitute the undertaking for this Class EA.

In accordance with the requirements of the Class EA, this Environmental Study Report (ESR) was prepared to document the full Class EA planning process that led to the selection of the preferred solution. The ESR includes a discussion of the problem, the project approach and the existing environmental conditions in the study area. It further describes the alternative solutions and designs considered as well as the evaluation method that was followed to select the preferred alternative.

When completed, the ESR is placed on the public record by filing a copy with the City Clerk who makes it available to public review for a minimum 30 calendar day period. If no unresolved concerns or "*bump-up*" requests are received during the review period, the municipality may complete the planning process, prepare contract documents, issue tenders and proceed to construction.

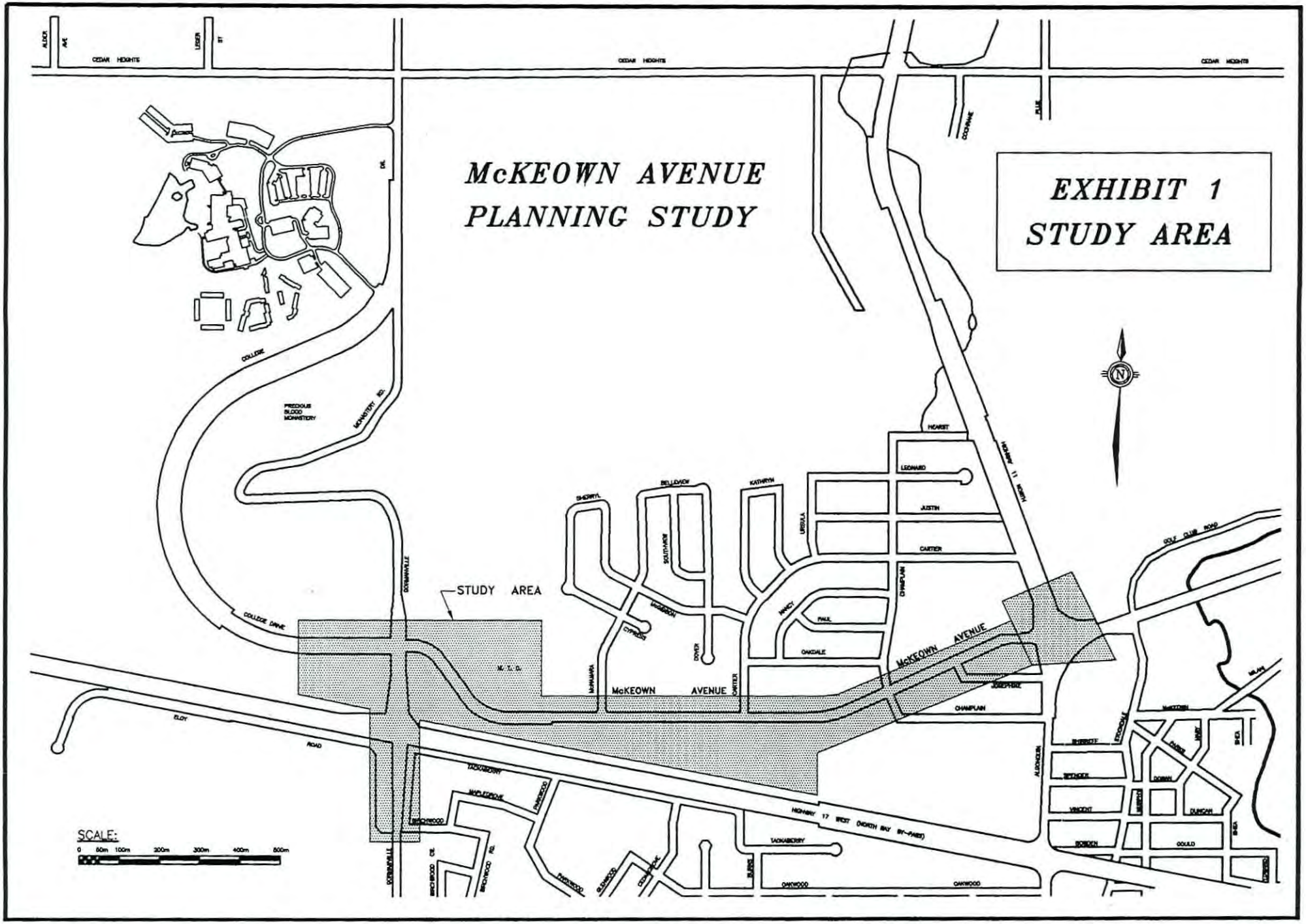
During the minimum 30 day review period any person or party may request that the Minster of Environment "*bump-up*" this project to an individual environmental assessment. "*Bump-up*" requests must be filed within the specified review period after the proponent has placed the ESR on the Public Record and has given a Notice of Completion of the ESR. The procedure for filing a "*bump-up*" is set out in the Notice of Completion at the front of this ESR.

1.2 STUDY AREA

The primary study area for this class environmental assessment includes McKeown Avenue from Gormanville Road easterly to Algonquin Avenue, lands adjacent to the street and the intersections of streets connecting to McKeown Avenue. The study area also includes surrounding streets, neighbourhoods, commercial areas and institutional lands to the extent that was necessary to describe traffic conditions affecting McKeown Avenue and to inventory the natural, social and economic environment that might reasonably be affected by the undertaking. A key plan identifying the study area boundaries is shown in Exhibit 1.

1.3 BACKGROUND

The road network in the McKeown Avenue and Josephine Street area has undergone important changes in recent years with the realignment of McKeown Avenue to link with Airport Road and the recent extension of Josephine Street to intersect with McKeown Avenue. Since the realignment, significant new commercial development has taken place in both the McKeown Avenue and Algonquin Avenue corridors. This new commercial growth has occurred as development on vacant parcels and as expansions on existing developed properties. The shift of commercial activity to the McKeown Avenue corridor is expected to continue in the future. In addition, with the extension of


McKEOWN AVENUE
PLANNING STUDY
EXHIBIT 1
STUDY AREA
STUDY AREA
McKEOWN AVENUE
McKEOWN AVENUE
CEDAR HEIGHTS
CEDAR HEIGHTS
CEDAR HEIGHTS
COLLEGE
COLLEGE DRIVE
MONASTERY RD.
PRECIOUS BLOOD MONASTERY
STEVENSON
ELOY
ROAD
HEARST
LEONARD
JUSTIN
CARTER
CHAMPLAIN
SHERYL
BELLEVIEW
KATHRYN
SOUTHVIEW
URSULA
NANCY
PAUL
OAKDALE
DOVER
CYPRESS
McNAMARA
JOSEPHINE
GOLF CLUB ROAD
HIGHWAY 11 NORTH
HIGHWAY 17 EAST (NORTH BAY BY-PASS)
TACKABERRY
MAPLEGROVE
PINEWOOD
BIRCHWOOD
BIRCHWOOD CR.
BIRCHWOOD RD.
GLENWOOD
COLONIAL
BURKE
OAKWOOD
OAKWOOD
ALDERSON
BERNICE
VERMONT
DUNCAN
GOULD
SCALE:
0 50m 100m 200m 300m 400m 500m

sewer lines, new growth is expected at the College Education Centre main campus and on adjacent lands in the Cedar Heights area. The former Eloy Farm property, now referred to as the College Education Centre Lowlands Site, has been selected as the location for the new North Bay Hospital. Continued development of the educational and health care institutions should provide sufficient warrants for consideration of further impacts to College Drive, which would be beyond the scope of this study.

These recent and ongoing activities have and will continue to generate additional traffic on McKeown Avenue. In 1993, the Ministry of Transportation completed a reconstruction of Algonquin Avenue to 6 lanes with median barrier and intersection treatments including new traffic signals at Sherreff Avenue and at Airport Road/McKeown Avenue to accommodate increased traffic in the area. The Ministry of Transportation has also recently resurfaced Highway 17 with intersection improvements at Gormanville Road. It is expected that road improvements to McKeown Avenue west of Algonquin will be required in order to keep pace with traffic demands.

Northland Engineering (1987) Limited and Tranplan Associates were retained in 1998 to review the traffic demand on McKeown Avenue from Algonquin Avenue to Champlain Street and to identify recommended road improvements. A report that included a recommended traffic plan and lane configuration to accommodate expected traffic growth over the long term was completed in June 1998. The report and recommendations were available for use in completing this Class EA and are summarized in the following section.

In 1998, the City of North Bay released a Request for Proposals to complete a Traffic Planning and Design Study for McKeown Avenue from Champlain Street to Gormanville Road and to include in the work program a process to satisfy the appropriate environmental assessment requirements for any identified road improvements. Tranplan Associates in association with Northland Engineering (1987) Limited were retained to undertake the study on behalf of the City. Based on the expected size of the overall project, the Class EA was conducted in accordance with the full Schedule C planning and design process.

1.3.1 McKeown Avenue/Josephine Street Traffic Study (June 1998)

Tranplan Associates and Northland Engineering (1987) Limited completed this study to identify required roadway improvements within the McKeown Avenue corridor from Algonquin Avenue/ Highway 11 to Champlain Street. The study was designed to provide traffic solutions in response to current and future commercial development in the corridor. Existing road configurations, traffic volumes, intersection level of service and accident statistics were evaluated for the study area. Future traffic forecasts were developed for a five year and ten year planning horizon with detailed trip generation and trip distribution patterns for two commercial development proposals (Ontario Hydro and Algonquin Mall - Stage 2), as well as background traffic in the study area.

Recommendations from the McKeown Avenue/Josephine Street Traffic Study include the following items:

McKeown Avenue Lane Configuration
That a centre two-way left turn lane be developed along McKeown Avenue from Algonquin Avenue to Champlain Street. This would result in a five lane cross-section along this section of McKeown Avenue. Also, right turn lanes or tapers are recommended at the McDonald's Restaurant entrance, at Josephine Street and at the Wendy's entrance.

Traffic Signals at Josephine Street
That traffic signals be installed on McKeown Avenue at Josephine Street, when the new commercial developments are built.

Consolidation of Commercial Entrances
Coincident with the installation of the traffic signals at Josephine Street, the existing commercial entrances on both sides of the Tim Horton Donuts restaurant are to be consolidated as one entrance opposite Josephine Street.

Intersection of McKeown Avenue and Algonquin Avenue
That planning be initiated with a view to acquiring property, if needed, to widen McKeown Avenue and Airport Road on the approaches to Algonquin Avenue, and that the northbound left turn traffic volume on Algonquin Avenue be monitored with a view to implementing a double left turn using the existing lanes in the short term future and adding a lane in the longer term future.

Sidewalks
That as development and redevelopment takes place, a sidewalk should be installed along the south side of McKeown Avenue and that if a sidewalk is also built along Josephine Street, it should be located on the side adjacent to the major development.

1.3.2 The College Education Centre Traffic Study

Tranplan Associates and Northland Engineering (1987) Limited completed the study for Canadore College and Nipissing University Centre to identify possible improvements to the campus road network. Existing traffic conditions supplemented by a review of accident statistics and vehicle and pedestrian counts were evaluated. The study recommended against a one way access road, but suggested consideration of road closure options as well as campus road traffic calming measures, adding turning lanes and sidewalk extensions. The study generated morning peak arrival and afternoon peak departure volumes for the campus. These figures were utilized in this study to determine lane requirements at the College Drive / Gormanville Road intersection.

1.4 STUDY PURPOSE

The purpose of the study is to determine what improvements will be required to be made to McKeown Avenue between Algonquin Avenue/Highway 11 and Gormanville Road and adjacent sections of College Drive, Gormanville Road, Algonquin Avenue and Airport Road to meet the needs of the expected development within the corridor. It is intended to address the following problems:

- Deteriorating pavement conditions
- Safety concerns

- Roadway capacity, including intersection Level of Service (LOS)
- Other traffic and operational deficiencies
- Transit and pedestrian facilities

The study includes a review of a wide range of alternatives to address the above problems and, based on a systematic evaluation against a number of environmental factors, identifies the preferred road improvements for the study area.

The City of North Bay intends to use the results of this study along with the results of the previous McKeown Avenue/Josephine Street Traffic Study (June 1998), which will identify needed road improvement costs, to develop methods by which the costs of infrastructure improvements could be collected and apportioned against benefitting property owners. One method the City of North Bay has identified at this time is a special area charge that would assign appropriate costs to development as development proceeds with the City of North Bay bearing a portion of the cost of the improvements.

1.5 PROBLEM STATEMENT

A review was completed of the existing conditions and the following problems have been identified.

TRAFFIC / CAPACITY

- Existing conditions are generally acceptable (with the following exception)
- The westbound left turn at McKeown Avenue and Gormanville Road intersection is presently operating at a Level of Service (LOS) F which is unacceptable.
- With new development there will be a rapid deterioration in the Level of Service and insufficient capacity throughout the McKeown corridor

SAFETY / ACCIDENTS

- The intersection of McKeown Avenue at Champlain Street and at the commercial entrances serving Tim Horton Donuts exhibit high accident frequency
- Accident reports for the McKeown Avenue and Gormanville Road intersection show low accident frequency.

PAVEMENT CONDITIONS

- The existing pavement structure of McKeown Avenue at certain locations west of Cartier Street is in poor condition and will require replacement in the near future.
- Minor drainage deficiencies are present in the existing roadway.

TRANSIT / PEDESTRIAN FACILITIES

- With the expected growth in traffic there will need for careful planning to avoid transit and pedestrian conflicts with vehicular traffic in the study corridor.

1.6 STATEMENT OF THE RATIONALE FOR THE PROJECT

The existing roadway between Cartier Street and Gormanville Road has deteriorated to a point where reconstruction is required to restore the structural integrity of the road base. In addition, the existing traffic volumes on this roadway are expected to grow beyond the capacity of the two lane section. As traffic volumes increase, it is also expected that accidents will increase in frequency.

The projected future traffic volumes, without improvements to the road network, will result in the following operational deficiencies.

- Through traffic volumes will be disrupted by left turning vehicles, resulting in driver frustration and delays.
- Road width discontinuity from 4 lanes to 2 lanes at Cartier Street.
- Long queues and delays on McKeown Avenue at Gormanville Road.
- Poor access to McKeown Avenue from Algonquin Mall and from new commercial development along Josephine Street (long queues and delays).
- More accidents, particularly at Champlain Street and at the Tim Horton Donuts, including personal injury accidents and possibly fatalities.

The existing pavement conditions, the existing accident history and the deteriorating levels of service warrant physical, safety and operational improvements to McKeown Avenue and its intersections with adjacent roads.

The proposed improvements are recommended after three alternatives and a number of design options at specific locations were identified, analyzed, reviewed by the public, and evaluated in detail. The conclusion was that the reconstruction of McKeown Avenue to four lanes plus a continuous left turn lane from Algonquin Avenue to Gormanville Road best meets future capacity requirements while reducing accidents on this major collector. These operational improvements will provide a good level of service and safety for road users in the future.

CHAPTER 2 - PROJECT APPROACH

2.1 STUDY APPROACH

The planning of this project followed the environmental assessment planning and design process as set out in the Class Environmental Assessment for Municipal Road Projects (June 1993). In support of the Class EA work, two traffic studies were completed to provide technical background information on traffic conditions in the study area.

The traffic planning studies included traffic data collection to establish existing traffic volumes and the projection of future traffic volumes in the study area. Future traffic was estimated for two planning horizon years 2004 and full development (possibly 2015). Future traffic estimates were analyzed to determine traffic impacts on the existing roadways and to provide an assessment of basic lane configuration requirements (e.g., two lane, four lane or five lane) for the study area roads. In addition, a capacity analysis for each intersection was performed assessing projected level of service and the need for turning lanes, channelization and signalization.

The traffic forecasting process was aimed at identifying roadway improvements designed to serve the full development of the study area along with expected demands from adjacent areas including the College Education Centre lands and the Cedar Heights area. The traffic planning work program was the basis for determining need and justification for road improvements, noise impact assessment and for preparing a functional transportation plan and preliminary engineering road designs as part of the Class EA work.

The study included the following components:

1. **McKeown Avenue**
   Alternatives for McKeown Avenue from Algonquin Avenue to Gormanville Road including intersection improvements at Gormanville Road/College Drive, McNamara Street, Cartier Street, Champlain Street and Josephine Street were developed and assessed as part of the scope of work for the undertaking. The Gormanville Road/Highway 17 intersection was recently reconstructed with the resurfacing of Highway 17 through the City of North Bay by the Province in 1997/1998. Approach improvements from the College Drive/Gormanville Road/McKeown Avenue intersection along Gormanville Road to Highway 17 were developed as a component of this undertaking.

2. **Algonquin Avenue**
   Alternative intersection improvements at Algonquin Avenue/Highway 11 North were developed to illustrate how the improvements to the McKeown Avenue approaches would match the improvements required for Algonquin Avenue. The improvements to the Algonquin Avenue intersection are under the jurisdiction of the Province.

In considering the Class EA requirements to demonstrate need and justification for improvements, it was noted that key assumptions and projections related to the travel demand for this area of the

City had to be updated. Some of the key activities taking place in the study area and having an impact on traffic volumes include:

- shift in commercial activity to the McKeown Avenue/Algonquin Avenue corridors,
- redevelopment and expansion of existing district commercial properties,
- new development of large footprint retail stores,
- development of the new North Bay General Hospital west of McKeown Avenue and Gormanville Road, and
- use of McKeown Avenue as a route to and from an expanding College Education Centre.

These factors were taken into account in the preparation of land use and traffic forecasts for the study.

2.2 STUDY PHASES

In order to ensure that environmental assessment requirements were met, the study was conducted with the following study phases. The study process is illustrated in Exhibits 2 and 3.

Study Phase
Phase 1 Notice of Commencement of Study & Problem Identification
Phase 2 Identify and Evaluate Alternative Solutions & Public Review
Phase 3 Identify and Evaluate Alternative Designs & Public Review
Phase 4 Environmental Study Report

The Class Environmental Assessment was completed to Phase 4 with the filing of the Environmental Study Report. With the completion of Phase 4, the City of North Bay may proceed to Phase 5 with the preparation of contract drawings and tender documents for construction of road improvements. It is expected that construction would proceed at such time that road improvements are needed and can be scheduled. A recommended timing for the phasing of improvements based on identified capacity deficiencies and the sequence in which capacity shortfalls are expected to occur is included in Chapter 6.

The study findings and cost estimates were used to produce cost estimates for construction and for the purposes of the City developing an equitable means of assessing costs as development proceeds.

2.3 STUDY TEAM

The study was carried out under the direction of Tranplan Associates in conjunction with Northland Engineering (1987) Limited. Northland Engineering was responsible for the engineering, land use, environmental and noise components of the study. Overall direction of the project was provided by the Engineering and Environmental Services Department of the City of North Bay.

City of North Bay Staff:

John Simmonds	- City Engineer
Brian Watters	- Manager of Designs and Approvals
Dave Linkie	- Manager of Planning Services

The consultant staff on the project team included:

Tranplan Associates:

Toivo Rukholm,	- Transportation Planner, Project Director
John Van Loon	- Senior Analyst

Northland Engineering (1987) Limited:

Dave Richards	- Special Advisor, Study Coordinator
Shiu-Kee Poon	- Senior Design Engineer
Mark Head	- Planner
Bruce Roberts	- Project Planner

Merlex Engineering Limited

Mike Merleau	- Geotechnical Consultant

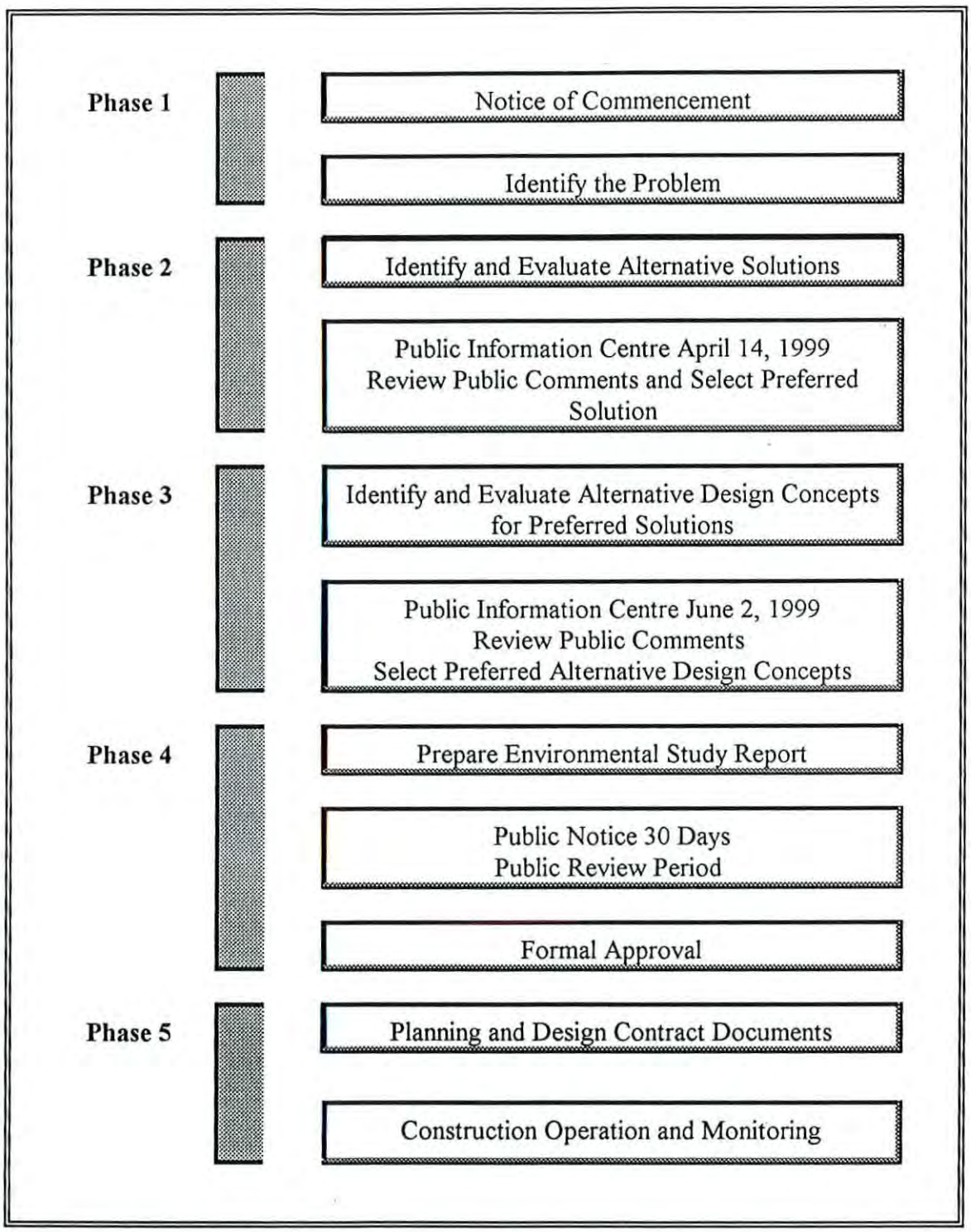


EXHIBIT 2 **CLASS EA PLANNING PROCESS**

PLANNING AND DESIGN PROCESS FOR MUNICIPAL ROADS PROJECTS

PHASE 1

1. IDENTIFY PROBLEM
2. DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PROBLEM

PHASE 2

1. IDENTIFY ALTERNATIVE SOLUTIONS TO THE PROBLEM
2. SELECT SCHEDULE (APPENDIX 1)
3. INVENTORY NATURAL, SOCIAL ECONOMIC ENVIRONMENT
4. INDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES
5. EVALUATE ALTERNATIVE SOLUTIONS; IDENTIFY RECOMMENDED SOUTIONS
6. CONSULT REVIEW AGENCIES & PUBLIC RE PROBLEMS AND ALTERNATIVE SOLUTIONS
7. SELECT PREFERRED SOLUTION
8. REVIEW & CONFIRM CHOICE OF SCHEDULE

MAY OPTION LAND

SCHEDULE A

FIRST ** OPPORTUNITY FOR LAND ACQUISITION (SCHEDULE B)

BUMP-UP GRANTED PROCEED WITH INDIVIDUAL E.A. OR ABANDON PROJECT

SCHEDULE B

SCHEDULE C

INDIVIDUAL E.A.

APPROVED MAY PROCEED

IF NO BUMP-UP MAY PROCEED

OPPORTUNITY FOR BUMP-UP REQUEST TO MINISTER WITHIN 30 DAYS OF NOTIFICATION

NOTICE OF COMPLETION TO REVIEW AGENCIES AND PUBLIC

PHASE 3

1. IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
2. DETAIL INVENTORY OF NATURAL, SOCIAL AND ECONOMIC ENVIRONMENT
3. IDENTIFY IMPACTOF ALTERNATIVE DESIGNS ON MITIGATION MEASURES
4. EVALUATE ALTERNATIVE DESIGNS, IDENTIFY RECOMMENDED DESIGN
5. CONSULT REVIEW AGENCIES & PREVIOUSLY INTERESTED & DIRECTLY AFFECTED PUBLIC
6. SELECT PREFERRED DESIGN
7. REVIEW ENVIRONMENTAL SIGNIFICANCE & CHOICE OF SCHEDULE
8. PRELIMINARY FINALIZATION OF PREFERRED DESIGN

FIRST ** OPPORTUNITY FOR LAND ACQUISITION (OR EXPROPRIATION) FOR SCHEDULE C PROJECTS

DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PREFERRED DESIGN

PHASE 4

1. COMPLETE ENVIRONMENTAL STUDY REPORT (ESR)
2. ENVIRONMENTAL STUDY REPORT PUT ON PUBLIC RECORD FOR 30 DAYS

NOTICE OF COMPLETION TO REVIEW AGENCIES & PUBLIC

3 OPPORTUNITY FOR BUMP-UP REQUESTS TO MINISTER WITHIN 30 DAYS OF NOTIFICTION

BUMP-UP GRANTED PROCEED WITH INDIVIDUAL EA OR ABANDON PROJECT

BUMP-UP DENIED WITH OR WITHOUT CONDITIONS

PHASE 5

1. COMPLETE CONTRACT DRAWINGS AND TENDER DOCUMENTS
2. PROCEED TO CONSTRUCTION
3. MONITOR FOR ENVIRONMENTAL PROVISIONS AND COMMITTMENTS

indicates mandatory event

indicates probable event

mandatory public contact

decision point

NOTE; FLOW CHART REPRODUCED FROM FLOWCHART 2.1 MUNICIPAL CLASS E.A. FOR MUNICIPAL ROADS PROJECTS

****NOTE** Proponenents must recognize that acquisition at this stage carries the risk that a bump-up could occur and the project may subsequently not be approved.

Exhibit 3 - ENVIRONMENTAL ASSESSMENT PROCESS FOR MUNICIPAL PROJECTS

2.4 EXTERNAL PARTICIPATION

On a project of this nature the participation of external agencies and organizations are an important part of the study. They provide input to the study, comment on the evaluation of solutions and design alternatives and on the study's recommendations. The following individuals and organizations participated in the study.

Table 1: List of Participating Agencies

Agency	Contact
Ministry of the Environment	Regional Office -Mark Delmonte District Office - Harvey Nelson
Ministry of Transportation of Ontario	Head of Planning & Design - Steve Cripps Area Engineer - Paul Lecoarer Corridor Control Officer - Derek Barkley Head of Traffic Office - Rick Geisler Head of Property Office - Dave Vail
Ministry of Natural Resources	North Bay District - Rick Calhoun
Ministry of Citizenship, Tourism & Recreation	Winston Wong
North Bay Mattawa Conservation Authority	Paula Scott
North Bay Hydro	Brian McMillan
Bell Canada - AN Facilities	Calvin Kohlsmith
Ontario Hydro	Jim Krats
Union Gas	Jeff Peroff
Cogeco Cable - Burlington	Ben Lawrence
City of North Bay Fire Department	Ted McCulloch
City of North Bay Police Department	Constable Mike Lahaie
City of North Bay Transit	Terry Brent
North Bay General Hospital	Glen Scanlan
City of North Bay Tourism Leisure Services	Jamie Houston
North Bay and District Ambulance Service	J. Botherston
College Education Centre	Ken Brown
Near North District School Board	Dan Alexander

Agency	Contact
Nipissing Parry Sound Catholic District School Board	Richard Shank
Conseil Scolaire du District Catholique Français Nipissing	Richard Shank
Conseil Scolaire Publique du Nord-Est de l'Ontario	Denis Boyer
Nipissing Naturalist Club	Dick Tafel
Northwatch	Brennain Lloyd

2.5 PUBLIC INVOLVEMENT

The following section describes the public consultation undertaken for this project.

2.5.1 Notice of Commencement of Project.

The Notice of Commencement for the study was published in the North Bay Nugget on February 20, 1999. This Notice informed the public that the study was commencing, indicated the study's purpose and provided contact names and phone numbers for individuals interested in participating. In addition, all property owners and tenants of buildings abutting McKeown Avenue were informed by letter of the commencement of the study. The letter explained the nature of the study, the proposed study schedule and the results that were expected. The letter to property owners also included a key map identifying their property interests along McKeown Avenue and explained how to obtain additional information if required.

2.5.2 First Public Information Centre

The first Public Information Centre (PIC) was held on Wednesday, April 14, 1999 in the Main Foyer of City Hall from 4:30p.m. to 8:00 p.m. Notices for the PIC appeared in the North Bay Nugget on April 3rd and April 10th, 1999. The notice explained that the purpose of the study was to examine the development potential of the study area and to determine the traffic impacts that future development is expected to have on the capacity of the existing road system. Copies of the notice in the paper are included in Appendix 1.

The property owners fronting on McKeown Avenue were all informed by letter of the meeting and were provided with a copy of the ad. Tenants in apartments and housing complexes adjacent to McKeown Avenue were informed by notices dropped off at their mailbox facilities.

A number of adjacent property owners contacted the study team by letter and telephone to discuss aspects of the project with the planners and were provided with the information that was requested.

The Public Information Centre was staffed by members of the study team from Tranplan Associates and Northland Engineering (1987) Limited and by staff from the City of North Bay Department of Engineering and Environmental Services. A representative from the Ministry of Transportation also attended.

The purpose of the first PIC was to present the results of the Phase 1 - Problem Identification and Phase 2 - Identification and Evaluation of Solutions. Displays at the PIC included background information on land use, property ownership and the natural and social environment. A number of traffic displays were available which provided the basis for defining future roadway improvements. The Phase 1 study results indicated that the existing McKeown Avenue was inadequate to accommodate future traffic requirements. Other displays included large size plans of the study area, three proposals for the reconfiguring McKeown Avenue at Gormanville Road and typical cross section examples of road widening options that were to be examined in the next study phases.

Signed in attendance in the visitor register totaled 20 people. Total attendance was estimated at 20 to 30 people. A majority of the verbal and written comments received indicated an understanding of the need to provide road improvements to accommodate future traffic. Some individuals brought forward questions about the development charges the City of North Bay intends to prepare and apply to new development to recover road improvement costs.

2.5.3 Second Public Information Centre

The second Public Information Centre was held on June 2,1999 at the same location as the previous PIC in the Main Foyer at City Hall. Two successive notices were published in the North Bay Nugget on May 22nd and May 29th, 1999. A copy of the notice is contained in Appendix 1.

The purpose of the second PIC was to present the results of Phase 3 which included the identification and evaluation of alternative road improvement designs. Three alternative designs were displayed including the alternative to reconstruct McKeown Avenue to its current 2 lane and 4 lane configuration (Alternative A); the alternative to widen McKeown Avenue to 4 lanes throughout (Alternative B) and the alternative to widen McKeown Avenue to 5 lanes throughout (Alternative C). The Alternative C, which consists of 4 traffic lanes for through traffic and a centre left turn lane throughout, was identified as the recommended design solution.

Signed in attendance at the second PIC totaled 10 individuals. Total attendance was estimated at 15 people. Staff from Tranplan Associates, Northland Engineering (1987) Limited, the City of North Bay Department of Engineering and Environmental Services and the Ministry of Transportation attended . The results from the previous study phases were also available.

Overall, verbal and written comments were similar to those received at the first PIC with individuals indicating an understanding and support of the need to provide road improvements to accommodate future traffic. Site specific property concerns related to access and commercial entrances, the development potential of properties, development charges and private property acquisition needed to accommodate the recommended alternative were brought forward by individual property owners. All concerns were addressed with follow up meetings and correspondence with the property owners.

2.5.4 Mailing List

External team contacts, property owners and individuals who requested to be kept informed of the study were placed on a mailing list which was maintained throughout the study. Copies of notices and requests to provide input were mailed or hand delivered to contact names on the mailing list prior to each study phase. A total of 50 names and contacts were included on the mailing list for the study.

CHAPTER 3 - STUDY AREA CONDITIONS

3.1 EXISTING CONDITIONS

This section highlights the natural and socio-economic environment of the study area and includes a description of existing and future land use, the physical condition of study area streets, transportation conditions, underground infrastructure and utilities. The inventory is provided as a basis for understanding and identifying how the environment might be affected with and without the proposed road improvements.

3.2 NATURAL ENVIRONMENT

The study area's natural environment can be described as typical of a highly urbanized environment. Adjacent properties include a mix of developed and vacant commercial, industrial, institutional and residential land uses.

3.2.1 Vegetation

Vegetation along the McKeown Avenue corridor is typical of a developed urban street with maintained and unmaintained grassed boulevards and open ditches, ornamental plantings associated with developed commercial properties and early successional grasses, shrubs and low trees on vacant undeveloped lands.

3.2.2 Watercourses and Drainage

Stormwater within the study area is handled by three separate and distinct drainage systems. These systems are:

McKeown Avenue / Algonquin Avenue

The area immediately adjacent to the McKeown Avenue/Highway 11 intersection that discharges to Chippewa Creek via a municipally owned storm sewer. This storm sewer system was recently constructed by the Ontario Government to handle the increased flow due to major improvements along Algonquin Avenue and the McKeown/Algonquin intersection.

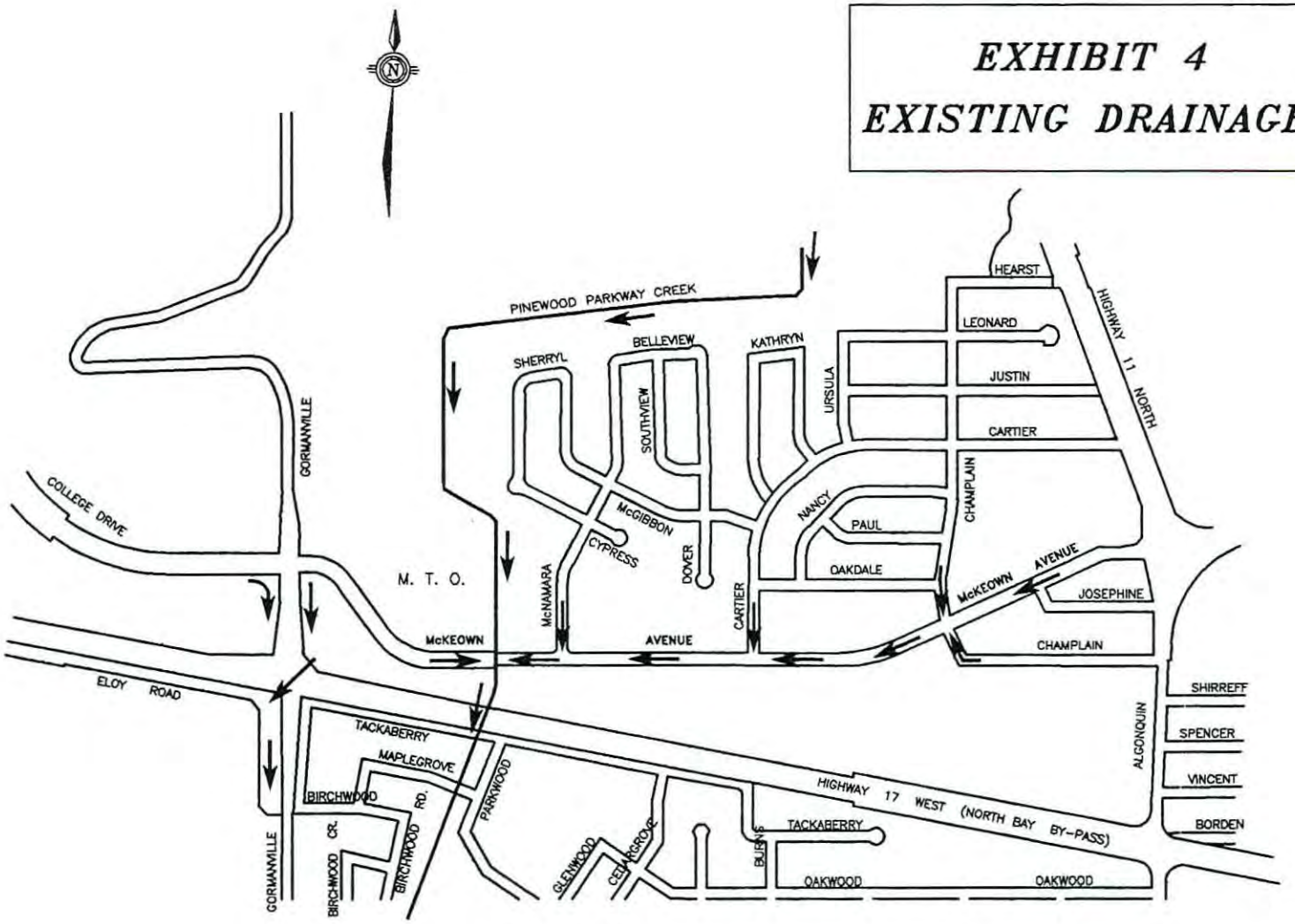
McKeown Avenue - Algonquin Mall to Ontario Government Office Complex

The area from approximately Algonquin Mall to just west of the Ontario Government Office Complex stormwater is collected via a system of storm sewers, catchbasins and some open ditch sections that discharge immediately west of the Hopper Pontiac Buick GMC dealership to the Pinewood Parkway Creek.

The storm sewer collection system that includes a 66 inch outlet has been sized to accommodate a high frequency (two year) storm event and at times experiences surcharging especially at its outlet to Pinewood Creek.

Pinewood Creek which outlets to Lake Nipissing has experienced substantial alteration due to the neighbourhood development and there are a number of structures as well as conveyance systems that limit is capacity.

EXHIBIT 4
EXISTING DRAINAGE



SCALE:

0 50m 100m 200m 300m 400m 500m

Although the section of creek at McKeown Avenue does not contain critical fish habitat, it is a highly altered open natural channel. The outlet of the creek at Lake Nipissing is known to support pickerel spawning which could be affected by sedimentation generated by upstream construction activities.

McKeown Avenue / Gormanville Road
That area from just west of the Ontario Government Office Complex that is collected via catchbasins and open ditches that discharges to an open ditch at the intersection of Gormanville Road and McKeown Avenue. From here, it travels south through road side ditches, culverts, a highly altered drainage course and under the railways to outlet to Lake Nipissing.

3.3 SOCIAL ENVIRONMENT

3.3.1 Existing Land Use

The pattern and type of land use in the study area has a significant bearing on whether future transportation improvements are needed. The existing pattern of land use within the study corridor includes a variety of district commercial, light industrial, residential, institutional (government office) and vacant land types. Existing light industrial uses predominate mid-corridor along the south side of McKeown Avenue. At the east end of the study area, larger retail, restaurants, and strip plaza district commercial development is now well established. Government office and large vacant land holdings predominate at the study corridor's west limits. Vacant lands also occur at several locations distributed along McKeown Avenue from Gormanville Road to Algonquin Avenue. Residential lands include medium density blocks from McNamara Street to Cartier Street, and low density uses forming the Belleview, Thibeault Terrace and Oakdale Highlands subdivisions.

The growth in traffic along McKeown Avenue has increased recently due in part to the commercial growth in the study area and its use as a route to and from the expanding College Education Centre.

3.3.2 Future Land Use

The shift of commercial activity to the McKeown Avenue corridor is expected to continue in the future as other property owners have expressed similar interests to develop or expand commercial properties along the north and south sides of McKeown Avenue from Algonquin Avenue to Cartier Street and to convert existing light industrial properties to district commercial uses. In response to the recent and expected future growth, the City of North Bay completed the McKeown Avenue Corridor Land Use Review and, based on the recommendations of that review, has updated the Official Plan with new policies and designations in order to support the further expansion of district commercial uses from the Algonquin Avenue area and to set the long term land use direction for highway commercial development on several small and large vacant properties at the west end of the study area.

Future development supported partly by the new Official Plan policies and growth in the Cedar Heights Planning District will continue to generate more traffic in the near future and over the long term. Traffic increases are forecasted as a result of new growth which will take the form of:

- vacant land development;
- expansion of the district commercial node at McKeown Avenue and Algonquin Avenue by conversion of industrial to commercial uses along the south side of McKeown Avenue;

- new development of the College Education Centre Lowlands (former Eloy Farm site) with major institutional, district commercial and residential development;
- expanding enrollment and new student residences at the College Education Centre main campus; and
- future residential growth in the Cedar Heights Planning District.

It is therefore important that long range planning is undertaken to identify the short and long term transportation improvements needed to accommodate traffic as this study corridor builds out to full development.

Plans of the study area showing existing and future land use is included as Exhibit 5.

3.3.3 Property Ownership

A property ownership inventory of the study area was prepared using current assessment mapping and detailed street plan and profile drawings obtained from the City of North Bay. The property inventory was used to identify ownership and property requirements for the road improvement options considered in the study. A copy of the inventory is included as Exhibit 6.

3.3.4 Noise Levels

Northland Engineering carried out a Noise Impact Assessment for this project. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing and future forecasted traffic volumes in the corridor and side streets.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less than the Ministry of Environment (MOE) maximum desirable criterion of $L_{eq\ (16)}$ 55 dBA for outdoor sound levels. Traffic volumes in the future are expected to increase sound levels by about 4 dBA. These levels are above the desirable criterion of 55 dBA but within the acceptable criterion of 60 dBA set by the MOE. The Ministry of the Environment considers that a noise increase of less than 10 dBA is acceptable and that a level of 55 dBA or less is desirable.

The use of noise barriers and other on roadway measures to mitigate sound level increases were investigated and were determined not to be possible or feasible. Noise barriers would be discontinuous at numerous locations for entrances and would not achieve a 5 dBA reduction required to result in a perceptible reduction in sound levels.

Exhibit 7 shows the predicted sound levels for the selection for existing and predicted future traffic volumes in the study area. The main part of the report is in the appendix.

The noise study concludes that sound levels will increase as a result of traffic increases but will remain within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible. The full report is included in Appendix 2.

EXISTING LAND USE

FUTURE LAND USE

LEGEND LAND USE

- RESIDENTAL
- COMMERCIAL
- INDUSTRIAL
- INSTITUTIONAL
- OPEN SPACE
- VACANT
- UTILITY CORRIDOR

Exhibit 5 - EXISTING AND FUTURE LAND USE

EXISTING CONDITIONS – PROPERTY OWNERSHIP

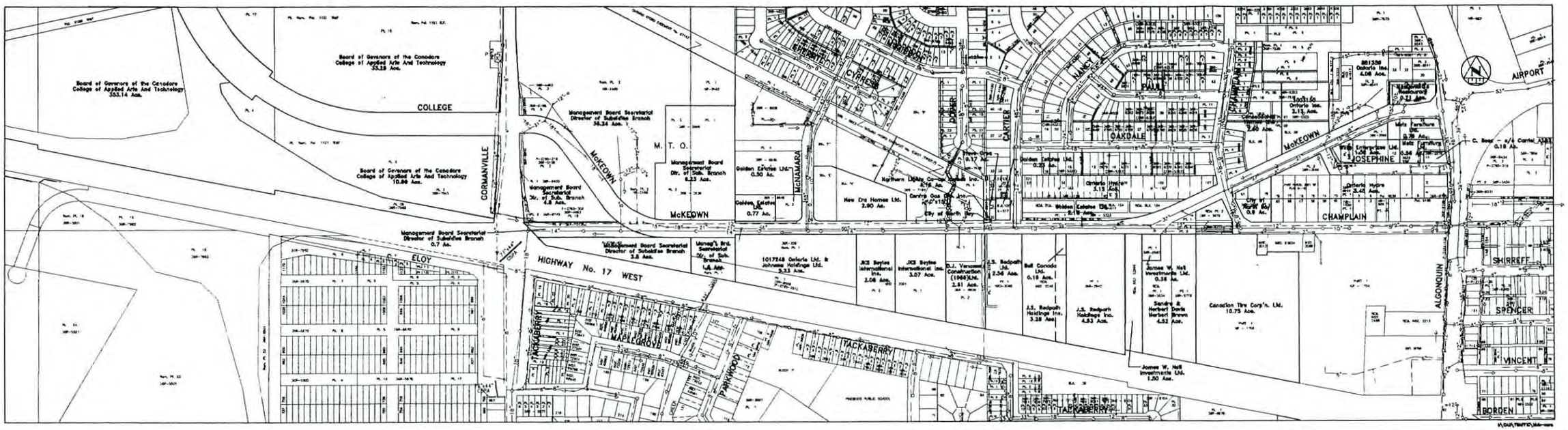


Exhibit 6 - EXISTING CONDITIONS PROPERTY OWNERSHIP

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA (DHV)

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates.
The predictions were made using the Ministry of Environment STAMSON* prediction program. These predictions are based on Design Hour Volume which is the heaviest traffic hour in the day.

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	55.44	59.04	3.6
2	centre of courtyard on New Era townhouses	42.76	46.39	3.63
3	rear of parking lot of New Era townhouses	57.31	61.48	4.17
4	centre of play/common area in backyards of Northern Lights co-op	56.72	60.89	4.17
5	backyards of the homes on south side of Oakdale Road	50.54	54.71	4.17
6	backyards of homes on east side of Champlain	54.97	58.11	3.14

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Exhibit 7 - NOSE PREDICTIONS present/future

3.3.4 Heritage Resources

The Ministry of Citizenship, Culture, and Recreation advised that the study area does not contain designated heritage resources or properties and, as a result of the study area being located away from major watercourses that a low potential for archaeological discoveries exist.

3.4 TRANSPORTATION

3.4.1 Study Area Streets

The Official Plan for the City of North Bay designates McKeown Avenue as a collector road. The major collector and arterial street system provides road links that connect the principal activity areas in the City. The street system at the north end of the City particular to this study includes Highway 17, Highway 11 North, Algonquin Avenue, McKeown Avenue, Gormanville Road and College Drive. Within this street system, McKeown Avenue is intended to carry traffic to and from the Belleview, Thibeault Terrace and Oakdale Highlands neighbourhoods of the Cedar Heights Planning District and to serve adjacent commercial, industrial and institutional lands in the corridor. It provides an east-west connection from Algonquin Avenue to Gormanville Road and also functions to carry through traffic to and from the College Education Centre north of the North Bay Escarpment. This roadway is presently four lanes from Algonquin Avenue to Cartier Street and two lanes from Cartier Street to Gormanville Road.

3.4.2 Structural Condition

A preliminary visual assessment of the structural and drainage condition of the pavement was undertaken by Merlex Engineering Ltd. in 1999. In addition, Merlex Engineering included a summary of geotechnical investigations performed by the firm on lands adjacent to McKeown Avenue to provide a preliminary characterization of subgrade and groundwater table conditions for the study area. The pavement inspection with geotechnical review was included in this study to identify a preliminary pavement structure and repair program as information for refining construction cost estimates.

The following is a summary of the investigation for four sections of McKeown Avenue from Algonquin Avenue to Gormanville Road.

Section 1 - Algonquin Avenue to Cartier Street

- the road section is four lanes (undivided) with curb and gutter
- reconstructed in 1992
- observed pavement conditions included longitudinal cracks in each inside lane, moderate intermittent cracks, a moderate frost heave in the eastbound lane over a sewer lateral (east of Champlain Street) and a few slight longitudinal meander and mid-lane cracking

Overall, this section of road has responded well over the last seven years.

Section 2 - Cartier Street to McNamara

- the road section is two lanes with curb and gutter
- constructed in 1979

- the visual review indicated moderate transverse cracking of an intermittent nature. Cracking included a few slight alligator cracks and slight wheel track rutting

Overall, this section of roadway has responded well over the last twenty years with selective resurfacing.

Section 3 - McNamara to 50 m West of West Entrance Into Ontario Government Office Building

- the road section is two lanes with curb and gutter
- constructed in 1978
- this section exhibits moderate wheel track rutting in front of the Lucky 13 store with moderate surface distortions and poor drainage between Lucky 13 and the west entrance to the Ontario Government Office Building

A preliminary geotechnical assessment of this short section suggests that due to the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to traffic load.

Section 4 - McNamara (50m west of Ont. Government Building) to Gormanville Road

- the road section is two lanes with curb and gutter
- constructed in 1978
- pavement conditions included slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking. Moderate intermittent centreline cracking was also observed

The detailed report of the preliminary geotechnical review with recommendations for further investigations to confirm a pavement design is included as Appendix 3.

3.4.3 Existing Traffic Conditions

At the present time, the traffic volumes along McKeown Avenue vary from approximately 14,000 vehicles daily at the east end (at Algonquin Avenue) to approximately 7,000 vehicles daily at the west end (at Gormanville Road). McKeown Avenue is currently operating at an acceptable Level of Service through the study area, except for the McKeown Avenue/Gormanville Road intersection where the left turns from McKeown to go south on Gormanville Road are facing unacceptably long queues and delays at peak hours. This intersection is getting close to warranting the installation of traffic signals; with signals, it would operate at a good level of service.

An analysis of the existing traffic volumes indicated the current need for left turn storage lanes on McKeown Avenue at McNamara Street, at Cartier Street, at Champlain Street, at the Algonquin Mall entrances and at the Provincial Government Building entrance.

3.4.4 Future Traffic Conditions

Future traffic volumes along McKeown Avenue are expected to increase dramatically based on the projected new development/redevelopment in the corridor over the next twenty years. Major growth is expected in the first five years (by 2004) but significant growth is expected to continue through to 2015 - 2020.

Daily traffic volumes at the east end (adjacent to Algonquin Avenue) are expected to increase from 14,000 vehicles to 22,000 vehicles by 2004, and to 28,000 vehicles by full development. At the west end (adjacent to Gormanville Road), daily traffic volumes are expected to increase from 7,000 vehicles to 14,000 vehicles by 2004, and to 20,000 vehicles by full development.

The three major institutional uses along College Drive which are expected to triple the traffic volumes are the existing university and college facilities and the proposed new hospital development. The increased traffic generation from the educational facilities accounts for approximately 700 vehicles at full development while an allowance for 140 vehicles has been assumed for the hospital development. The full impact of these increases on College Drive traffic will need to be reviewed in other development related studies.

To meet the future needs, McKeown Avenue will need two through lanes in each direction, a continuous centre fifth lane for two-way left turns, right turn tapers or channelization at key locations and new traffic signals at its intersection with Gormanville Road and Josephine Street. Traffic signals may also be required at an additional location, possibly at McNamara Street, in the long term future.

3.4.5 Accidents

A review of accident statistics within the study area identified two major problem areas:

- intersection of McKeown Avenue and Champlain Street
- McKeown Avenue at the Tim Horton Donuts driveway

A high accident frequency was also found at the Highway 17/Gormanville Road intersection, but this intersection has been rebuilt recently and it is expected that the situation has improved.

At Champlain Street, a high number of accidents have occurred involving left turns, including a high proportion of personal injury accidents. These statistics indicate a need for left turn storage lanes and special left turn phasing in the signal timing.

At the Tim Horton Donuts entrance, all the accidents involve left turning vehicles exiting the site. It is expected that these accidents could be significantly reduced by consolidating the existing entrances to a signalized intersection opposite Josephine Street with left turn storage lanes.

Apart from the above locations, there are relatively few accidents occurring within the study area. Some locations, such as the McKeown/Gormanville intersection, are noteworthy for the unexpectedly small number of accidents recorded over the past three years.

The transportation conditions of the study area are described in detail in the McKeown Avenue Traffic Study: Algonquin Avenue to Gormanville Road appended to this report (see Appendix 4).

3.5 UTILITIES

Bell Telephone - Extensive aerial and underground Bell cable facilities are found within the McKeown Avenue right-of-way. Plans identifying Bell facilities were provided to the Study Team as background material. Bell facilities include underground duct conduit (some with fibre optics), buried road crossings, direct buried cable and aerial cable. The plant included a remote switching

station on a small parcel owned by Bell Canada on the south side of McKeown Avenue at Cartier Street.

Union Gas - Plans identifying the location of Union Gas gas mains and service lines were provided to the study. Gas lines are present throughout the study area rights-of-way.

North Bay Hydro - North Bay Hydro provided distribution maps of the study area showing existing North Bay Hydro overhead and underground plant and the City of North Bay owned street lights. The overhead plant on McKeown Avenue includes an aerial pole line along the north side of McKeown Avenue extending from the Ontario Government Building easterly to the new realignment of McKeown Avenue where it crosses the road and follows the original McKeown Avenue road allowance to Champlain Street.

Ontario Hydro - Ontario Hydro owns a utility corridor that extends through the study area crossing McKeown Avenue at Champlain Street. The utility corridor contains a L5H Circuit 115 kV high tension line and is currently the only route for the facility through the City of North Bay. Parts of the facility where it crosses McKeown Avenue were recently relocated when the new McKeown Avenue re-alignment with Airport Road was built. Poles at this location are anchored with guys which are now located close to the street. These locations may be affected with a road widening alternative.

3.6 UNDERGROUND INFRASTRUCTURE

McKeown Avenue from Algonquin Avenue to Cartier Street
New sanitary sewer, storm sewer and watermain services were installed with the re-alignment of McKeown Avenue in 1992. It is not expected that the new infrastructure within this section of roadway would require upgrading or replacement when road improvements recommended in this study are scheduled for construction with the exception of the storm sewer which appears to be undersized from Champlain Street to Cartier Street on McKeown Avenue.

McKeown Avenue from Cartier Street to Gormanville Road
Camera and visual inspection reports on the underground services in this section of McKeown Avenue are not available. New storm sewer was installed in 1979 with the reconstruction and re-alignment of McKeown Avenue with College Drive. The sanitary sewer, which was constructed in 1970, and watermain, which was installed in 1963, were not replaced with the 1979 McKeown Avenue reconstruction. A camera inspection of underground infrastructure in this section is recommended in order to determine replacement and upgrading priorities to coincide with any future improvements to the road.

3.6.1 STORM SEWER

The existing storm sewer system on McKeown Avenue and its feeder lines appear to have been designed in the early 1970's based on a 2 year return storm design criteria that has been updated by the municipality. This more recent design criteria appears to reflect the actual conditions that occur within the City.

Based on the current design standards and assuming no new development, the McKeown Avenue

Storm Sewer system has sections that are deficient in capacity. An analysis of the drainage system has identified the following areas of concern:

(a) The outlet of the 66" storm sewer is situated below the invert of the Pinewood Creek as well as the culvert under Highway 17. This restricts the outflow from the storm sewer system;

(b) The storm sewer pipe system is undersized based on the current 5 year design storm from the outlet of the 66 inch storm sewer to the intersection of Champlain Street and McKeown Avenue. This analysis has assumed the following:

- That all future land development will be developed with the current philosophy of no increase in storm runoff.
- That there is a free outlet at the receiving stream.
- That the feeder lines to the McKeown Avenue pipe system were sized to accommodate the flow that results from the current design standards, and
- That overland flow relief will not provide substantial relief to the storm sewer pipe system.
- Current problems regarding basement flooding on McKeown Avenue and McNamara Street are to be controlled by pumps and backwater valves.

(c) If overland flow relief is considered to be an option, we would note the following:

- McKeown Avenue itself drains from Algonquin Avenue to approximately the outlet to Pinewood Creek.
- If we assume a standard cross-section with the normal curb and gutter the water depth on the street would vary from 0.075 m for the five year storm to in excess of 0.20 m for the 100 year storm; and
- This overland flow relief scenario will not eliminate the surcharging that currently exists within the pipe system.

CHAPTER 4 - EVALUATION OF ALTERNATIVES

4.1 ALTERNATIVES AND EVALUATION

This chapter describes the evaluation of the planning solutions and design alternatives that were developed to address the needs along McKeown Avenue in terms of existing and future traffic capacity, level of service and safety.

4.2 EVALUATION OF ALTERNATIVES

Under the Class Environmental Assessment for Municipal Road Projects, road improvements are developed in accordance with an approved environmental assessment procedure, which requires the systematic identification and evaluation of alternatives. The environmental assessment of alternatives in the study was carried out on a staged basis with the initial screening of alternative solutions (Phase 2) followed by a detailed evaluation of the design alternatives carried forward (Phase 3).

4.3 PHASE 2 INITIAL SCREENING OF SOLUTIONS

The Class Environmental Assessment process identifies a first step in Phase 2 as the identification of alternative solutions to the problem. Alternative solutions are defined as functionally different ways of addressing transportation problems and may include the consideration of alternate routes, operational adjustments, transit improvements and roadway improvements such as road widenings.

In the initial screening, alternatives that would not resolve identified transportation problems or future requirements of the roadway were screened out from further investigation. Solutions expected to partly or fully address the study area's transportation requirements were carried forward for detailed evaluation. The following solutions were evaluated in this study in the initial screening at a general level of detail:

- Do Nothing
- Improve Transit
- Improve Other Roadways
- Rehabilitate Existing Road
- Operational Improvements
- Widen Existing Roadway to 3, 4, or 5 lanes

The above solutions were initially presented at the first Phase 2 - Public Information Centre along with reasons for selecting the preferred solution for detailed evaluation.

4.3.1 Do Nothing

The do nothing alternative maintains the existing pavement, traffic capacity, operational and safety conditions which are unacceptable. This alternative does not accommodate the requirements for alleviating traffic capacity deficiencies and would result in unacceptable levels of service over the long term. This alternative would not accommodate future planned development in the study area.

The do nothing alternative was not carried forward.

4.3.3 Improve Transit

The City of North Bay is well served by urban transit services which currently operates three bus routes through the study corridor. North Bay Transit will play an important role as an alternative mode of travel especially to the College Education Centre (CEC) main campus and student residences. These routes now exhibit amongst the highest ridership levels in the City of North Bay. Transit service is also important for the adjacent residential areas. Although transit will continue to provide an important alternate mode of travel, a transit solution alone could not replace the auto mode in serving the existing and future large retail businesses along McKeown Avenue.

The transit alternative was not carried forward for detailed evaluation, but should be implemented as part of the overall transportation system.

4.3.3 Improve Other Roadways

The existing and particularly the future traffic on McKeown Avenue is predominantly destination traffic to locations along the corridor and neighbouring areas. Destination traffic does not have route choices and would therefore continue to use McKeown Avenue in the future. Through traffic to and from the College Education Centre and future development in the Cedar Heights area does have route choices including Highway 17, Highway 11, Algonquin Avenue and Cedar Heights Road. Future improvements to these alternate routes may attract some traffic from McKeown Avenue but would not be expected to solve the largest part of the identified traffic capacity and operational deficiencies.

This solution was not recommended to be carried forward for detailed evaluation, but it should be implemented as part of the overall transportation system.

4.3.4 Rehabilitate Existing Road

This alternative does not accommodate projected traffic volumes and would result in an unacceptable level of service over the long term. Although this alternative would improve existing pavement conditions which are deficient at some locations, the alternative would not accommodate future planned development in the study area.

Pavement and road structure rehabilitation was carried forward for detailed evaluation as part of the preferred solution.

4.3.5 Operational Improvements

Non-structural improvements such as optimizing signals, operational adjustments and minor road improvements lack the ability to relieve the present and future traffic congestion of the road system. This solution can improve the effectiveness of other road improvement alternatives.

Operational improvements were carried forward to be incorporated in the design of road widening alternatives.

4.3.6 Widen Existing Roadway to 3, 4, or 5 lanes

The reconstruction and widening of the existing roadway offers the potential to solve projected capacity, operational and structural deficiencies. Road widening options either individually or in combination would improve traffic conditions and support future planned and expected development.

Road widening options were carried forward for detailed evaluation.

4.4 PHASE 3 DETAILED EVALUATION OF DESIGN ALTERNATIVES

Based on the results of the Phase 2 initial screening, the following road design alternatives were developed:

Alternative A -Reconstruct McKeown Avenue to its Existing 2 Lane and 4 Lane Configuration (See Exhibit 8 - Drawings 1, 2 and 3)

Alternative B - 4 Traffic Lanes (See Exhibit 9 - Drawings 1, 2 and 3)

Alternative C - 5 Traffic Lanes (See Exhibit 10 - Drawings 1, 2 and 3)

The detailed evaluation was carried out with seven environmental factors representing the environment affected or most likely affected by the project alternatives. Sub-factors for each factor were developed to provide detail in the accounting of expected positive and negative environmental impacts. The seven factors were:

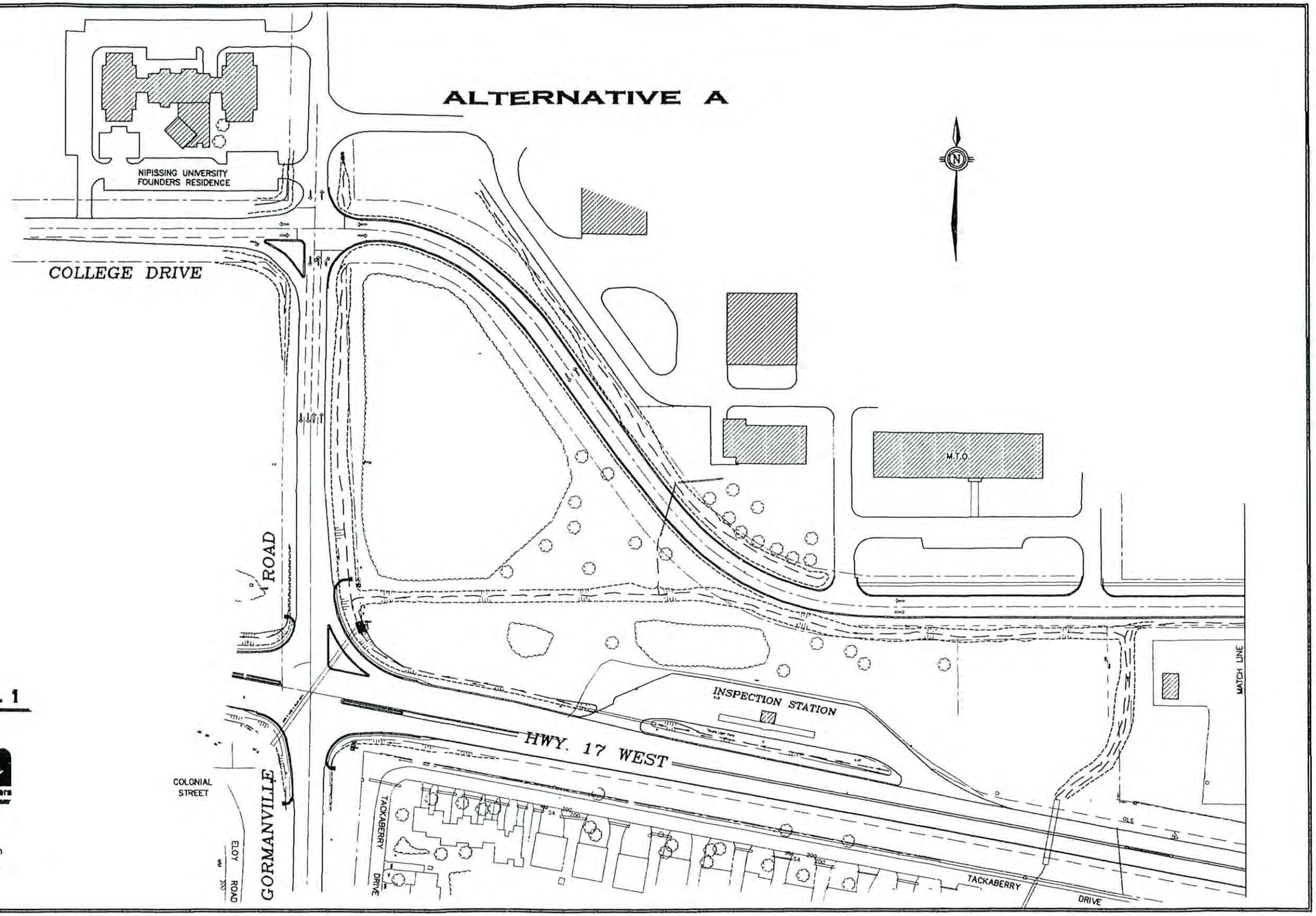
- Transportation
- Safety
- Land Use
- Social Environment
- Natural Environment
- Cost
- Public Preference

Descriptions of sub-factors used in the evaluation are presented in Exhibit 11.

The different road design alternatives were comparatively ranked against each detailed evaluation factor using a five point rating scale from most preferred to least preferred. A rank of most preferred indicated an alternative that provided the most benefit (e.g., met traffic capacity requirements) or least impact (e.g., minimized property requirements). Least preferred ratings were assigned to options that provided no or minimal benefits or which had the greatest negative impact. Ratings varied according to the alternative and sub-factor used. Exhibit 12 is an illustration of the rating scale used.

The results of the evaluation are presented in detail in Exhibit 13. The inventory of impacts as presented in the detailed evaluation table together with the following description of ranking results represents the rationale and documentation for the selection of the preferred alternative.

ALTERNATIVE A

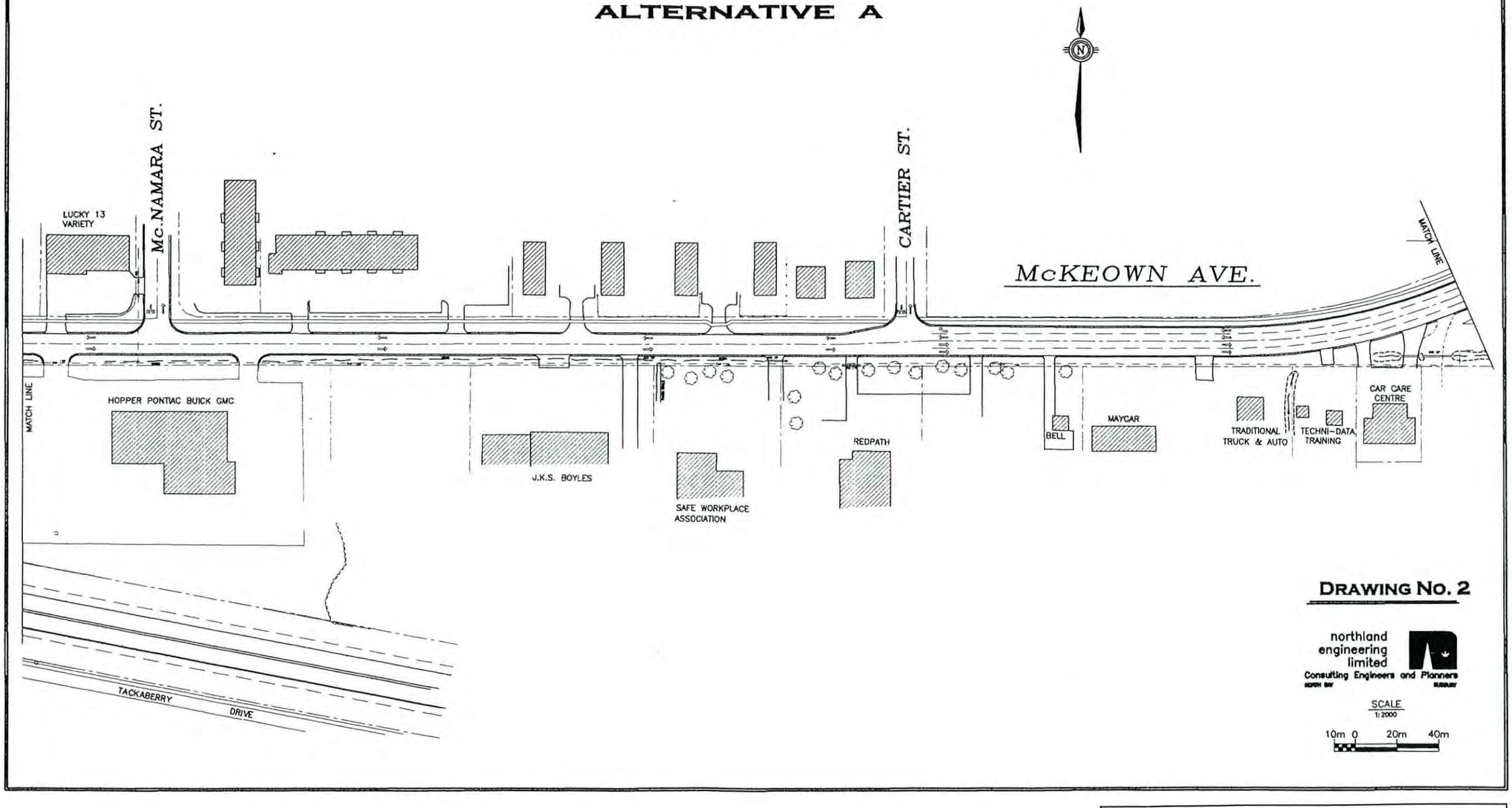


DRAWING No. 1

northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

Exhibit 8 - ALTERNATIVE "A" - page 1

ALTERNATIVE A



DRAWING No. 2

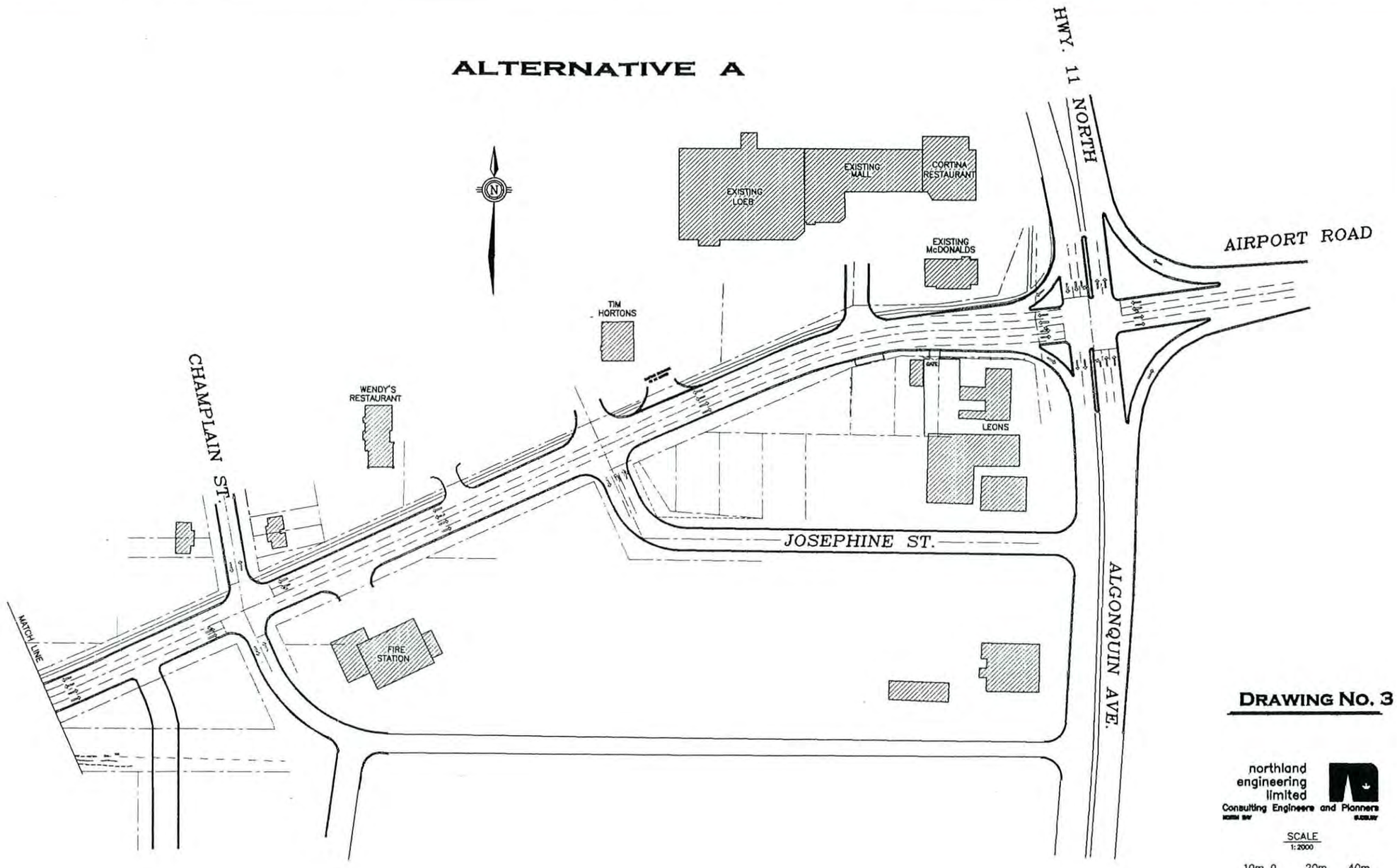
northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

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Exhibit 8 - ALTERNATIVE "A" - page 2

ALTERNATIVE A



DRAWING No. 3

northland engineering limited
Consulting Engineers and Planners

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Exhibit 8 - ALTERNATIVE "A" - page 3

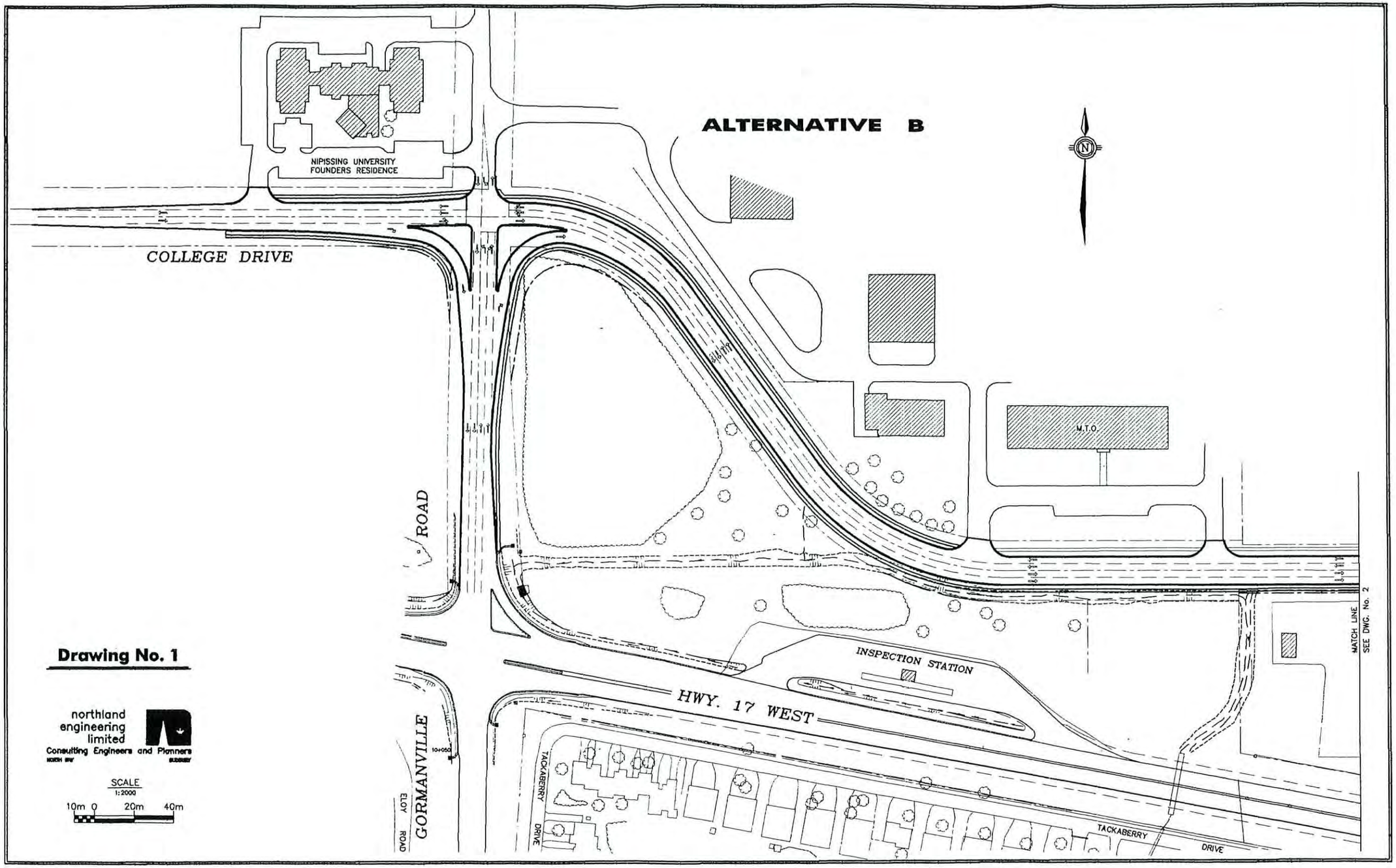
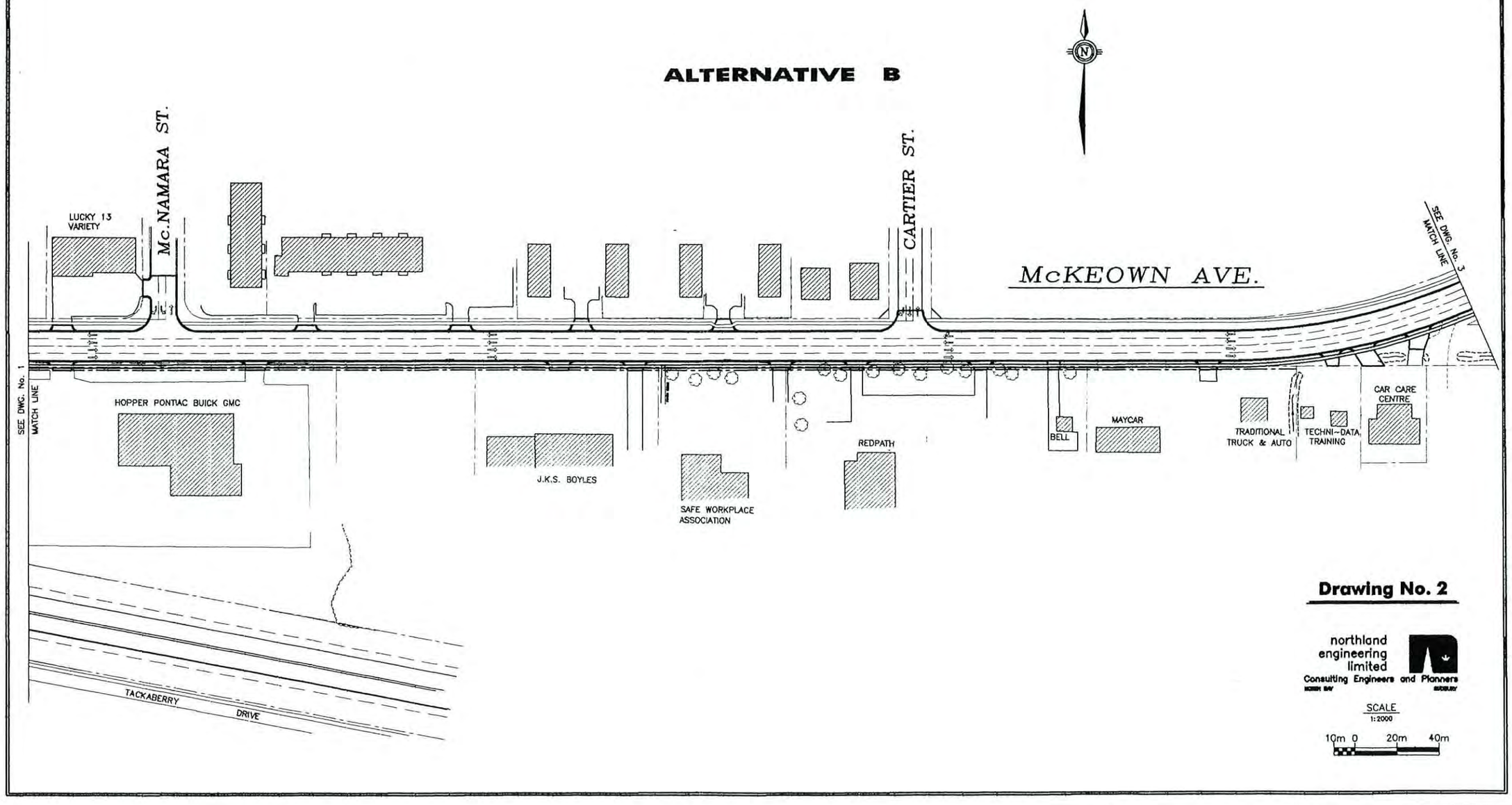


Exhibit 9 - ALTERNATIVE "B" - page 1

ALTERNATIVE B



Drawing No. 2

northland engineering limited
Consulting Engineers and Planners

SCALE
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Exhibit 9 - ALTERNATIVE "B" - page 2

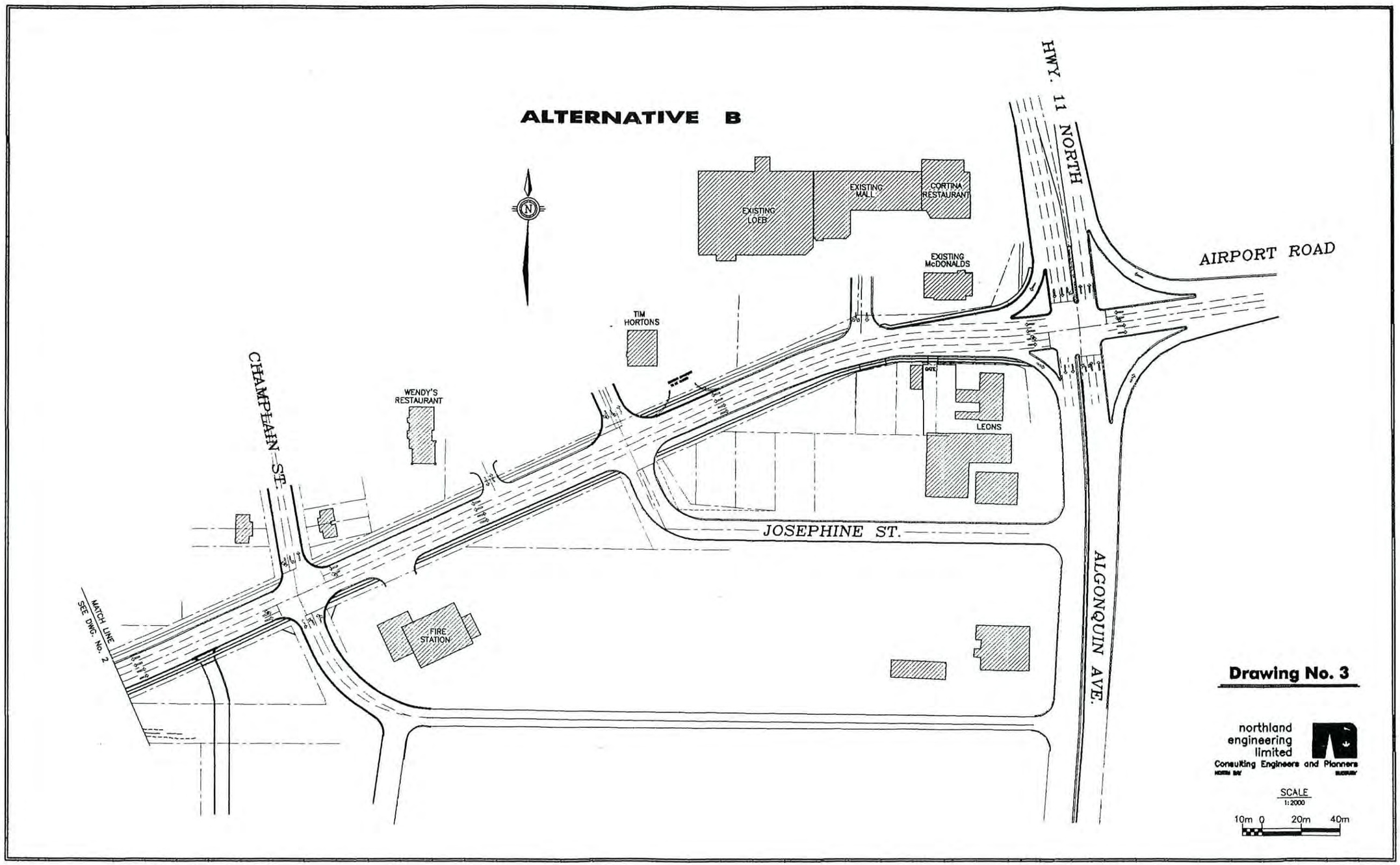
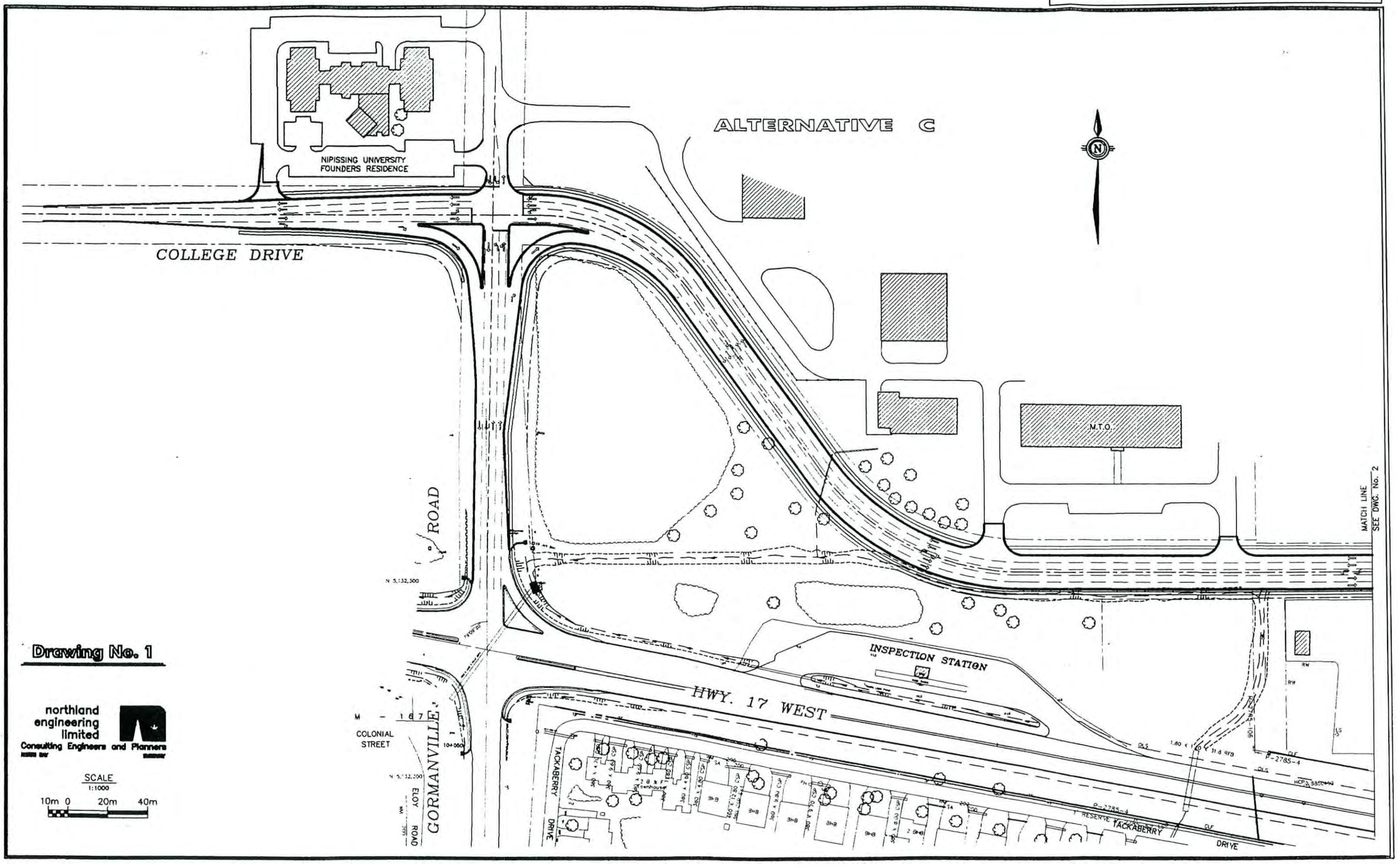


Exhibit 9 - ALTERNATIVE "B" - page 3



Drawing No. 1

northland engineering limited
Consulting Engineers and Planners

SCALE
1:1000
10m 0 20m 40m

ALTERNATIVE C



Mc.NAMARA ST.

CARTIER ST.

McKEOWN AVE.

LUCKY 13 VARIETY

SEE DWG. No. 3 MATCH LINE

SEE DWG. No. 1 MATCH LINE

HOPPER PONTIAC BUICK GMC

J.K.S. BOYLES

SAFE WORKPLACE ASSOCIATION

REDPATH

BELL

MAYCAR

TRADITIONAL TRUCK & AUTO

TECHNI-DATA TRAINING

CAR CARE CENTRE

CLF

TACKABERRY DRIVE

Drawing No. 2

northland engineering limited
Consulting Engineers and Planners

SCALE
1:1000

10m 0 20m 40m

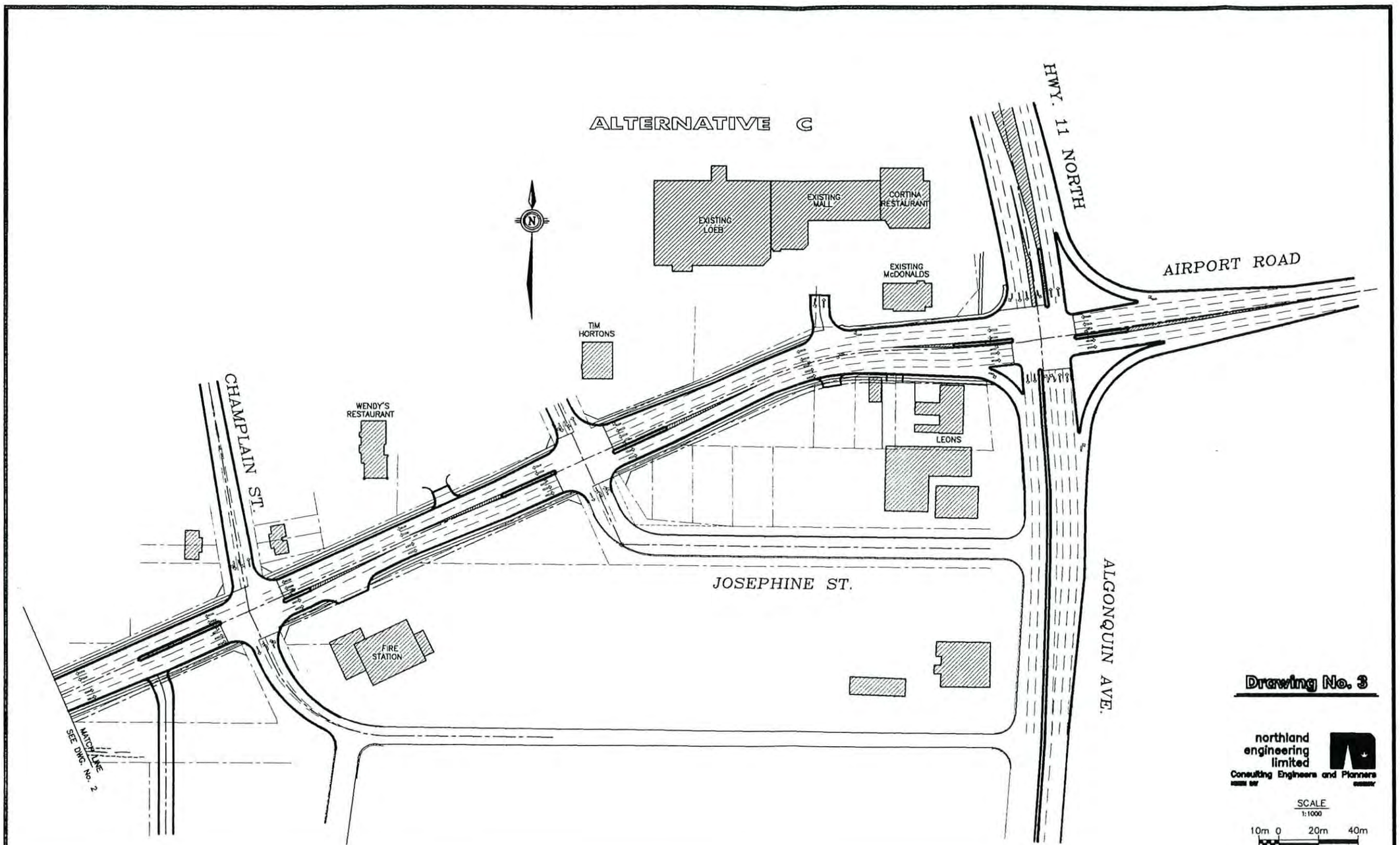

ALTERNATIVE C
HWY. 11 NORTH
AIRPORT ROAD
EXISTING LOEB
EXISTING MALL
CORTINA RESTAURANT
EXISTING McDONALDS
TIM HORTONS
WENDY'S RESTAURANT
LEONS
CHAMPLAIN ST.
JOSEPHINE ST.
ALGONQUIN AVE.
FIRE STATION
MATCH LINE SEE DWG. No. 2
Drawing No. 3
northland engineering limited
Consulting Engineers and Planners
SCALE 1:1000
10m 0 20m 40m

Exhibit 11 - DETAILED EVALUATION FACTORS

Detailed Evaluation Factors		
Factor	**Sub-Factor**	**Description**
TRANSPORTATION	Capacity/Flow	Identification of whether an option improves or reduces the capacity of flow.
	Intersection Level of Service	Identification of whether an option improves or reduces the ability of an intersection to move vehicles.
SAFETY	Traffic Operations	Subjective measure of how traffic will operate and affect safety.
	Safety of Access	Subjective measure of whether access to and from McKeown Avenue will be good or poor.
	Pedestrian Safety	Indication of the safety and convenience of pedestrian movements.
LAND USE	Impact on Existing or Future Land Uses	Indication of the compatibility of an option with existing or future land uses.
SOCIAL ENVIRONMENT	Property Acquisition	Identification of the amount of property required to accommodate option.
	Noise	Quantitative measure of the predicted change in noise levels.
	Aesthetics/Visual Impacts	Subjective identification of whether aesthetics of the roadway is improved or reduced.
NATURAL ENVIRONMENT	Water Management	A statement of the proposed stormwater management system.
	Air Quality/Fuel Consumption	Subjective measure on the effects of air quality and fuel consumption.
COST	Annual Maintenance	Subjective measure of the effects on annual maintenance costs.
	Construction	Quantitative statement of construction costs.
PUBLIC PREFERENCE		Indication of general public preferences.

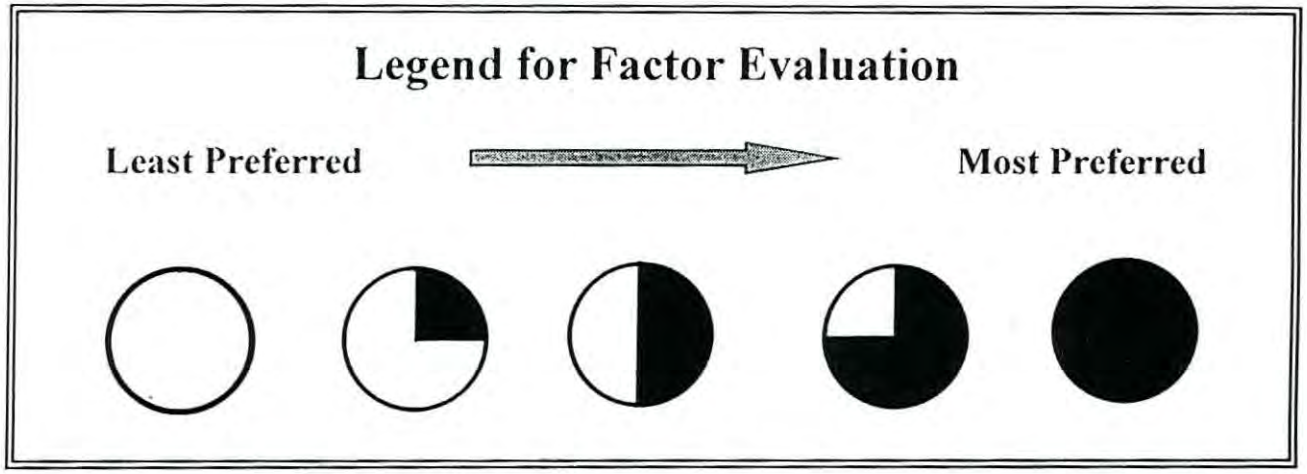


Exhibit 12 - RATING SCALE

DETAILED EVALUATION TABLE - McKeown Avenue Class Environment Assessment from Gormanville Road to Algonquin Avenue

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
TRANSPORTATION						
Capacity / Flow	• will not meet future capacity requirements • existing 2 lane/4 lane roadway will be at capacity in 5 years	○	• will meet basic capacity requirements in the study area during the initial planning period, but will not meet capacity requirements with full development	◕	• will meet future capacity requirements from Algonquin Avenue to Gormanville Road	●
Intersection Level of Service	• does not presently meet acceptable level of service at Gormanville Road (LOS F) • all other intersections presently operate at acceptable Level of Service (LOS B and C) • intersection capacity for McNamara Street and Cartier Street will diminish to unacceptable Level of Service within 5 years • intersection capacity for all intersections will diminish to unacceptable Level of Service (LOS E and F) under full development	○	• intersection Level of Service at all intersections will be unacceptable under full development without traffic signals • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	◑	• will provide acceptable Level of Service at all intersections under full development • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes and left turn lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	●
Traffic Operations	• existing traffic experiences some stoppages and interruptions to flow especially at McNamara Street and major driveways • stoppages and interruptions will increase notably over next 5 years	○	• flow of traffic from Algonquin Avenue to Cartier Street will continue to deteriorate with increasing conflicts between through traffic and left turning vehicles • flow of traffic from Cartier Street to Gormanville Road will improve but traffic flow will be delayed at intersections and driveway entrances by left turning vehicles in the inside through lane	◑	• flow of traffic will improve as conflicts between left turning vehicles and through traffic are reduced with a fifth centre turn lane	●
Summary Evaluation		○		◑		●
SAFETY						
Accidents	• existing high accident locations will continue to worsen at Champlain Street, Tim Horton's and McNamara Street over time as traffic increases	○	• existing high accident locations will continue to worsen at Champlain Street and Tim Horton's • no improvement would occur at McNamara Street	◔	• left turn lanes at intersections and the continuous two-way left turn lane will improve safety, eliminating high accident intersections	●
Safety of Access	• ease of access to and from entrances and side streets will continue to deteriorate over time and will result in greater risk of accidents	○	• ease of access to and from entrances and side streets from Algonquin Avenue to Cartier Street will continue to deteriorate over time in terms of delays and safety	◔	• ease of access to entrances and side streets is improved over 4 lane alternative by providing safe storage for left turning vehicles • traffic signals will ensure left turn access to McKeown Avenue from side streets and driveways	●

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
Pedestrian Safety	• existing sidewalk on north side from Ontario Government Building to Algonquin Avenue accommodates existing pedestrian movements • as development proceeds pedestrian access to and from the south side will be difficult at unsignalized intersections • does not provide sidewalk access along the south side of McKeown Avenue; this will become more important as retail development occurs on south side	○	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along the street • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along McKeown Avenue • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●
Summary Evaluation		○		◑		●
LAND USE						
Conformity with Existing and Future Planned Land Uses	• will maintain existing conditions which would not support higher traffic generation by new uses as approved by City	○	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • supports Official Plan direction for future development of the study area	◕	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • most supportive of Official Plan direction for future development of the study area	●
Summary Evaluation		○		◕		●
SOCIO-ECONOMIC ENVIRONMENT						
Property	• no property acquisition required • no change to existing business entrances are required	●	• additional right-of-way will be required to provide for daylighting at the Gormanville Road and Champlain Street intersections • additional right-of-way width will be required along the south side of McKeown Avenue • property requirements affect 11 properties • no changes to existing business entrances are required	◕	• additional right-of-way will be required to accommodate the proposed widening and intersection improvements • property requirements range from approximately 1 m to 4.5 m in width affecting 19 properties • affects 3 existing entrances at Tim Horton's, Leon's and Canadian Tire	◑
Noise	• no sound level changes as a result of reconstructed roadway (road lane configuration remains unchanged) • predicted changes in sound levels of 4 dBA over existing ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑
Aesthetics / Visual Impact	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑
Summary Evaluation		◕		◑		◑

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
NATURAL ENVIRONMENT						
Water Management	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●
Air Quality / Fuel Consumption	• projected increase in congestion will increase air pollution, however, not significantly	◑	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	◕	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	●
Summary Evaluation		◕		◕		●
COST						
Annual Maintenance	this alternative has the lowest annual maintenance costs	●	this alternative would cost more to maintain than alternative A and would cost less than alternative C to maintain.	◔	this alternative has the highest annual maintenance costs	○
Construction	$ 1,060,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	●	$ 2,780,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	◔	$ 3,400,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	○
Utility Relocation	• not required	●	• not required	◔	• minor relocation of North Bay Hydro and Ontario Hydro pole line and shared Bell and Cable TV plant on the south side of McKeown Avenue.	○
Summary Evaluation		●		◔		○
PUBLIC PREFERENCE						
Public Preference	see comments - Alternative "C"	◑	see comments - Alternative "C"	◕	Overall comments received at the two Public Information Centres indicated an understanding that the recommended improvements were needed. (Alternative C)	●
Summary Evaluation		◑		◕		●
Overall Evaluation	Least Preferred	◑		◕	Most Preferred	●

4.4.1 Transportation

Alternatives C and B provided significantly greater roadway capacity, intersection level of service and traffic operations benefits over Alternative A. The existing 4 lane roadway from Algonquin Avenue to Champlain Street is currently at capacity and the existing 2 lane roadway from Champlain to Gormanville will be at capacity in 5 years. The operation of all intersections would diminish to an unacceptable Level of Service (LOS E and F) under full development conditions. Alternative A was rated least preferred.

The projected future traffic volumes require McKeown Avenue to be a five lane roadway from Algonquin Avenue to the Ontario Government Building. From the Ontario Government Building to Gormanville Road the need for five lanes is less definite, but since the required tapers would reduce the four lane section to minimal length and provide minimal cost savings, it is proposed that the five lane section be continued through to Gormanville Road.

The added capacity of 5 lanes throughout would provide better traffic flow and result in fewer conflicts than 4 lanes. Traffic flow with Alternative B would tend to deteriorate with increasing conflicts between through traffic and left turning vehicles. Overall, Alternative C is preferred over Alternative B.

4.4.2 Safety

Alternative C provides the most preferred design in terms of transportation safety. Alternatives A and B maintain the existing high accident locations which would tend to worsen as traffic increases in the future. The added centre left turn lane in Alternative C would improve safety for left turning vehicles at intersections and at mid-block locations where conflicts between through traffic and left turning vehicles would occur without the centre left turn lane (Alternative B).

4.4.3 Land Use

Alternative C provides the most support for the desired future land use in the study corridor. The five lane roadway would be attractive for new development/redevelopment in the form of new district commercial and highway commercial along McKeown Avenue.

4.4.4 Socio-Economic Environment

Overall, Alternatives A, B and C were similar in the evaluation of socio-economic factors. Sound level changes were predicted to be similar for all alternatives and no differences in the aesthetics of the alternatives were identified. Alternative A was slightly more favoured over Alternatives B and C as the design would involve no property requirements.

Property requirements were greatest with Alternative C; however, the impact of property required for the road widening is minor overall and does not compromise the development potential of affected properties. The amount of property required generally involves narrow strips (not exceeding a width of 4.5 metres) along the south side of the street and small day lighting triangles at intersections. The inventory of property requirements for Alternatives B and C is included in Appendix 5.

4.4.5 Natural Environment

All alternatives were similar in the evaluation of the natural environment factor. Impacts that were identified for the road widening and culvert extension into Pinewood Parkway Creek associated with

Alternative C were minor and could be mitigated. Overall, Alternative C was slightly more preferred over Alternatives A and B as this alternative would reduce traffic congestion, result in lower fuel consumption and provide marginal air quality benefits.

4.4.6 Cost

Alternative A was most preferred, having the lowest construction and maintenance costs. Alternative C was the most costly option in terms of its construction and maintenance costs. However, Alternative B only ranked slightly ahead of Alternative C, with the difference being the $620,000 cost to construct the centre left turn lane.

4.4.7 Public Preference

Overall, public comments received at the two Public Information Centres indicated support for the recommended improvements (Alternative C) to McKeown Avenue in the Study Area. There were, however, insufficient comments received to indicate if one alternative was strongly preferred over the others. Alternative C was rated as only slightly more favoured than Alternatives A and B.

4.4.8 Overall Evaluation

Overall, in considering the detailed evaluation and taking into account ratings for the individual environmental factors, Alternative C was preferred over Alternatives A and B. The technical assessment and evaluation shows that the benefits of Alternative C outweigh its disadvantages to the environment which are minor and can be mitigated. Alternative C is the Study Team's recommended solution.

4.4.9 Proponent's Selection of Preferred Solution

The Study Team's recommended solution was endorsed by Council as the preferred solution by Resolution No. _____ on _____, 2001.

CHAPTER 5 - RECOMMENDED DESIGN AND CONSTRUCTION REQUIREMENTS

5.1 RECOMMENDED DESIGN

The following sections provide information on the recommended design alternative for McKeown Avenue. It provides preliminary engineering recommendations on the design plan, alignment, cross-section and intersection details.

5.1.1 Recommended - Plan

The recommended design is Alternative C. The plans for the alternative are illustrated in the three Exhibits 8, 9 and 10 (see Chapter 4) and on larger scale plans enclosed in the rear pocket of this report.

- Alternative C - Drawing No.1 - McKeown Avenue from Gormanville Road easterly to west of McNamara Street
- Alternative C - Drawing No.2 - McKeown Avenue from west of McNamara Street easterly to west of Champlain Street
- Alternative C - Drawing No.3 - McKeown Avenue from east of Cartier easterly to Algonquin Avenue

The recommended alternative provides for two lanes of travel in both directions, as well as a centre left turn lane. The design will provide an acceptable level of service for the anticipated future growth in traffic on McKeown Avenue.

McKeown Avenue from Gormanville Road easterly to west of McNamara Street (Alternative C, Exhibit 8, Drawing No. 1)

This section of roadway is presently a two lane roadway with curb and gutter. There are no additional lanes at intersections or at property entrances. The roadway drainage is by open ditches and by curb and gutter which is collected to a short section of 21 inch diameter storm sewer which discharges to an open ditch along Gormanville Road.

McKeown Avenue will be reconstructed in this section to a five lane urban cross-section. The cross-section provides two lanes in both directions of travel as well as additional turning lanes at Gormanville Road. A continuous centre fifth lane for left turns will accommodate left turning vehicles at the Ontario Government Building and will provide capacity in the roadway in the event that adjacent vacant lands are developed which would add additional traffic and new turning movements to commercial entrances on the street.

McKeown Avenue from West of McNamara Street easterly to west of Champlain Street (Alternative C, Exhibit 9, Drawing No. 2)

This section of roadway is presently a two lane roadway with an urban curb and gutter cross-section. Two side streets, McNamara Street and Cartier Street, intersect McKeown Avenue on its north side at "T" intersections. There are presently four entrances on the north side of the street serving apartment building/townhouse complexes and twelve commercial entrances on the south side which

serve a variety of industrial and commercial establishments. Drainage is by curb and gutter and storm sewer which outlet to Pinewood Parkway Creek on the west side of the Hopper Pontiac Buick GMC dealership.

McKeown Avenue in this section will be reconstructed from a two lane cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a continuous centre left turn lane to accommodate left turning vehicles at street intersections, existing apartment/townhouse complexes, commercial and industrial properties. Drainage will be by curb and gutter to storm sewers which outlet to an existing outlet at Pinewood Parkway Creek.

McKeown Avenue West of Champlain Street to Algonquin Avenue
(Alternative C, Exhibit 10, Drawing No. 3)

This section of roadway is presently a four lane roadway with an urban cross-section that was constructed in 1992. There are two side roads in this section, Champlain Street, which is a cross street, and Josephine Street, which connects to McKeown Avenue at a "T" intersection from the south. There are presently four commercial entrances on the north side serving the Wendy's Restaurant, the west and east entrances to Tim Horton's, which also serve as the Algonquin Square Mall west entrances, and the east entrance to the shopping mall and McDonald's Restaurant. Four entrances exist on the south side including the entrance west of Champlain Street to the Canadian Tire store, the McKeown Avenue entrance to the City of North Bay Fire Hall, and the entrance to the rear of Leon's Furniture Store between Josephine Street and Algonquin Avenue. Drainage is by curb and gutter and storm sewers which flow west along McKeown Avenue to Pinewood Parkway Creek at McKeown Avenue except for the area immediately adjacent to the McKeown Avenue/Algonquin intersection which flows to Chippewa Creek.

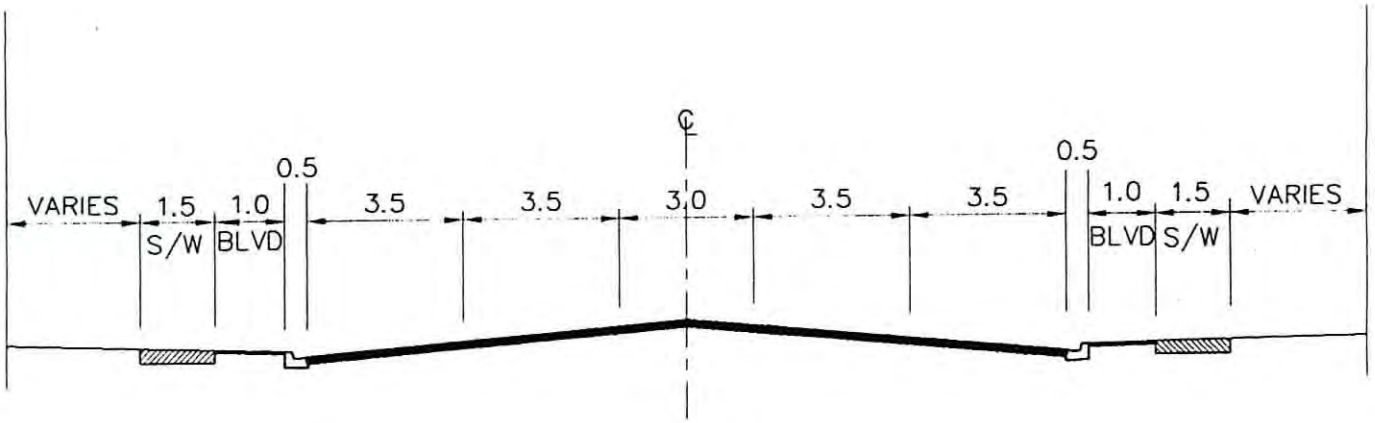
McKeown Avenue will be reconstructed in this section from a four lane urban cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a centre left turn lane. Additional lanes for acceleration or deceleration and turning lanes are included in the design.

5.1.2 Recommended Design - Cross-Section

The proposed cross-section includes four 3.5 metre driving lanes, a 3.0 metre centre left turn lane, curb and gutter, boulevard and sidewalk. The 3.0 metre centre left turn lane is continuous throughout McKeown Avenue from Algonquin Avenue to Gormanville Road except at signalized intersections where the lane becomes an exclusive lane for intersection left turn movements. The cross-section specifications are listed below and are shown on Exhibit 14.

Side-walk	Blvd	Curb and Gutter	Driving Lane	Driving Lane	Left Turn Lane	Driving Lane	Driving Lane	Curb and Gutter	Blvd	Side-walk
1.5 m	1.5-1.75	0.5 m	3.5 m	3.5 m	3.0 m	3.5 m	3.5 m	0.5 m	1.5-1.75	1.5 m

The cross-section provides a 1.5 m sidewalk on both the north and south sides of McKeown Avenue and a boulevard of varying width between the sidewalks and edge of curb. The area beyond the sidewalk will be suitably graded and landscaped to fit adjacent properties.



FIVE LANE ROADWAY

Exhibit 14 - CROSS-SECTION

5.1.3 Cross-Section and Property

The proposed cross-section is a minimum 25 metres wide including allowances for boulevards and right-of-way. The cross-section will require minor property acquisition from adjacent parcels throughout most of the project limits for lane widening and day lighting at intersections. An inventory of property required is included in Appendix 5.

5.1.4 Storm Drainage

Storm drainage will be provided by three existing storm sewer systems that run from Algonquin Avenue and the Ontario Government Office Building to Pinewood Parkway Creek and from the Ontario Government Building to open ditches along Gormanville Road. A third system drains the Algonquin Avenue/McKeown Avenue intersection area to Chippewa Creek.

5.1.5 Traffic Signals

New traffic signals are recommended at Josephine Street to coincide with new development in the area and at Gormanville Road. In the future, traffic signals may also be required at McNamara Street.

5.1.6 Illumination

There is existing illumination from east of McNamara Street through to Algonquin Avenue. The existing illumination from Algonquin Avenue to Cartier Street was replaced with the realignment of McKeown Avenue in 1993. The existing illumination will be upgraded where required and new illumination will be provided to Gormanville Road.

5.1.7 Utilities

Ontario Hydro, North Bay Hydro, Bell Canada and Union Gas will be contacted at the detail design stage for review and approval of the final design drawings.

5.1.8 Underground Infrastructure

5.1.8.1 Sanitary Sewer and Watermains

There have been no reported deficiencies in either of these services either due to capacity or maintenance related issues. However, due to the current age of these services we would recommend that further investigation be undertaken to confirm their adequacy in terms of structural integrity and system capacity prior to the commencement of design. No costs have been assigned in our estimate for the replacement of these services.

5.1.8.2 Stormwater

Storm Sewer - Remedial Measures

Due to the deficiencies in capacity of the existing storm sewer system and outlet, the following works should be given consideration.

(a) Perform remedial work on the downstream drainage system as recommended in the Pinewood Fingers Park study. The remedial work recommended included improvements to the Pinewood Creek System, diversion of part of the flow to the Duschenay Creek System or a combination of both. This work needs to provide a free outlet to the gravity storm sewer system to be effective.

(b) Provide relief to the existing storm sewer system on McKeown Avenue by:

(i) Regrading the existing storm sewer and or providing an additional storm sewer within the right-of-way with an interconnection between both of them when the roadway is reconstructed or widened in the future; or

(ii) Accepting the concept of overland flow down McKeown Avenue with flooding of the road and possibly adjacent currently developed properties; or

(iii) A combination of storm sewer relief via an additional piped system and overland flow.

(c) It is recommended that some type of backflow prevention system be installed on the existing properties that are connected to the existing storm sewer and are experiencing flooding as well as all future development where it is deemed necessary and it should also be ensured that all new developments in this corridor employ Stormwater Management techniques to ensure that post development flow is equal to pre-development flow.

Stormwater Management Issues

Quantity

Due to the changes in the design standards and increase in runoff coefficients for the storm sewer associated with new development within the municipality, as mentioned previously, and the current requirements with respect to water quality and quantity, it is imperative that future developers make provisions to accommodate increased stormwater by means of on-site stormwater management plans. The same scenario should be applied to municipal lands where an increase in stormwater is generated. These stormwater management plans would need to demonstrate that any increase in flow, as a result of development, would be detained and released in a controlled fashion.

For private development, the municipality currently has the controls in place (site plan and subdivision agreements) to ensure that proper stormwater management occurs. We recommend that due to current capacity problems that detention of flows occur as close as possible to the point of origin.

The municipality will be required to detain stormwater due to the increase in hard surface with the new proposed increase in road width. The options to the municipality are:

- Since there are no municipally owned lands available within the right-of-way to create a storm detention area, it will be necessary to obtain these from potential developers. These lands would best be obtained during the development stage, as part of the development agreement for each parcel, rather than purchased directly by the municipality. Should the municipality wish to purchase these lands in advance, this procedure would place the onus of maintenance on the municipality.

- An additional option would have the developer increase the amount of post-development flow that they detain on site to include a portion of the 1.0 ha of increase in hard surface. Based on approximately 13 ha of land yet to be developed, this would require each developer to accommodate an additional 0.075 ha of hard surface of land in their stormwater management plan for each hectare of land that is the subject of their development proposal. Should there

be a time lapse between the property development and the improvements to the road it may be necessary to negotiate with earlier developer's to accommodate more storage in order to ensure that the flows are not increased.

- Should the municipality decide not to provide detention for the increased flow that it generates at or near the point of origin, the potential exists to provide some storage between the outlet of the 66 inch storm sewer and the Highway 17 cross-culvert on land currently owned by the Management Board Secretariat (Part 2 of Plan 36R-8858). This property could accommodate approximately 6000 cubic metres of water which would exceed the increased flow for the 100 year storm and the increased hard surface for municipal lands. While this option provides no relief to the capacity of the existing storm sewer or the surcharging experienced at the outlet it will meet the requirements for storage of the increased flow at least for that portion of Pinewood Creek below the Highway 17 culvert.

Stormwater - Quality Issues

The existing drainage system consists of a system of pipes, culverts and rechannelled sections throughout this catchment. The entire drainage course has been altered and, therefore, the potential for fish production is low. This type of drainage course is considered to require Level 3 protection. However, we have been advised that there is strong potential for walleye spawning and fish feeding areas at the outlet of the drainage course to Lake Nipissing and; therefore, recommend that Level 2 Protection, as a minimum, be applied to any development in this area.

Cost Estimates

The costs associated with

- Improvements to the Pinewood Creek drainage system are identified in the City's Pinewood Fingers Park Study.

- Providing relief to the storm sewer system in the way of an additional parallel storm sewer ranges between $1,500,000 to $2,000,000.

- Associated with a pond on Part 2 of Plan 36R-8858 is approximately $150,000 exclusive of land purchase.

5.1.9 Construction Staging

The improvements associated with the recommended alternative will likely be staged over a number of years as all of the capacity improvements are not expected to be warranted at the same time. The recommended timing for improvements is based on traffic volumes, identified capacity deficiencies which exist now and the sequence in which capacity shortfalls are expected to occur.

McKeown Avenue from Algonquin Avenue to Champlain Street

The analysis of existing traffic volumes and accident statistics indicate **an existing need** to provide a fifth centre left turn lane within this section of roadway. The improvements can be timed to coincide with the development of vacant lands along the corridor or with the redevelopment of existing properties.

McKeown Avenue from Champlain Street to Gormanville Road
There will be **a future need** to provide a fifth centre left turn lane within this section of roadway with two through lanes in each direction to provide sufficient capacity over the planning period with full development. The timing for the recommended improvements from Cartier Street to Gormanville Road will be warranted as new development occurs in the corridor west of Champlain Street.

McKeown Avenue/Gormanville Road/College Drive Intersection
It is expected that **traffic signals will be warranted at the intersection within the next few years.** The left turns from McKeown Avenue onto Gormanville Road are facing long queues and delays at peak hours (Level of Service F). It is recommended that the intersection be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

5.2 RECOMMENDED DESIGN - POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

5.2.1 Natural Environment
Impacts to the natural environment as a result of the proposed work are minor as the reconstruction will be limited to roadway widening of approximately 5 m on the south side within a highly urbanized environment.

The road widening will require a 5 metre extension (approximate) of a 66 inch diameter storm sewer which would result in enclosing an open section of Pinewood Parkway Creek for the 5 metre length. The extension would most likely consist of adding the required length of 66 inch diameter precast reinforced concrete pipe, a new concrete headwall with end grade and stream bed armouring with rip rap for long term erosion protection. Although the creek at this location does not contain critical fish habitat (eg. spawning areas), it is an open natural channel that supports warmwater minnow species. The creek outlets at the Lake Nipissing shoreline which is known to support walleye spawning and the creek and downstream waters could be affected by sedimentation generated by upstream construction activities.

It is recommended that the construction of the storm sewer extension occur in low flow conditions. If it becomes necessary, standard construction practices to temporarily dam or dam and pump flows for dewatering of the work area could be employed and specified in contract documents. It is also recommended that a detailed erosion and sedimentation control plan be prepared for the entire project identifying controls to be employed before, during and after construction. Consideration should be given to incorporating silt fence barriers along both banks of Pinewood Parkway Creek at McKeown Avenue and straw bale flow checks in the open ditches discharging to the creek.

When detailed design drawings are available and before construction proceeds, the drawings should be submitted to the appropriate public authority to finalize mitigation plans.

5.2.2 Social Environment
The overall adverse impacts associated with the recommended improvements are minor. There will be some noise impacts with this project due to the increases in traffic. The residential areas on the north side of McKeown Avenue are recognized as sensitive noise receptors and a Noise Impact

Assessment completed in May 1999 indicated that:

> *"The existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less than the Ministry of Environment desirable Criteria of $L_{eq\ (16)}$ 55dBA. Traffic volumes in the future as a result of the expansion in traffic will increase the sound levels by about 4dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other roadway mitigation are not possible or feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.*
>
> *The conclusion of the noise study is that noise will increase as a result if expected increases in the traffic but would remain within acceptable levels. Barriers and other devices on the right-of-way are not required or feasible."*

The selected alternative has a number of features which provide social benefits to the residents of the area and to road users. There will be a decrease in driver frustration with reduced congestion of the roadway. Traffic signals at intersections will provide for safer turning and allow through vehicles to pass safely in the additional lane. Vehicles will move through the area quicker and with increased safety. It is expected that there will be a reduction in the number of accidents at the intersections and entrances as a result of this project.

The road will be illuminated and should result in safer pedestrian movements through the area with sidewalks on both sides of the street.

5.2.3 Property

The recommended design will involve land acquisition from adjacent properties. The property requirements were identified using the best information available to the Study Team including preliminary engineering design drawings of the recommended alternative, assessment base mapping and existing Plan and Profile drawings of McKeown Avenue supplied by the City of North Bay.

The property requirements should not be considered to be survey accurate. Prior to construction, and when detailed Plan and Profile drawings of the recommended design are available, a legal survey will be prepared to finalize property requirements.

Where property is acquired for public road allowance by the City of North Bay, it is the policy of the City to negotiate fair and full compensation based on current appraised value in accordance with the provisions of the Expropriations Act.

5.3 RECOMMENDED DESIGN - SPECIFIC CONSTRUCTION REQUIREMENTS

There are no site specific conditions which require special consideration over and above those that are normally prescribed for a project of this nature.

5.4 SUMMARY OF PUBLIC COMMENTS AND RESPONSES

The study process included extensive public consultation and review which was previously described in Chapter 2. The comments and concerns brought forward in the study are summarized in the following table:

Commenter / Study Participant	Comments / Concerns	Response
Willis Enterprises Ltd.	- owner of vacant parcel on south side of McKeown Avenue - concerned about future access to the property from McKeown Avenue and the amount of property required from the parcel for road widening - Q. Will the City of North Bay pay compensation for the property acquisition to accommodate the road widening? - Q. Will the widening and reduced lot area affect the development potential of the remaining parcel? - Q. Will access to the property from McKeown Avenue be approved in the future?	- study team members met with the owner at both PICs and at a follow up meeting with the City of North Bay - answers to the questions/concerns were provided at the meetings and in correspondence to the owner (Northland Engineering letter to Willis Enterprises dated July 7, 1999) - no further action required
James W. Neil Investments	- owner of developed industrial parcel on south side of McKeown Avenue (Techni Data Training) - requested information on the amount of land required with the recommended alternative	- plan of Alternative C showing the property requirements was provided
D.J. Venasse Construction Ltd.	- owner of developed parcel on south side of McKeown Avenue - expressed concerns regarding the impact of the proposed Alternative on a newly severed property - requested that any new development fees for road improvements be calculated on an area and not road frontage basis	- the owner was provided with correspondence from Northland Engineering (dated July 14, 1999) and from the City of North Bay (dated August 18, 1999) on what action was to be taken to maintain the severed parcel size with the road widening - Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA Study is completed. - no further action required

Commenter / Study Participant	Comments / Concerns	Response
Algonquin Square Mall	- owner concerned that future special area charges should not apply to new development on the Algonquin Square Mall lands as road improvement contributions were already provided to the City - identified that the consolidation of the commercial entrances to Tim Horton Donuts/Algonquin Mall would impact access to the property	- the Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA is completed - the two existing entrances would be consolidated and replaced with a new signalized intersection at Josephine Street which would provide controlled access into the property - preliminary sketches identifying how the internal driveway and parking would fit with a new intersection were supplied by Tranplan Associates - no further action required at this time
J.S. Redpath Limited	- owns property on the south side of McKeown Avenue - requested to be kept informed of the study	- contact name was kept on the mailing list to receive notices
Hopper Pontiac Buick GMC	- requested to participate in study	- contact name was kept on mailing list to receive notices
McDonald's Restaurant	- requested to receive notice of meetings for the study	- contact name was kept on mailing list to receive notices
Leon's Furniture	- requested copy of the McKeown Avenue/Josephine Street Traffic Study - identified a concern that access to the property from McKeown Avenue be maintained	- copy of the study was provided as requested - recommended centre left turn lane would allow access to the existing rear entrance. Left turn arrows were added to the design drawing to indicate the turning movement
Multidev de l'Outaouais	- requested notices and copies of the recommended road improvements	- plans were provided - contact name was kept on the mailing list to receive notices
Ontario Hydro	- requested detailed design drawings of the recommended road improvements - concerned that incompatibilities between the road improvements and the Ontario Hydro transmission line be identified and addressed prior to approval of detailed engineering design	- contact at detail design stage for Ontario Hydro review and approval of design drawings
Bell Canada	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Bell Canada review and approval of design drawings

Commenter / Study Participant	Comments / Concerns	Response
Union Gas	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Union Gas review and approval of design drawings
North Bay Hydro	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for North Bay Hydro review and approval of design drawings
North Bay-Mattawa Conservation Authority	- requested detailed design drawings of the recommended improvements to storm sewer outlets affecting Pinewood Parkway Creek	- contact at detail design stage for Conservation Authority review of recommended erosion and sedimentation control plan
Ministry of Citizenship, Culture and Recreation	- provided clearance that no archaeological study was required	- no further action required
Ministry of Transportation	- was consulted and provided input on what design considerations were required to integrate MTO interests into the design alternatives for the Class EA	- on-going involvement of MTO during detailed design stage

CHAPTER 6 - MONITORING

Contract supervision should be provided during construction to monitor work in progress and ensure that the recommended mitigation measures in this report and which are incorporated into the detailed design and contract package are carried out.

APPENDIX 1

PUBLIC CONSULTATION

Public Notices
PIC Attendance
Mailing List

NOTIC. OF STUDY COMMEN EMENT
CLASS ENVIRONMENTAL ASSESSMENT
McKeown Avenue from Gormanville Road to Algonquin Avenue
CITY OF NORTH BAY

The City of North Bay passed Resolution No. 20 on December 7, 1998 which gives direction to conduct an environmental assessment study and associated traffic planning and design study for McKeown Avenue from Gormanville Road to Algonquin Avenue. Accordingly, the City is commencing a study to identify any required improvements on McKeown Avenue in accordance with the Schedule 'C' planning requirements of the Class Environmental Assessment for Municipal Roads.

The study will examine the development potential of the study area and determine the impacts that this development will have on the capacity of the existing road system. Options to alleviate the problems will be investigated and recommendations made for improvements. The primary study area is indicated on the key plan attached to this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City in 1996.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct this study on behalf of the City of North Bay. The study team will present their findings to the general public at two Public Information Centres. The first Public Information Centre will be held in the spring. The date, time and location will be advertised in the local paper.

If you would like to participate in the study process or to obtain further information, please contact

Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre St. East
NORTH BAY, ON, P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P.Eng. **Or** **Mr. Dave Richards, P.Eng.**
Tranplan Associates **Northland Engineering (1987) Limited**
1850 Bond Street
NORTH BAY, ON, P1B 8G5
Telephone: 474-2720

NOTICE

Notice of Public Information Centre — Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and options to alleviate identified problems will be displayed at a Public Information Centre (PIC) at the following location:

Location: Main Foyer, City Hall, 200 McIntyre Street East
Date: Wednesday, April 14, 1999
Time: 4:30 p.m. to 8 p.m.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

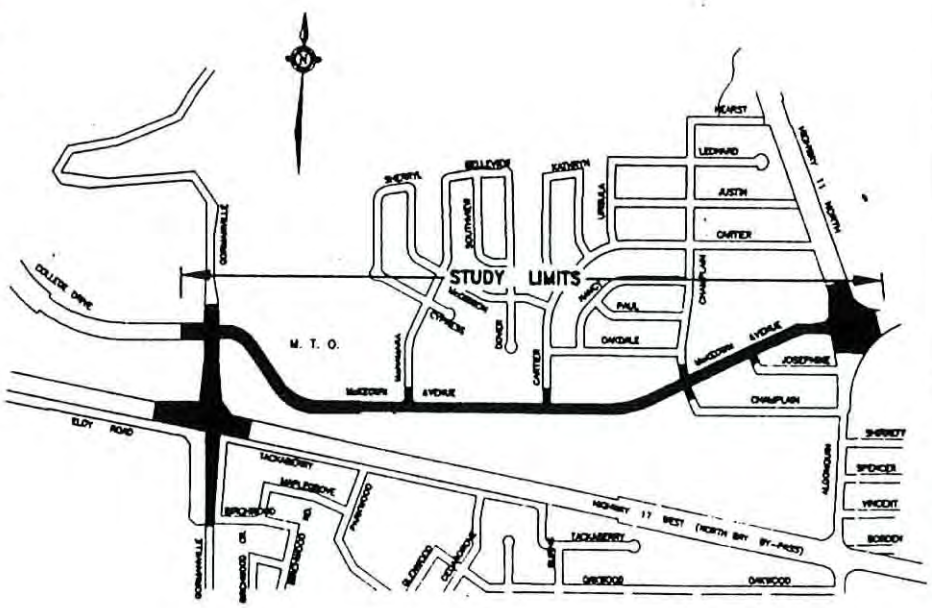
Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre Street East
NORTH BAY, ON P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P. Eng.
Tranplan Associates
Telephone 474-2720

Or

Mr. Dave Richards
Northland Engineering
(1987) Limited

1850 Bond Street
NORTH BAY, ON P1B 8G5
Telephone: 474-2720



NOTICE

Notice Of
Second Public Information Centre
Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class Environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts that any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and road improvement alternatives will be displayed at a second Public Information Centre (PIC) at the following location:

Location: **Main Floor, City Hall, 200 McIntyre St. East**
Date: **Wednesday, June 2, 1999**
Time: **4:30 p.m. to 8 p.m.**

The road improvement alternatives under consideration include reconstructing McKeown Avenue to its current 2 lane and 4 lane configuration (Alternative A), widening McKeown Avenue to 4 traffic lanes throughout (Alternative B) and widening McKeown Avenue to 5 traffic lanes throughout (Alternative C).

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

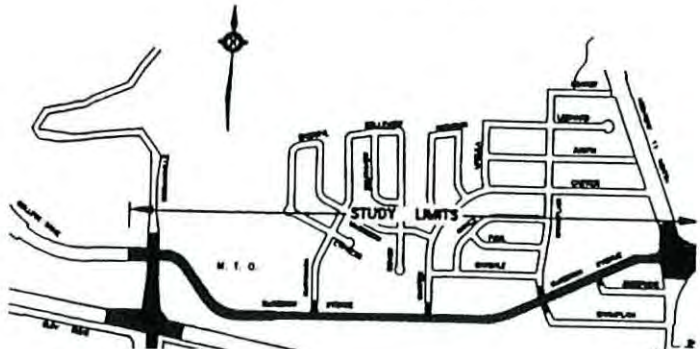
Please note that this study deals with McKeown Avenue, west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

Mr. John Simmonds
City Engineer
City of North Bay
200 McIntyre Street East
North Bay ON P1B 8H8
Telephone:
474-0400, Ext. 308

Mr. Toivo Rukholm, P.Eng.
Tranplan Associates
Telephone: 474-2720

Mr. Dave Richards
Northland Engineering
(1987) Limited
1850 Bond Street
North Bay ON P1B 8G5
474-2720



APPENDIX 2

NOISE IMPACT ASSESSMENT

NOISE IMPACT ASSESSMENT

NEL 4351 - MCKEOWN AVENUE, NORTH BAY

FROM GORMANVILLE ROAD
EASTERLY TO ALGONQUIN AVENUE

prepared for the

CITY OF NORTH BAY



May 21, 1999

northland
engineering
limited
north bay sudbury

EXECUTIVE SUMMARY

NOISE IMPACT ASSESSMENT
CITY OF NORTH BAY - MCKEOWN AVENUE, NORTH BAY

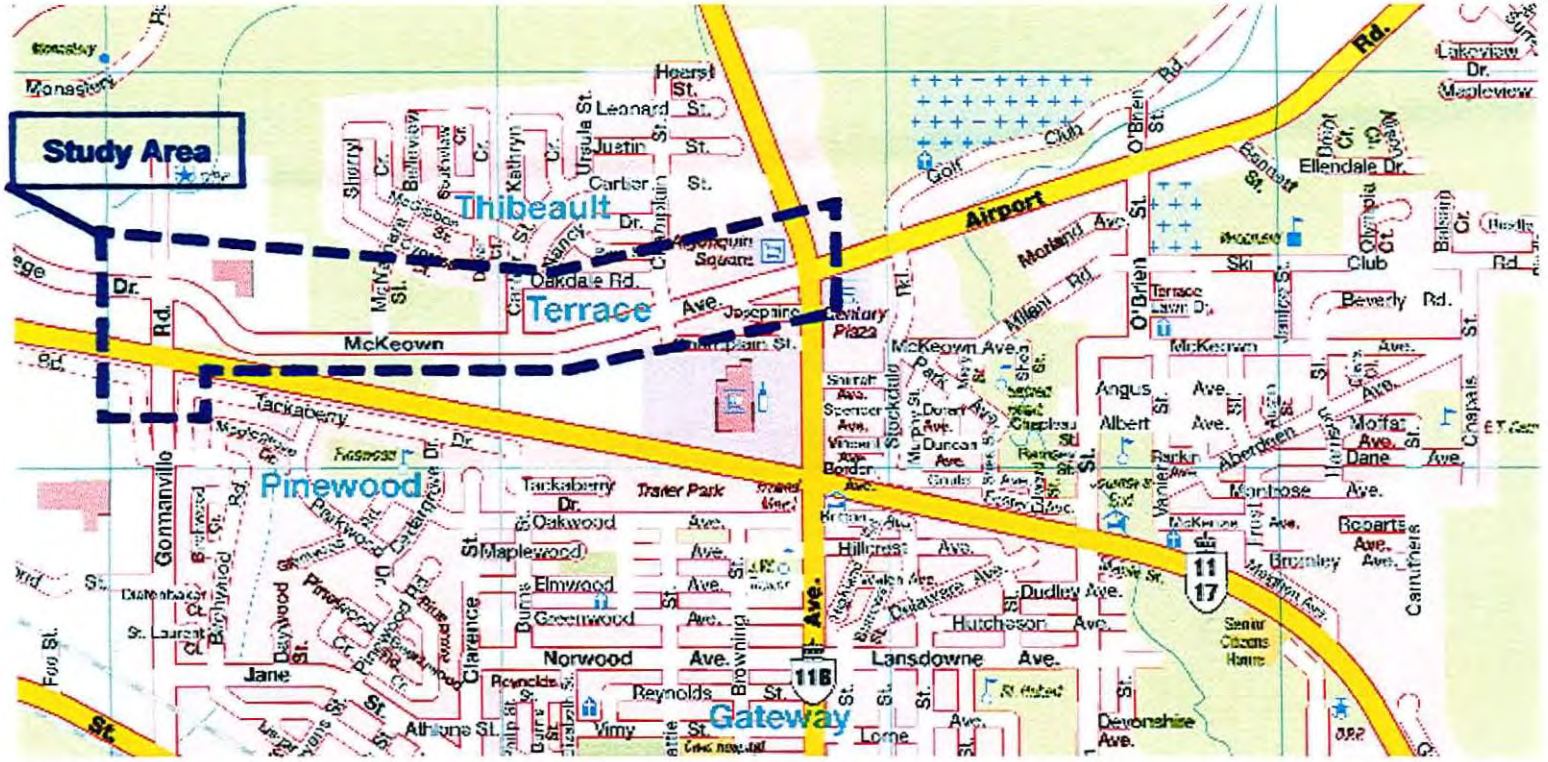
From Gormanville Road
Easterly to Algonquin Avenue

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

KEY PLAN



MCKEOWN AVENUE FROM GORMANVILLE TO ALGONQUIN AVENUE
TRAFFIC PLANNING STUDY - NOISE ASSESSMENT STUDY

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1.0 INTRODUCTION

1. This report analyzes the 1999 sound levels resulting from the 1999 traffic volumes on McKeown Avenue and the associated side streets, of McNamara Street, Cartier Street and Champlain Street. It compares these levels with the future full development scenario traffic volumes for the McKeown Avenue corridor.

2. The purposes of the study are to:

   - To determine the potential changes to the ambient environment due to the proposed widening and reconfiguring of traffic lanes on McKeown Avenue and the adjacent side streets.

   - To assess the significance of the changes, and to recommend mitigation appropriate to the increases if necessary.

3. At the present time McKeown Avenue is four lanes from Algonquin Boulevard to Cartier Street. The section from Cartier Street over to Gormanville Road is two lanes.

4. The future traffic predictions are based on the proposed five lane section - four through lanes with a continuous left turn in the middle to accommodated left turns for both directions of travel.

5. The predictions in this report are based on traffic volumes for the present traffic volumes and predictions traffic volumes prepared by Tranplan Associates.

6. The sound level predictions were made using STAMSON. This is a computer version of the road and rail noise prediction methods contained in ORNAMENT (Ontario Road and Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). This project used the road's portion of this program to make the prediction for present and future traffic in the corridor. Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

2.0 SOUND LEVELS CRITERIA

2.1 MOE/MTO Protocol

The MOE/MTO protocol is a joint effort of both the Ministry of the Environment (MOE) and the Ministry of Transportation (MTO) as outlined in the document titled "a Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of the Provincial Highways Environmental Assessments," Feb. 1986. It primarily applies to Provincial Highways undertaking such as Freeways and Kings Highways

The MOE has informally extended the use of the MOE/MTO protocol criteria to also embraced other roadways, such as the Regional and local Municipal roads subject to the provisions of the Environmental Assessment Act (EAA) administered by the MOE. Since there is no formal direction published by the MOE on the protocol application, it is recommended that the same directions with regards to mitigation applies to the MTO projects be applied also for this Municipal project. The criteria which should apply to this and other municipal projects, is a review of mitigation within the roadway road allowance. The noise impacts assessment should be reviewed for the Outdoor Living Area (OLA). The protocol does not specify whether the L_{eq} sound levels should be 24-hour based or some other time frame, the MOE extended the appropriate technical logic to municipal roads by requesting calculations be done on the basis of the daytime $L_{eq\,(16)}$ dBA[1].

To ensure that the assessment covers the most significant sound levels, predictions are made in this the assessment on the 16 hour time frame from 07:00 to 23:00 hours. This is considered the day time hours. As this an urban residential areas and commercial industrial area we have assumed 90% of the traffic is in this time frame. For purposes of determining the traffic needs for this roadway Tranplan Associates developed traffic volumes for the Design Hour Volume (DHV). These figures are 10% of the Annual Average Daily Traffic (AADT) traffic volumes.

The study also calculated the sound levels which would be experienced under the Design Hour Volume flows for comparison against the 16 hours volumes. There is a slightly higher level of 2 or 3 dBA using the DHV versus the 16 hour volumes. The increases from now to future are about the same using either method. For the purposes of the evaluation the 16 hour volumes were used, and is more representative of the sound levels experienced in this residential area, and in keeping with the latest Ministry of the Environmental Guidelines "Noise Assessment Criteria in Land Use Planning LU-131, October 1997, and its ancillary publications. The other point worth noting is that despite the presence of Provincial objective the outdoor levels of L_{eq} 55

---

[1] The sound levels in this report are all report in $L_{eq\,(16\ hour)}$ dBA. This is the 16 hour time frame from 07:00 to 23:00, reported in dBA which is the A weighted sound scale which best represent the hearing of the human ear. For purposes of simplification and convenience in the report figures will be reported as L_{eq} dBA the 16 hours will be assumed unless noted otherwise.

dBA[2], 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 levels criteria, the following statements are quoted from the protocol:

1 Section 3.1.2 of the publication LU-131 gives the equivalent sound level (L_{eq}) criterion in the selected Outdoor Living Area. The criterion applies to the entire daytime period from 07:00 to 23:00. The objective for outdoor sound levels is the higher of the L_{eq} 55 dBA or the existing ambient. The significance of the noise impact will be quantified by using this objective in addition to the change in noise levels above the ambient.

2. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as it 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 Levels above the Ambient	Mitigation Effort
0 to 5 dBA	none
greater than 5 dBA	• investigate noise control measures on ROW. • if project costs are not significantly affected introduce noise control measures within ROW • noise control measures, where introduced, should achieve the minimum of 5 dBA attenuation, over first row receivers • mitigate to ambient, as administrative, economically and technically feasible

[2] L_{eq} is an energy averaging concept adopted by the MOE to sum the time varying noise generated by vehicular traffic. The result are expressed in dBA: which is a logarithmic scale that approximates the response to the human ear.

2.2 MTO Directive A - 1

This directive is specifically written for the Provincial Highways, the MTO also applies this directive to Arterial and the Municipal roads.

The following are some of the typical applicable highlights of the MTO directive, supplemented by previous MTO work experience knowledge.

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

2. There are no subsidies for off ROW mitigation.

3 The MTO favors the institution of retrofit programs where the present or future levels exceed L_{eq} 70 dBA irrespective of how small the excess of future levels is above the present ambient, or the future Do Nothing scenarios.

3.0 ANALYSIS AND THE RESULTS

3.1 Noise Impact Methodology

1. Noise is generally defined as unwanted sound. In this case, the noise under consideration is the road traffic noise perceived along the McKeown Avenue corridor. The glossary section provides technical definitions of the road traffic noise analysis to assist in understanding the principles and terminology used in this report.

   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 preset sound level limit (criterion) such as L_{eq} 55 dBA. The degree of noise impact varies directly as the ratio between the intruding and existing noise levels; for instance, the more the intruding noise level exceeds the existing noise level, the higher the impact

   Since the proposed roadway traffic noise represents the future consideration, projections are made as to sound levels which will be generated by the project under consideration when the roadway has been in operation for at least ten years and the existing and adjacent commercial/industrial properties have come to full development and the other areas serviced by the road have been fully developed.

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

   The MTO and MOE modifications included adjustments for ground cover, terrain differences and barrier adjustments. The algorithms were also adjusted to accommodate typical Ontario traffic mixes, speeds, and situations. These modifications resulted in the ORNAMENT noise prediction methodology. The computerized version of the program is STAMSON. Version 5.1 of the prediction program was used to make sound level predictions for this project. The technical data of the ornament model used and the various adjustments implemented are summarized in appendix B.

3. There are a variety of descriptors that can be used to describe the noise levels at any location. The prediction methods all use the same descriptors are all therefore similar, in that they account for all the different parameters that modify or attenuate the noise at that location such as intervening rows of homes, townhouses, length of roadway segments, various roadway etc. Therefore, the differences in the sound levels experienced is therefore more or less based on traffic volumes.

   The sound levels for these locations selected were predicted using the L_{eq} 16 hour traffic volumes, which is approximately 90% of the daily traffic, percentages of the medium and heavy trucks, posted speed limits, road receptor distances, elevation differentials between the road and the receptor, roadway grading, pavement types and the type of ground cover between the road receptor in question. The percentage of trucks and classifications were derived from traffic counts by Tranplan and the City of North Bay.

   The sound levels which would result from the Design Hour Volumes were also calculated and compared to the 16 hour volumes. These values are higher by 2 or 3 dBA than the normal 16 hour dBA prediction. This was done to determine a peak sound level. The MOE criteria uses the 16 hour volumes to get a better representation of the sound levels. The 16 hour dBA L_{eq} is based on 90% of the traffic occurring in the 16 hour period from 7:00 a.m. to 11:00 p.m. Using this descriptor the value are approximately 2.5 dBA less than the DHV traffic volumes. The DHV then indicates the worst case scenario, and is associated with the level of traffic occurring in the highest afternoon peak hour. The levels for the remainder of the day are best represented by the dBA $L_{eq\ (16)}$ levels.

4. Ambient or existing sound levels along McKeown Avenue are largely due to the traffic on McKeown Avenue and the existing side streets. There are some sound levels in the area as a result of the nearby Highway 17 corridor to the south of this

area. The remainder of the sound in the neighbourhood is typical of urban subdivisions, children playing, traffic on local streets, lawnmowers, etc.

3.2 Study of the Alternatives.

For the purpose of the design study 6 receivers were selected which typify the various neighbourhoods adjacent to the study area. These represent more or less the areas that are impacted by sound levels from the McKeown Avenue traffic in the corridor.

There are three main alternatives,

A. The existing corridor with reconstruction to fix frost heaves and poor subbase conditions, this alternative utilizes the existing centreline.

B. Four lanes throughout, the existing Algonquin Avenue to Cartier Street section would remain the same and the section from Cartier Street to Gormanville Road would be widened to four lanes similar in cross section to the section from Cartier Street to Algonquin Avenue, this alternative utilizes the existing centreline.

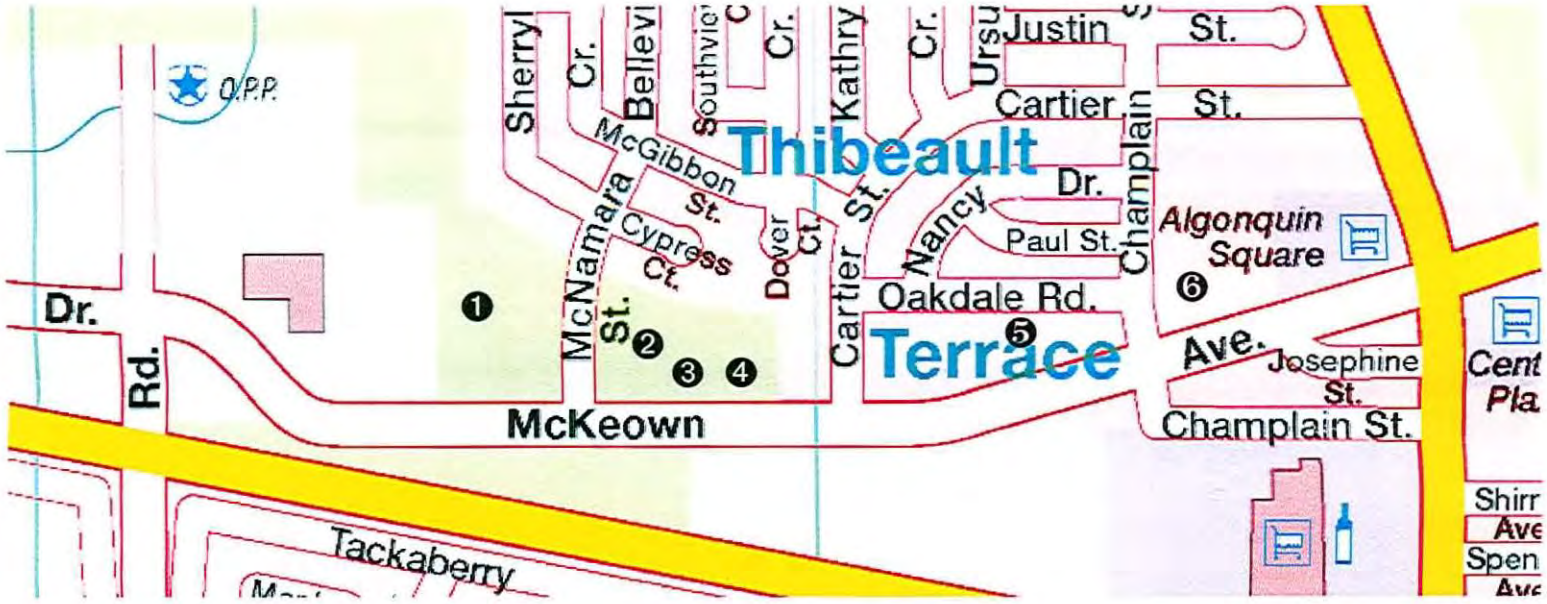
C. This alternative has a five lane section throughout from Algonquin Avenue to the Gormanville Road intersection. This centre lane will allow left turns in both directions to entrances and side streets. This alternative moves the centreline to the south about 1.5 m's in the section from Cartier Street to the Ontario Government Building west entrance.

The minor difference in source to receiver distance is so minor as to not make any significant difference in the predictions. The future traffic predictions are generally based on the commercial and industrial properties developing to their highest and best use. The larger traffic volumes as a result of this development is the most significant difference in the increase in sound levels.

3.3 Receiver Locations

There were six locations selected as representing the various neighbourhoods adjacent to McKeown Avenue. Each of these locations are typical for a particular site. They are illustrated on the McKeown Avenue Receiver Site Map. A description of each of the sites follows.

MCKEOWN AVENUE - GORMANVILLE ROAD TO ALGONQUIN AVENUE
NOISE ASSESSMENT RECEIVER LOCATIONS



3.3.1 Receiver #1 - 545 McNamara Street, Maplecrest #2



Figure 1 - Receiver #1 575 McNamara in the outside recreational area

This is a townhouse development off MacNamara Street north of Algonquin Avenue, behind the Lucky 13 Convenience Store Strip Mall. The outside recreational area to the left of the picture is used for the receiver location and represents the outdoor living area of the housing complex. The townhouse recreational and playground area are here as well. This site represents the highest sound levels in the complex. The homes elsewhere in the complex are shielded by the first row of continuous houses.

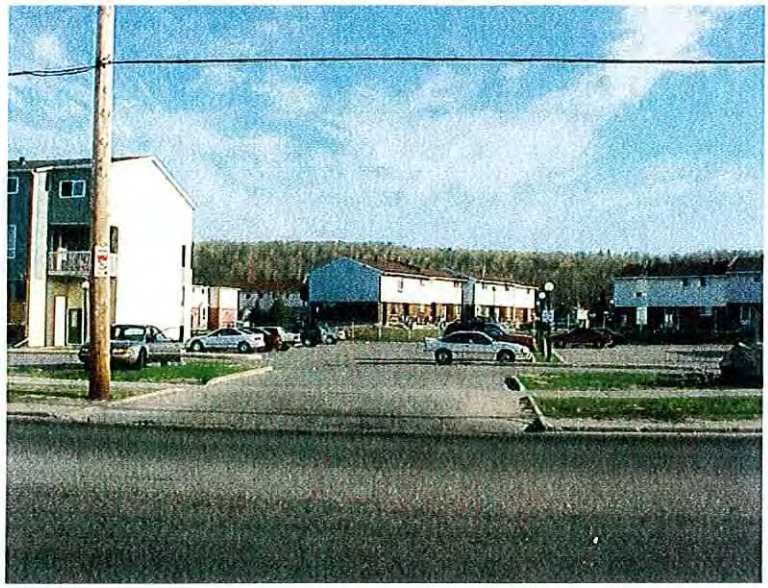
3.3.2 Receiver #2 - New Era Outdoor Recreational Area



Figure 2 - Receiver #2 outdoor recreational area of the New Era townhouse complex

This receiver location is the outdoor recreation area in the courtyard of the New Era Townhouse at the northwest corner of McKeown Avenue and McNamara Street. This also represent the common outside recreational area to the north of the townhouse complex on McNamara Street. This area is shielded by the 3 story building on two sides. The area to the right, which is the next complex on McNamara St., also receive the benefit of this shielding.

3.3.3 Receiver #3 - New Era Townhouse Outside Area east of building



This is the area is to the east of the New Era Townhouse complex. This encompasses the are between the New Era Complex and the Northern Co Operative Housing next door. This represent a nearby area with some shielding and also approximates the levels at the townhouse complex next door on McNamara Street visible in the background.

Figure 3 - Receiver #3 area east of townhouse complex

3.3.4 Receiver #4 - Northern Co Operative Housing Complex outside living area



This location is in the outdoor living area for the Northern Co Operative Housing Complex on McKeown Avenue. This location is representative of the outdoor living areas for the complex. The location is in the centre of the common area of the backyards and outside areas.

Figure 4 - Receiver 4 outdoor living area of the Northern Co Operative

3.3.5 Receiver #5 - Rear Backyards of the homes on Oakdale Avenue.



Figure 5 - Receiver #5 rear of the homes on Oakdale Avenue

Receiver #5 is the rear back yards of the residences along Oakdale Avenue. These outdoor living areas face McKeown Avenue. They are separated from McKeown Avenue by the Ontario Hydro corridor. There is some intervening shrubbery which provides some screening. This are along McKeown is likely going to develop as commercial property.

3.3.6 Receiver #6 - Rear of the Homes on Champlain Street on east side of street.



Figure 6 - Receiver #6 rear of homes on the east side of Champlain Street north.

This location is in the rear yard and outdoor living area of the homes on Champlain Street north on the east side. The actual location for evaluation was in the rear yard of the second home north of McKeown Avenue.

3.4 Description of the Ambient Noise

The existing ambient noise referred to in this study is the 1999 ambient or existing sound levels at the receptors locations based on the existing traffic volumes and lane configuration. The future full development ambient levels are based on the traffic volumes predicted by Tranplan Associates. These future ambient have been calculated in accordance with the MOE guidelines and using the Stamson computer noises prediction program based on the Ornament noise prediction methodology.

The dominant sources of noise in the project area is vehicular traffic movements along McKeown Avenue and the neighbourhood traffic in the side streets. Highway 17 is nearby and has large traffic volumes. It was included in the receiver #1 calculations because of the proximity and visibility. For the other receivers the highway is further away and there are intervening structures which means that the highway contribute little to the sum of the noise in the receiver locations. A prediction including this source resulted in a very minor increase in the sound levels of about 0.1 dB. In the still of the night the highway may be audible from some of these other locations.

3.5 Traffic Data

For the purposes of the study, AADT volumes for all the streets were used as supplied by Tranplan Associates. The AADT for the existing ambient is based on the present Design Hour Volumes which have been calculated for all roadways and intersections. The Design Hour Volume is basically 10% of the AADT. The future AADT was based on a future scenario where all of the properties along McKeown have been developed to their fullest and best use as commercial and industrial properties. The traffic generated at these location and in the study area is based on the present plans that are in place for a number of these properties. See Figure 7 McKeown Avenue Traffic Volumes Presents and Figure 8 McKeown AvenueTraffic Volumes - Future.

3.6 Impact Assessment

The process for assessing the impact of the project for the adjacent resident was to calculate the existing sound levels based on today's traffic volumes. The future traffic sound levels were predicted as well. These were based on the full development of adjacent properties. These values were compared to the established criteria as determined by MOE. Figure 11 - McKeown Avenue Noise Predictions which shows the sound levels at the various receiver locations for the existing traffic and the levels expected with the future traffic volumes. The change in dBA is also illustrated on Figure 12 McKeown Avenue Sound Levels, which shows a graphical representation of these predictions.

McKeown Avenue Traffic Planning Study - Traffic Volumes Present

May 20, 1999

1999 - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	6,750	6,480	99	171
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	8,100	7,767	126	207
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	13,050	12,528	198	324
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	9,000	8,100	405	495

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

C:\DATA\Northland\North Bay\NEL 4351 McKeown Ave\Noise Predictions\Traffic Volumes 16 hour 1999.wpd

Figure 7

McKeown Avenue Traffic Planning Study - Traffic Volumes Future

May 20, 1999

FUTURE - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	11,350	18,576	290	484
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	21,150	20,304	317	529
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	27,000	25,920	410	670
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	15,300	13,770	689	841

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

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Figure 8

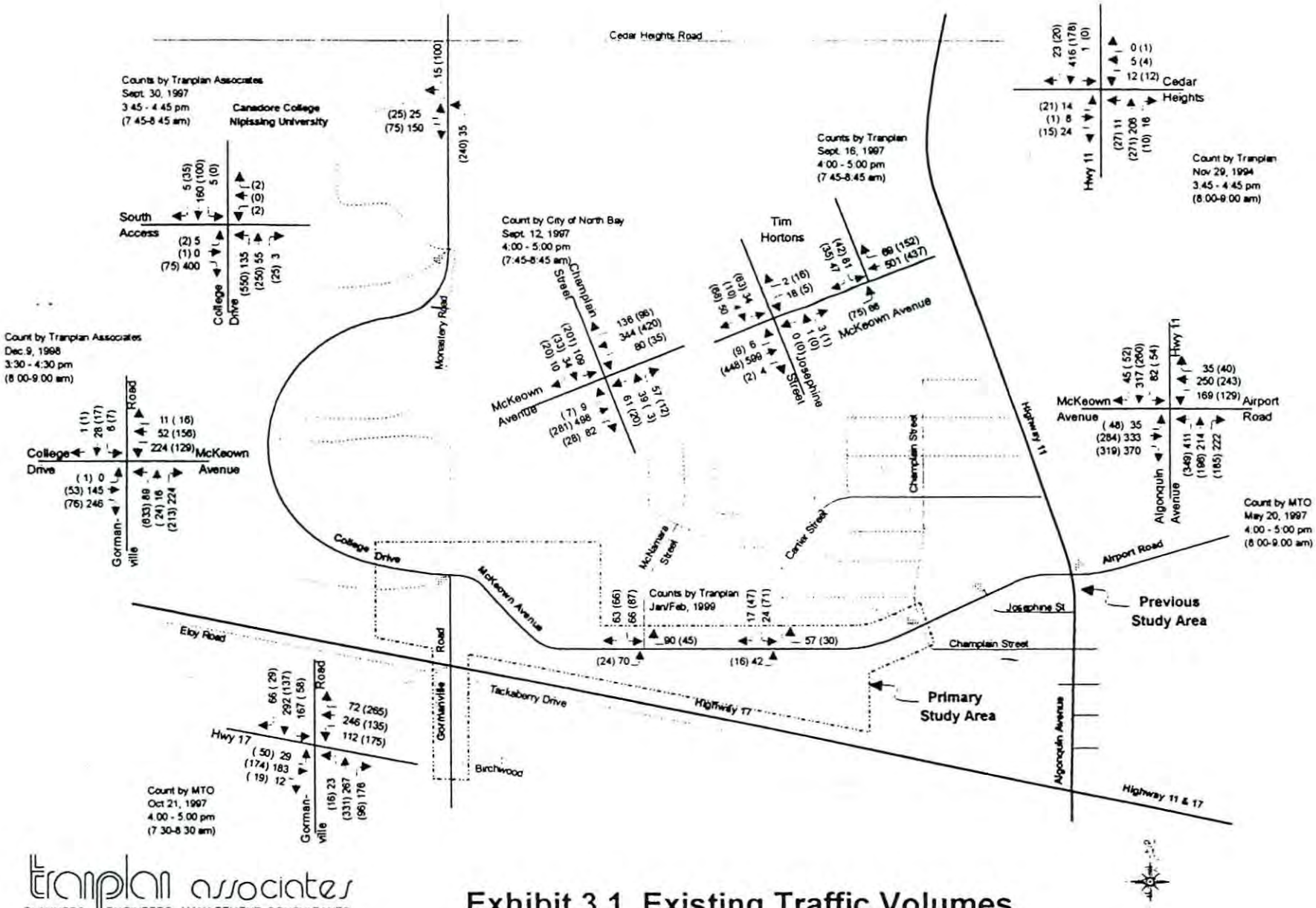
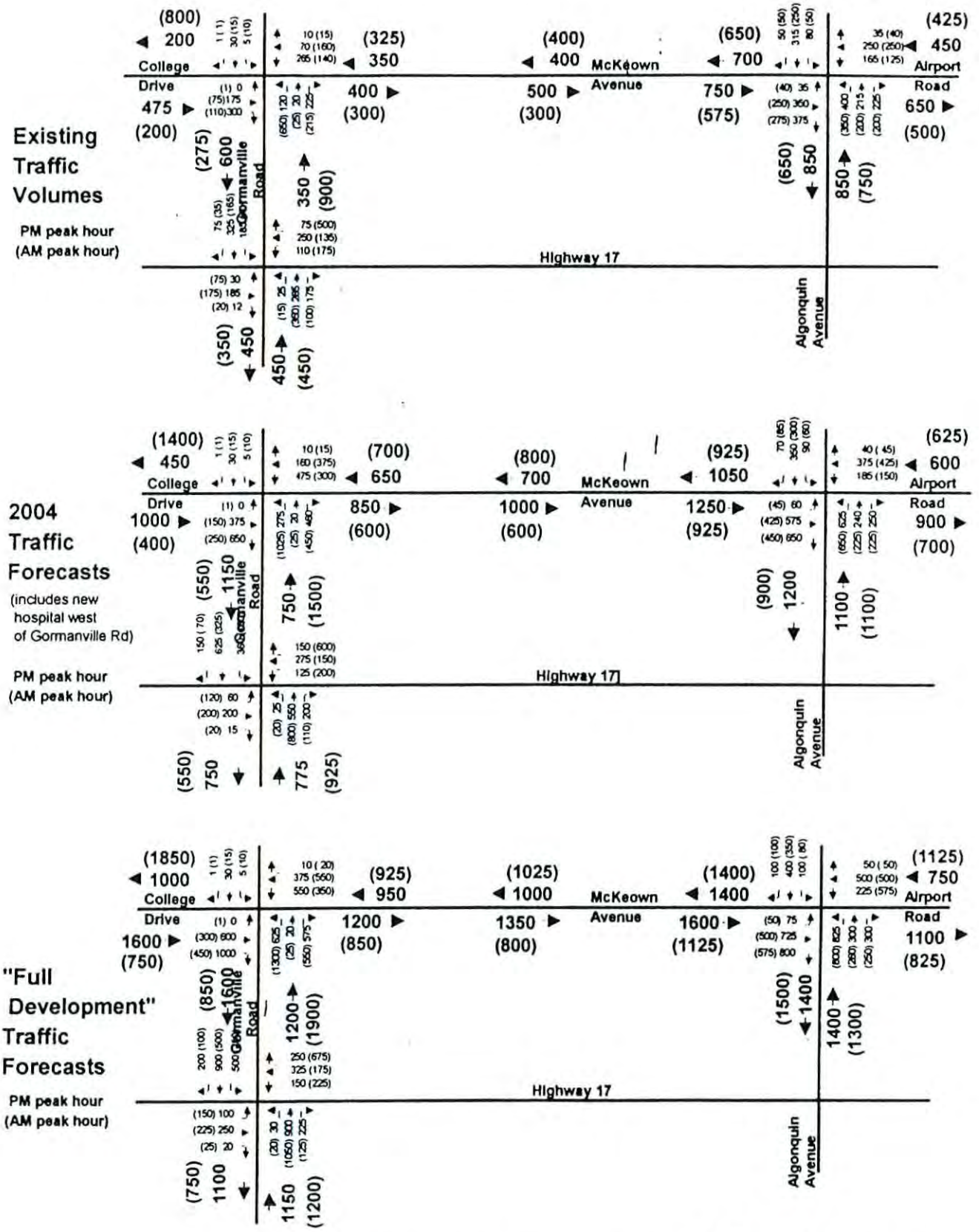


Exhibit 3.1 Existing Traffic Volumes

tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville Tel (905) 849-1500 Fax (905) 849-8164
Sudbury Tel (705) 522-0272 Fax (705) 522-1733

Figure - 10



McKeown Avenue Traffic Study

Traffic Forecasts

PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, STE 1, OAKVILLE, ONT. L6H 7R6
Oakville Tel (905) 849-1500 Fax (905) 849-8184
Sudbury Tel (705) 522-0272 Fax (705) 522-1733

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA 16 hour May 17, 1999

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates.
The predictions were made using the Ministry of Environment STAMSON* prediction program

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	49.03	52.89	3.86
2	centre of courtyard on New Era townhouses	43.04	43.84	0.8
3	rear of parking lot of New Era townhouses	54.81	58.91	4.1
4	centre of play/common area in backyards of Northern Lights co-op	54.28	58.38	4.1
5	backyards of the homes on south side of Oakdale Road	48.04	52.14	4.1
6	backyards of homes on east side of Champlain	52.76	55.59	2.83

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Figure - 11

Northland Engineering Limited

The Annex to Publication LU-131 indicates that the:

> "If the daytime sound level in the Outdoor Living Area is 55 dBA or less, no further assessment is required.
>
> Where it can be clearly demonstrated that it is not technically feasible to achieves the Ministry's outdoor sound level criterion for road and rail traffic, a tolerance of no more than 5dBA above the stated criteria may be allowed.[3] "

This means that even though these receivers are above the desirable criteria, and there are no outdoor mitigation available to lessen their impacts, then this situation is acceptable.

3.7 1999 Sound Levels

Figure 11 - McKeown Avenue Noise Predictions, shows the predicted existing values. The LU 131 guidelines recommend the level of 55 dBA L_{eq} 16 hour as the desirable criteria. As can be seen from the number in this figure that all of the locations are within acceptable values. Even the closest receivers with little or no attenuation from structures are below 55. There are no receivers with existing noise problems or concerns.

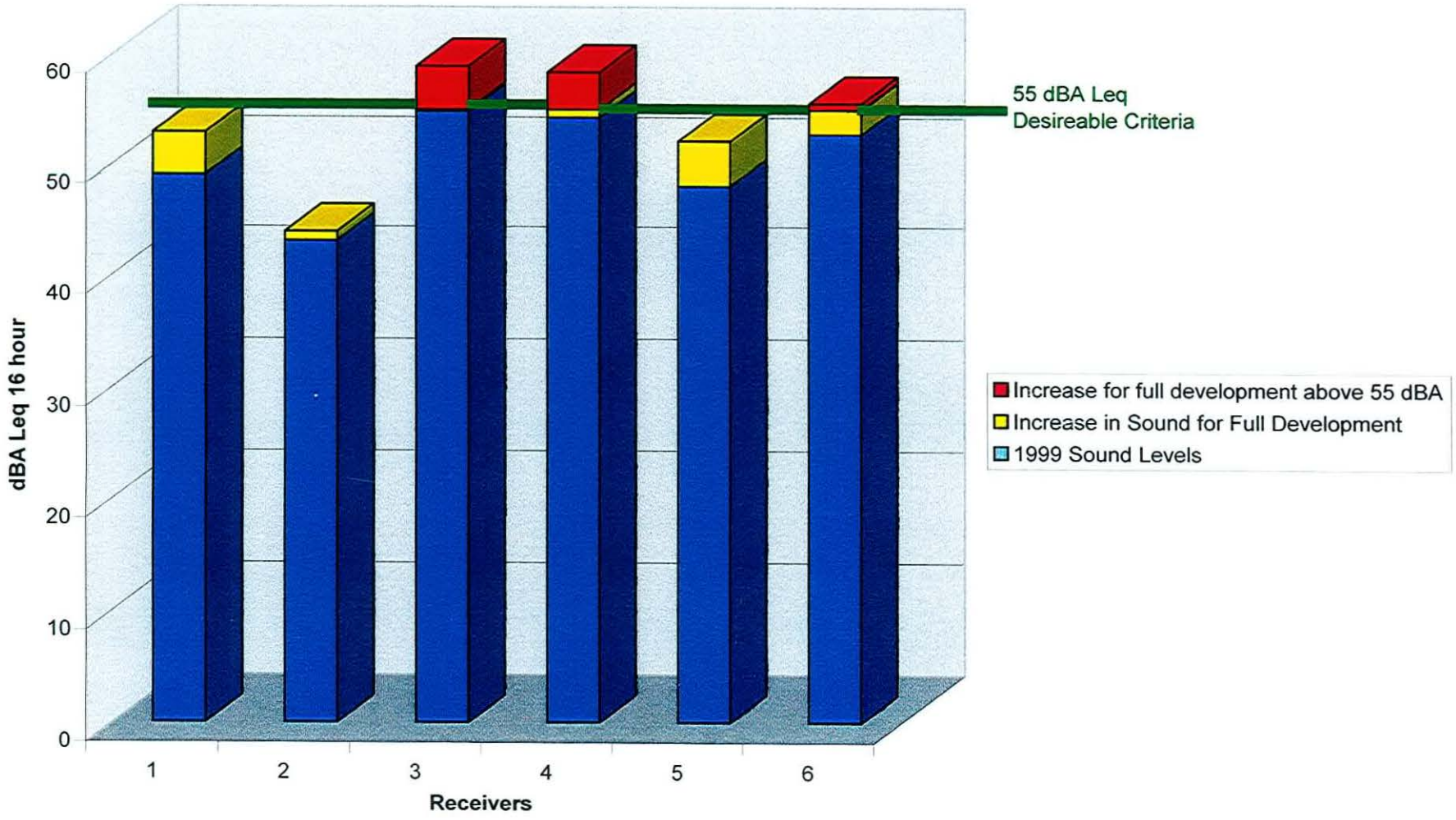
3.8 Future Full Development sound Levels.

Figure 12 - McKeown Avenue Sound Levels, shows the values of the predicted sound levels for the same receivers with the future traffic volumes. Three receivers exceed the criteria of 55 dBA L_{eq}. These are:

Receiver location	Present L_{eq} dBA	Future L_{eq} dBA	Change in L_{eq} dBA	Exceed 55 dBA
3	54.81	58.91	4.1	3.91
4	54.28	58.38	4.1	3.38
6	52.76	55.59	2.83	0.59

[3] Annex to Publication LU - 131 Noise Assessment Criteria in Land Use Planning, October 1997, Section A.3.2.1 Application of Criteria, part (a) Road and Rail

Figure 12 - McKeown Avenue Sound Levels
Leq 16 hour



These values are also illustrated in Figure 12 McKeown Avenue Sound Levels, which shows the existing levels and the increase which will result from the higher volumes in the future. It shows in yellow the receivers that exceed the desirable criteria of 55 dBA. These values are not above 60 dBA L_{eq} which is the second criteria. A number of options were reviewed in relation to reducing these values. All normal noise mitigation measures such as barriers were reviewed. Any attempt to install barriers at these locations are unfeasible. The problem being the access through the barriers for entrances and access seriously compromise the barrier, and render them unfeasible. The barriers, even if continuous would not achieve the necessary 5 dBA attenuation required for barrier. Anything less than the 5 dBA decrease is not usually considered noticeable by adjacent receivers.

The outside areas which are affected are the parking lot area beside the New Era parking lot (Receiver 3), which is not used very much as a recreational area. The outdoor areas of Kingsview Court which is adjacent to the New Era development will be at lower levels and the impact less than receiver 3 levels.

The Receiver 4 area is the outside living area at the Northern Cooperative Housing. The future levels expected are above 55 dBA but below the 60 dBA levels. The outdoor living area that are further back will have lower sound levels. The predictions did

not include the effect of the privacy fencing around all of the backyards. This would reduce the sound levels a little. They certainly cannot be considered as noise barriers.

Receive 6 is the other location that will be subjected to levels above 55 dBA. This location is in the rear backyard of the second home north of McKeown Avenue. The outdoor living area here is fenced. This will have some minor effect, but cannot be considered a noise barrier. The area to the rear of the building will eventually be part of the strip mall development, which will likely have a more significant impact on these outdoor living areas at the rear of these homes.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Summary

This study has been carried out to review the sound levels which are being experience at a number of locations that represent a variety of the typical neighbourhoods adjacent to the project. The study dealt with the documentation of the existing sound levels and the future projected sound levels for these area. There are three areas where the predicted levels exceed the desirable levels. These three areas are still within the

allowable maximum which is outlined in the appropriate MOE documentation mentioned previously. Noise barriers are unfeasible and cannot achieve an appreciatable reduction in these levels.

4.2 Noise Control During Construction

In addition to the noise emitted during the operation of vehicles on the updated roadway, another noise issue is the noise associated with the construction of the roadway.

Unlike the operational noise, construction noise is temporary in nature. It is also transient throughout the site. It is also dependent on the nature of work underway at the time. The significance of the noise impact is dependent on the number of pieces of equipment, type, hours of operation and proximity to the receptors. The following points should be reviewed during detail design stage to ensure the aspect of construction noise is addressed.

1. The City of North Bay has adopted the Model Municipal Noise Control Bylaw. The Bylaw should be reviewed during the design stage to determine contract package requirements for noise control.

2. There are no noise sensitive land uses adjacent to the project other than the residences and apartments.

3. The contract package should include "general noise control measures" referring to the maintenance levels of equipment and assurance that the equipment is being maintained in the appropriate manner to reduce noise. This would include operation methods of the equipment, and requirements like mufflers in good repair.

4. The operation and location of granular sources should also be considered and reviewed during detail design to ensure that aggregate production and extraction does not cause noise problems to residents living near the aggregate production areas.

5. In the event of a complaint about noise from the construction, the municipality or its contract administrator, should enure the general noise control measures are being abided to. If they are not, then the municipality will ensure that contractor is made aware of the problem and of the complaint, and indicate to them to adjust or modify their operation or equipment as required.

5.0 CONCLUSION

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

APPENDIX

A -Definition of Terms

B - Stamson Noise Receivers Printouts

2. DEFINITIONS

"Adverse effect"

means one or more of the following effects of sound and vibration, selected from the relevant definitions in the Environmental Protection Act, Reference [6]:

- impairment of the quality of the natural environment for any use that can be made of it;
- harm or material discomfort to any person;
- an adverse effect on the health of any person, and
- loss of enjoyment of normal use of property.

"Ambient sound level"

means Background sound level;

"Background sound level"

is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by a source such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level;

"Class 1 Area"

means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the urban hum.

"Class 2 Area"

means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 19:00 and 23:00 hours;
- evening background sound level defined by natural environment and infrequent human activity;
- no clearly audible sound from stationary sources other than from those under impact assessment.

"Class 3 Area"

means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

"Construction", "Conveyance"

refer to the Annex.

"Control measure"

refers to action which can be taken to achieve compatibility for the specific land use or activity. The control measure should be permanent in nature and not be readily removable or alterable by the future occupants. Control measures may include, but are not limited to, the following:

- Acoustical Barriers - berms, walls, favourable topographical features, other intervening structures;
- Architectural Design - room and corridor arrangement, blank walls, placement of windows, balconies, and courtyards, building height;

- Building Construction - acoustical treatment of walls, ceilings, selection of acoustical materials and other control devices. Provision for air conditioning;
- Mitigation at Source - noise control applied directly to the noise source;
- Site Planning - orientation of buildings and Outdoor Living Areas with respect to noise sources, spatial separation such as the insertion of noise insensitive land uses between source and receiver, appropriate setbacks, and the use of intervening service roads;
- Windows/Doors - acoustically designed windows or doors that provide the required noise reduction. In order to allow for the windows and doors to remain closed, air conditioning, i.e. mechanical ventilation and climatic control system, is necessary.

Refer to References [1] and [2] for further description of control measures and their application.

"dBA"
means the A-weighted sound pressure level.

"dBAI"
means the A-weighted sound pressure level of an impulsive sound measured with a sound level meter set to "impulse" response.

"Indoor sound level"
is an estimated sound level in the central part of a room.

"L_{eq} (T): L_{eq} (16), L_{eq} (8), L_{eq} (1)"
means the A-weighted level of a steady sound carrying the same total energy in the time period T as the observed fluctuating sound. The time period T is given in hours.

"Ministry"
means the Ontario Ministry of the Environment.

"NEF/NEP"
means Noise Exposure Forecast/Noise Exposure Projection contours for major Ontario airports.

"Noise"
means unwanted sound.

"Noise sensitive land uses"
mean the following sensitive land uses:

- residential developments;
- seasonal residential developments;
- hospitals, nursing/retirement homes, schools, day-care centres, etc.

Sensitive land use means a land use that is sensitive in accordance with the definition of Reference [15], and that must be planned and/or designed using appropriate land use compatibility principles.

"Outdoor Living Area"
is the part of an outdoor area easily accessible from the building and designed for the quiet enjoyment of the outdoor environment. Outdoor Living Areas include, but are not limited to, the following:

- Backyards or front yards or gardens or terraces or patios;
- Balconies, provided they are the only Outdoor Living Areas for the occupant and meet the following conditions:

(a) minimum depth of 4 m;
(b) outside the exterior building facade;
(c) unenclosed;

- Common Outdoor Living Areas associated with multi-storey apartment buildings or condominiums;
- Passive recreational areas such as parks if identified by the municipality.

"Point of Reception"
means any point on the premises of a person where sound or vibration originating from other than those premises is received, see Reference [12].

"Stationary Source"
means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance, see Reference [12]. Section A.2.1.1 provides further explanation.

"Time Periods"
"Day-time"
is the 16-hour period between 07:00 and 23:00 hours.

"Evening"
is the 4-hour period between 19:00 and 23:00 hours.

"Night-time"
is the 8-hour period between 23:00 and 07:00 hours.

"Urban Hum"
means aggregate sound of many unidentifiable, mostly road traffic related sound sources.

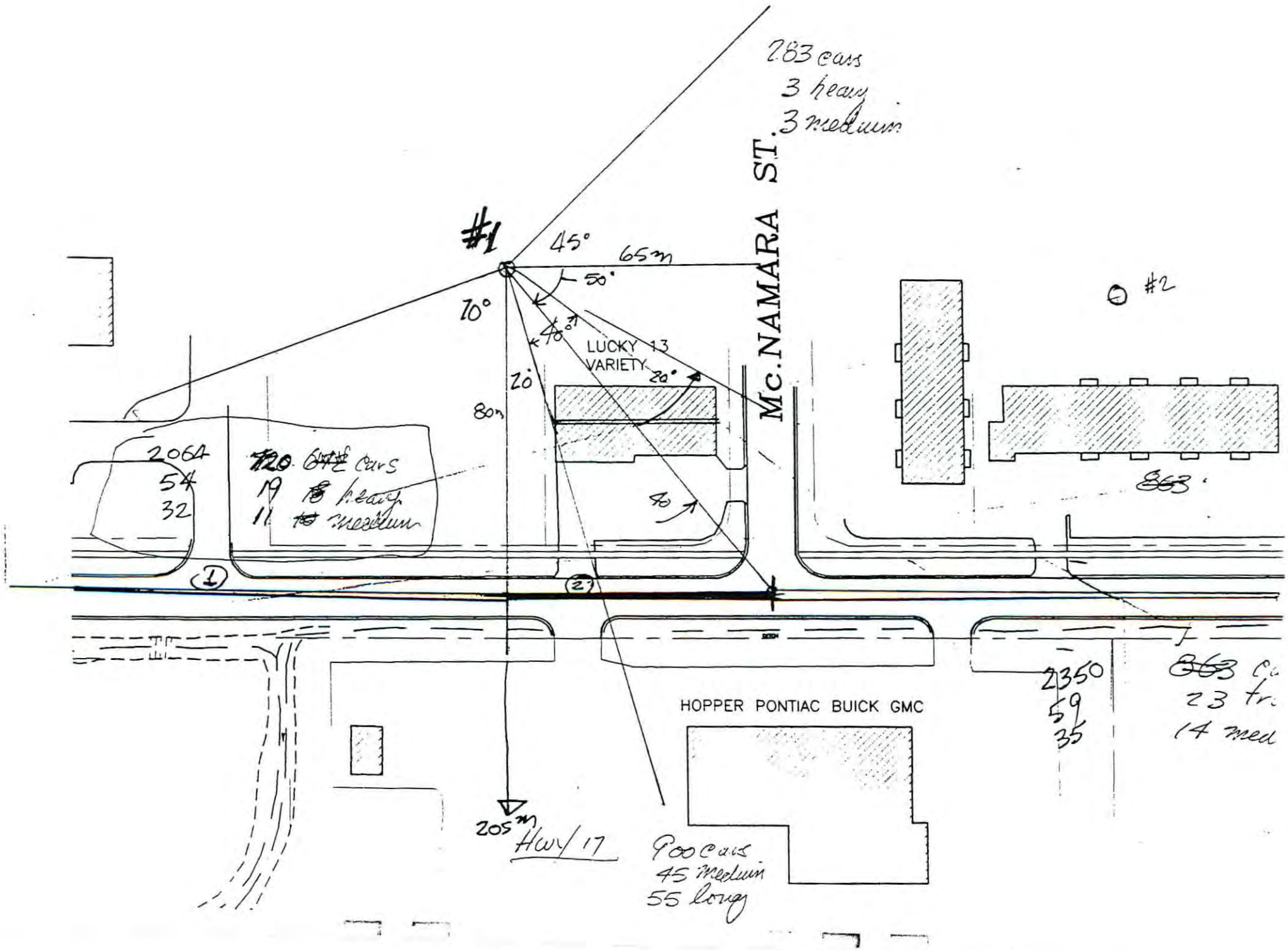
"Warning Clause" (or "Environmental Warning/Restriction")
means a notification of or obligation to notify a potential purchaser of some environmental concern; in this case the concern is potential annoyance due a source of noise.

3. NOISE IMPACT ASSESSMENT, TRANSPORTATION SOURCES

This section deals with noise impact from transportation corridors (i.e., road, rail and air traffic). In case of multiple transportation noise sources:

(a) the outdoor noise impact due to air traffic shall be established separately from the impact due to road and/or rail traffic;
(b) the outdoor noise impact due to road and rail traffic shall be combined;
(c) the indoor noise impact shall be assessed separately for road, rail and aircraft noise. The required indoor noise control measures for the multiple source impact are then defined by a combined acoustical insulation parameter (descriptor) that is evaluated by combining the acoustical insulation parameters determined for each of the sources.

In all cases, consideration should be given to future sound levels. For road and rail noise, a minimum ten year prediction should be made and for aircraft noise, the current NEF/NEP contours shall apply.


783 cars
3 heavy
3 medium
#1
45°
65m
50°
10°
40°
20°
80m
LUCKY 13
VARIETY
Mc. NAMARA ST.
#2
2064
54
32
120 642 cars
19 heavy
11 medium
40
1
2
2350
59
35
HOPPER PONTIAC BUICK GMC
205m
HWY 17
900 cars
45 medium
55 long

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:43:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1b1699.te Time Period: 16 hours
Description: 4351 Rec #1 16 hour volumes 1999 575 MacNamara Pla

Road data, segment # 1: mck west 1

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : -40.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : -20.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 50.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

oad data, segment # 3: mck east 1
---
ar traffic volume : 7767 veh/TimePeriod
edium truck volume : 126 veh/TimePeriod
eavy truck volume : 207 veh/TimePeriod
osted speed limit : 50 km/h
oad gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 3: mck east 1
---
ngle1 Angle2 : -60.00 deg 0.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
urface : 1 (Absorptive ground surface)
eceiver source distance : 150.00 m
eceiver height : 1.50 m
opography : 2 (Flat/gentle slope; with barrier)
arrier angle1 : -60.00 deg Angle2 : -40.00 deg
arrier height : 5.00 m
arrier receiver distance : 55.00 m
ource elevation : 0.00 m
eceiver elevation : 0.00 m
arrier elevation : 0.00 m
eference angle : 0.00

oad data, segment # 4: mcn north 1
---
ar traffic volume : 2547 veh/TimePeriod
edium truck volume : 27 veh/TimePeriod
eavy truck volume : 27 veh/TimePeriod
osted speed limit : 50 km/h
oad gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 4: mcn north 1
---
ngle1 Angle2 : -45.00 deg 45.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
urface : 1 (Absorptive ground surface)
eceiver source distance : 65.00 m
eceiver height : 1.50 m
opography : 2 (Flat/gentle slope; with barrier)
arrier angle1 : 30.00 deg Angle2 : 45.00 deg
arrier height : 5.00 m
arrier receiver distance : 55.00 m
ource elevation : 0.00 m
eceiver elevation : 0.00 m
arrier elevation : 0.00 m
eference angle : 0.00

esults segment # 1: mck west 1

ource height = 1.26 m

OAD (0.00 + 45.80 + 0.00) = 45.80 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	62.76	0.00	-12.07	-4.89	0.00	0.00	0.00	45.80

egment Leq : 45.80 dBA

esults segment # 2: mck west 2

ource height = 1.26 m

arrier height for grazing incidence

ource eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.98	1.98

OAD (0.00 + 30.11 + 41.09) = 41.43 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	62.76	0.00	-9.50	-9.74	0.00	0.00	-13.40	30.11
-20	0	0.66	62.76	0.00	-12.07	-9.60	0.00	0.00	0.00	41.09

egment Leq : 41.43 dBA

Results segment # 3: mck east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.41	1.41

ROAD (0.00 + 30.42 + 40.22) = 40.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	-40	0.37	63.60	0.00	-13.67	-10.26	0.00	0.00	-9.24	30.42
-40	0	0.66	63.60	0.00	-16.60	-6.77	0.00	0.00	0.00	40.22

Segment Leq : 40.66 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

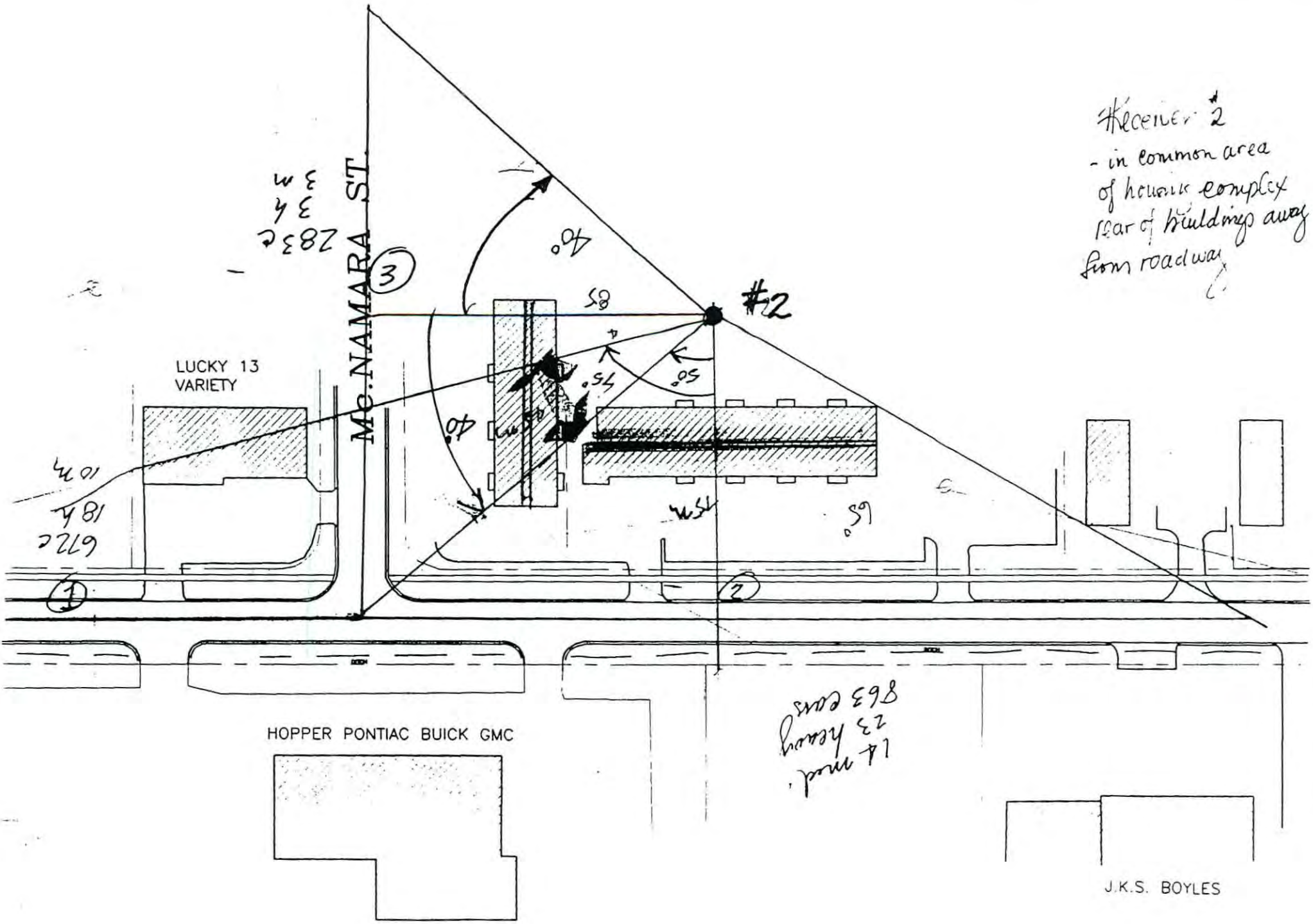
ROAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.11
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.75

Segment Leq : 42.14 dBA

Total Leq All Segments: 49.03 dBA

TOTAL Leq FROM ALL SOURCES: 49.03


Receiver #2
- in common area of housing complex rear of buildings away from roadway
Mc.NAMARA ST.
LUCKY 13
VARIETY
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
#2
40°
85
75°
50°
65°
40
1
2
3

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:45:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1b16fut.te Time Period: 16 hours
Description: 4351 Rec#1b 16 hour volumes ~~1999~~ future 575 McNamara Rec

Road data, segment # 1: mck west 1

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : -40.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : -20.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 50.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

```
.oad data, segment # 3: mck east 1
 ---------------------------------
Car traffic volume  : 21150 veh/TimePeriod
Medium truck volume :   317 veh/TimePeriod
Heavy truck volume  :   529 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1
 ---------------------------------
Angle1   Angle2           : -60.00 deg   0.00 deg
Wood depth                :       0      (No woods.)
No of house rows          :       0
Surface                   :       1      (Absorptive ground surface)
Receiver source distance  : 150.00 m
Receiver height           :   1.50 m
Topography                :       2      (Flat/gentle slope; with barrier)
Barrier angle1            : -60.00 deg   Angle2 : -40.00 deg
Barrier height            :   5.00 m
Barrier receiver distance :  55.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: mcn north 1
 ---------------------------------
Car traffic volume  :  2547 veh/TimePeriod
Medium truck volume :    27 veh/TimePeriod
Heavy truck volume  :    27 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mcn north 1
 ---------------------------------
Angle1   Angle2           : -45.00 deg   45.00 deg
Wood depth                :       0      (No woods.)
No of house rows          :       0
Surface                   :       1      (Absorptive ground surface)
Receiver source distance  :  65.00 m
Receiver height           :   1.50 m
Topography                :       2      (Flat/gentle slope; with barrier)
Barrier angle1            :  30.00 deg   Angle2 : 45.00 deg
Barrier height            :   5.00 m
Barrier receiver distance :  55.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

Results segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 50.35 + 0.00) = 50.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.31	0.00	-12.07	-4.89	0.00	0.00	0.00	50.35

Segment Leq : 50.35 dBA

Results segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.97	1.97

ROAD (0.00 + 34.66 + 45.64) = 45.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	67.31	0.00	-9.50	-9.74	0.00	0.00	-13.41	34.66
-20	0	0.66	67.31	0.00	-12.07	-9.60	0.00	0.00	0.00	45.64

Segment Leq : 45.98 dBA

Results segment # 3: mck east 1

Source height = 1.25 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.25	1.50	1.41	1.41

ROAD (0.00 + 34.57 + 44.39) = 44.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLec
-60	-40	0.37	67.76	0.00	-13.68	-10.26	0.00	0.00	-9.25	34.5
-40	0	0.66	67.76	0.00	-16.60	-6.77	0.00	0.00	0.00	44.3

Segment Leq : 44.82 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

ROAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.1
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.7

Segment Leq : 42.14 dBA

Total Leq All Segments: 52.89 dBA

TOTAL Leq FROM ALL SOURCES: 52.89

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:52:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_1699.te Time Period: 16 hours
Description: 4351 Rec #2 16 hour volumes 1999 New Era Courtyard

Road data, segment # 1: McK west 1

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1

Angle1 Angle2 : 50.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east 1

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1

Angle1 Angle2 : -65.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

oad data, segment # 3: Mcn north 1

ar traffic volume	:	2547	veh/TimePeriod
edium truck volume	:	27	veh/TimePeriod
eavy truck volume	:	27	veh/TimePeriod
osted speed limit	:	50	km/h
oad gradient	:	0	%
oad pavement	:	1	(Typical asphalt or concrete)

ata for Segment # 3: Mcn north 1

ngle1 Angle2	:	-40.00 deg	40.00 deg
ood depth	:	0	(No woods.)
o of house rows	:	0	
urface	:	1	(Absorptive ground surface)
eceiver source distance	:	85.00 m	
eceiver height	:	1.50 m	
opography	:	2	(Flat/gentle slope; with barrier)
arrier angle1	:	-40.00 deg	Angle2 : 5.00 deg
arrier height	:	8.00 m	
arrier receiver distance	:	45.00 m	
ource elevation	:	1.00 m	
eceiver elevation	:	0.00 m	
arrier elevation	:	0.00 m	
eference angle	:	0.00	

esults segment # 1: McK west 1

ource height = 1.26 m

OAD (0.00 + 40.32 + 0.00) = 40.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	75	0.66	62.76	0.00	-11.60	-10.84	0.00	0.00	0.00	40.32

egment Leq : 40.32 dBA

esults segment # 2: McK east 1

ource height = 1.26 m

arrier height for grazing incidence

ource .eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.81	1.81

ROAD (0.00 + 36.30 + 0.00) = 36.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	63.60	0.00	-8.30	-2.11	0.00	0.00	-16.89	36.3(

egment Leq : 36.30 dBA

esults segment # 3: Mcn north 1

ource height = 1.01 m

arrier height for grazing incidence

ource eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.7
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.8

egment Leq : 37.09 dBA

otal Leq All Segments: 43.04 dBA

OTAL Leq FROM ALL SOURCES: 43.04

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:50:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_16fut.te Time Period: 16 hours
Description: 4351 Rec#2 16 hour volumes future 575 McNamara

Road data, segment # 1: McK west 1

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1

Angle1 Angle2 : 50.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 50.00 deg Angle2 : 75.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK east 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1

Angle1 Angle2 : -65.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: Mcn north 1

Car traffic volume : 2547 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Mcn north 1

Angle1 Angle2 : -40.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 85.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : 5.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 45.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: McK west 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.47	1.47

ROAD (0.00 + 39.10 + 0.00) = 39.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
50	75	0.49	67.31	0.00	-10.40	-10.26	0.00	0.00	-7.56	39.1

Segment Leq : 39.10 dBA

Results segment # 2: McK east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.80	1.80

ROAD (0.00 + 40.40 + 0.00) = 40.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	67.70	0.00	-8.30	-2.11	0.00	0.00	-16.90	40.40

Segment Leq : 40.40 dBA

Results segment # 3: Mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

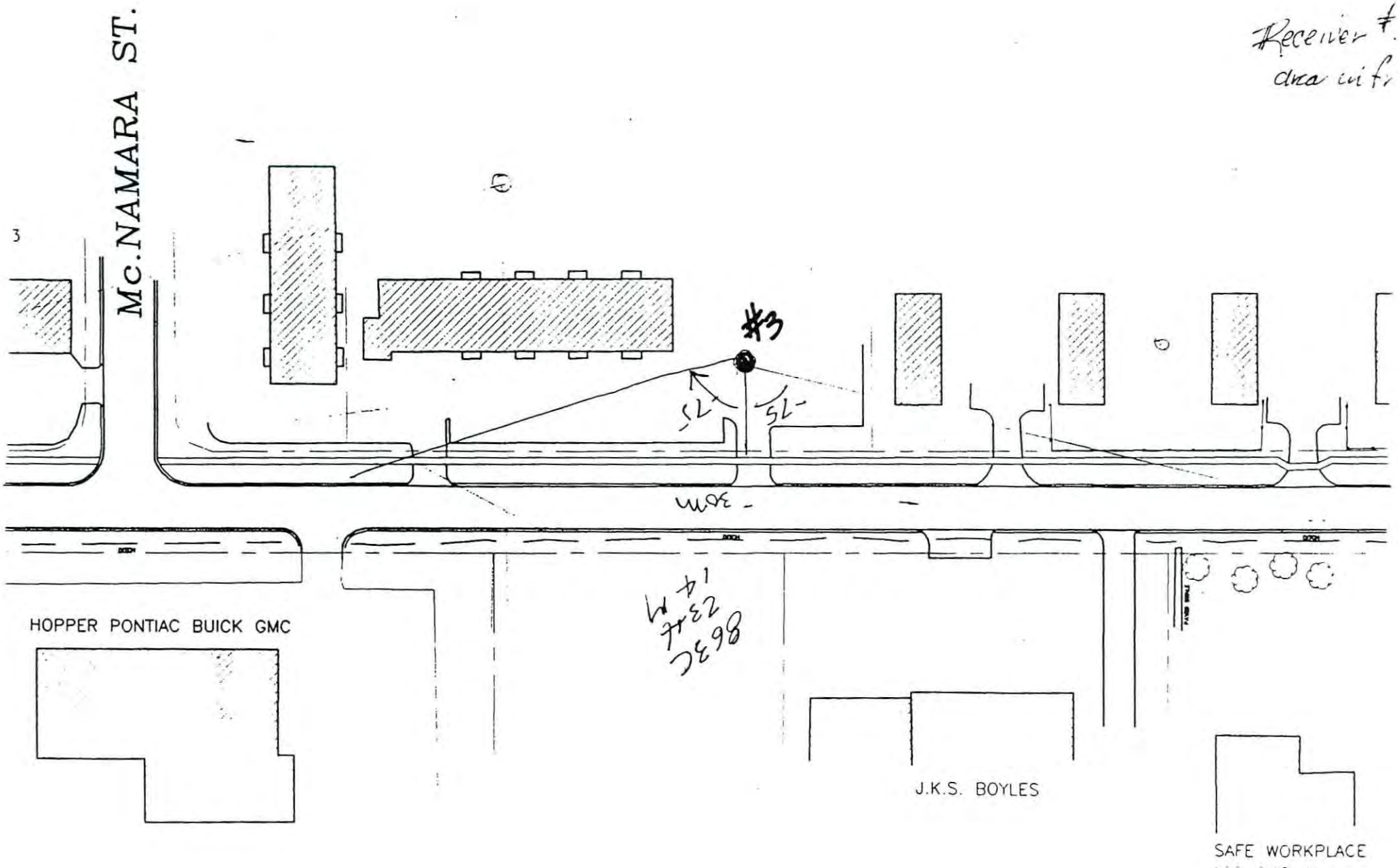
ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.7
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.8

Segment Leq : 37.09 dBA

Total Leq All Segments: 43.84 dBA

TOTAL Leq FROM ALL SOURCES: 43.84


Mc. NAMARA ST.
#3
75'
75'
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
SAFE WORKPLACE

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:55:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_1699.te Time Period: 16 hours
Description: 4351 Rec #3 16 hour volumes 1999 New Era Parking

Road data, segment # 1: McKeown

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2 : -75.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: McKeown

Source height = 1.26 m

ROAD (0.00 + 54.81 + 0.00) = 54.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	75	0.66	63.60	0.00	-7.07	-1.72	0.00	0.00	0.00	54.81

Segment Leq : 54.81 dBA

Total Leq All Segments: 54.81 dBA

TOTAL Leq FROM ALL SOURCES: 54.81

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 10:35:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_16fut.te Time Period: 16 hours
Description: 4351 Rec#3 16 hour volumes future New Era Parking

Road data, segment # 1: McKeown

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2 : -75.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: McKeown

Source height = 1.26 m

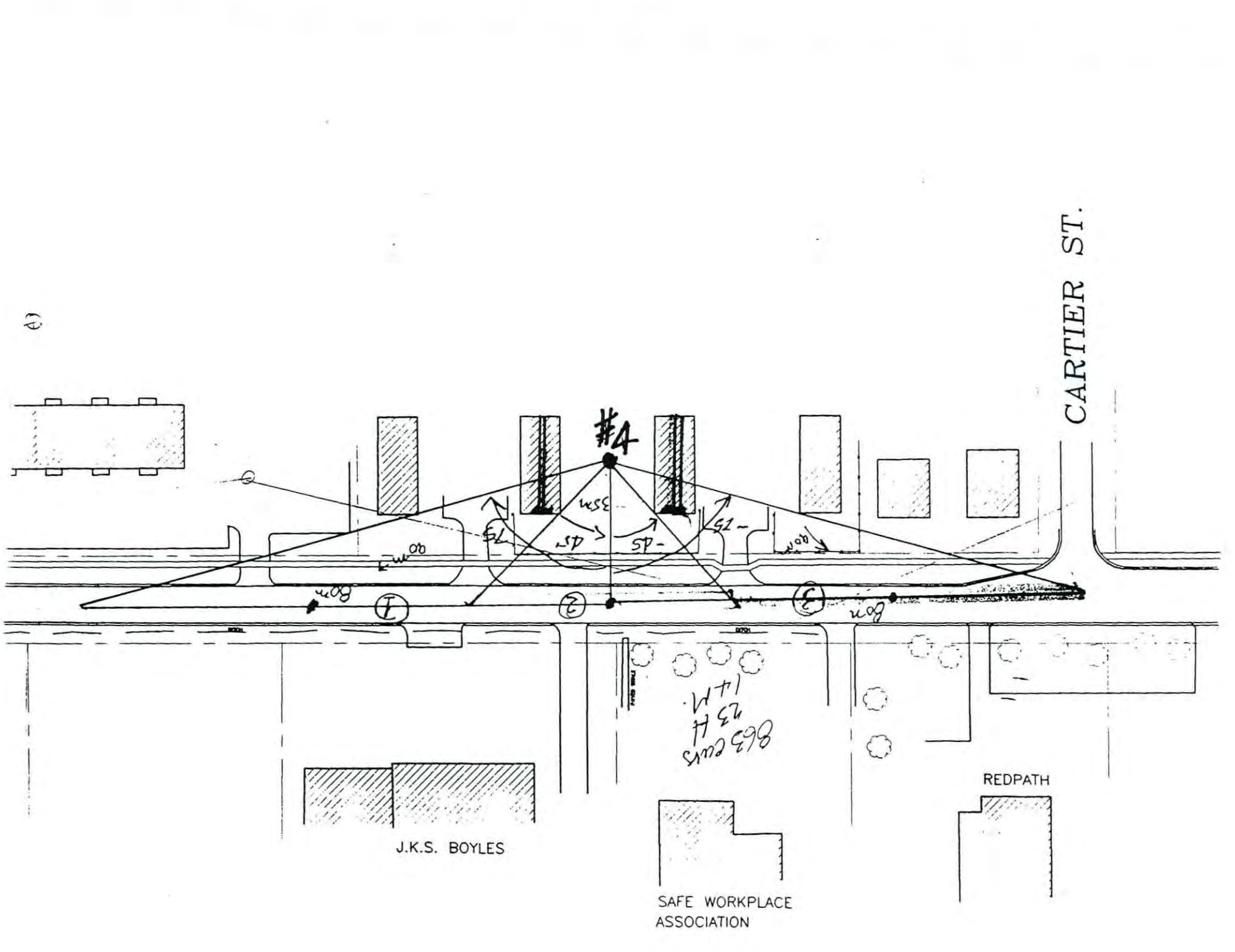
ROAD (0.00 + 58.91 + 0.00) = 58.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-75	75	0.66	67.70	0.00	-7.07	-1.72	0.00	0.00	0.00	58.9

Segment Leq : 58.91 dBA

Total Leq All Segments: 58.91 dBA

TOTAL Leq FROM ALL SOURCES: 58.91


CARTIER ST.
#4
J.K.S. BOYLES
SAFE WORKPLACE ASSOCIATION
REDPATH

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 10:49:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_1699.te Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes 1999 Northern Co-Op

Road data, segment # 1: McK west

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west

Angle1 Angle2 : 45.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 45.00 deg Angle2 : 75.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 20.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK centre

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK centre

Angle1 Angle2 : -45.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: McK east

Car traffic volume	: 7767	veh/TimePeriod
Medium truck volume	: 126	veh/TimePeriod
Heavy truck volume	: 207	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 3: McK east

Angle1 Angle2	: -75.00 deg	-45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -75.00 deg	Angle2 : -45.00 deg
Barrier height	: 7.00 m	
Barrier receiver distance	: 20.00 m	
Source elevation	: 1.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
Reference angle	: 0.00	

Segment # 1: McK west

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

ROAD (0.00 + 35.94 + 0.00) = 35.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
45	75	0.31	63.60	0.00	-4.81	-8.76	0.00	0.00	-14.09	35.9

Segment Leq : 35.94 dBA

Segment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 54.17 + 0.00) = 54.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	63.60	0.00	-6.11	-3.32	0.00	0.00	0.00	54.17

Segment Leq : 54.17 dBA

Segment # 3: McK east

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

ROAD (0.00 + 34.53 + 0.00) = 34.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	-45	0.25	63.60	0.00	-4.59	-8.57	0.00	0.00	-15.91	34.53

Segment Leq : 34.53 dBA

Total Leq All Segments: 54.28 dBA

TOTAL Leq FROM ALL SOURCES: 54.28

```
STAMSON 5.0          NORMAL REPORT          Date: 17-05-1999 10:41:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_16fut.te              Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes future Northern Co-Op


Road data, segment # 1: McK west
----------------------------------
Car traffic volume   : 20304 veh/TimePeriod
Medium truck volume  :   317 veh/TimePeriod
Heavy truck volume   :   529 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 1: McK west
----------------------------------
Angle1   Angle2               :  45.00 deg   75.00 deg
Wood depth                    :       0      (No woods.)
No of house rows              :       0
Surface                       :       1      (Absorptive ground surface)
Receiver source distance      :  35.00 m
Receiver height               :   1.50 m
Topography                    :       2      (Flat/gentle slope; with barrier)
Barrier angle1                :  45.00 deg   Angle2 : 75.00 deg
Barrier height                :   6.00 m
Barrier receiver distance     :  20.00 m
Source elevation              :   1.00 m
Receiver elevation            :   0.00 m
Barrier elevation             :   0.00 m
Reference angle               :   0.00

Road data, segment # 2: McK centre
----------------------------------
Car traffic volume   : 20304 veh/TimePeriod
Medium truck volume  :   317 veh/TimePeriod
Heavy truck volume   :   529 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 2: McK centre
----------------------------------
Angle1   Angle2               : -45.00 deg   45.00 deg
Wood depth                    :       0      (No woods.)
No of house rows              :       0
Surface                       :       1      (Absorptive ground surface)
Receiver source distance      :  35.00 m
Receiver height               :   1.50 m
Topography                    :       1      (Flat/gentle slope; no barrier)
Reference angle               :   0.00
```

.oad data, segment # 3: McK east

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: McK east

Angle1 Angle2 : -75.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -75.00 deg Angle2 : -45.00 deg
Barrier height : 7.00 m
Barrier receiver distance : 20.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: McK west

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

ROAD (0.00 + 40.03 + 0.00) = 40.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	75	0.31	67.70	0.00	-4.81	-8.76	0.00	0.00	-14.10	40.03

Segment Leq : 40.03 dBA

Results segment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 58.27 + 0.00) = 58.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	67.70	0.00	-6.11	-3.32	0.00	0.00	0.00	58.2

Segment Leq : 58.27 dBA

Results segment # 3: McK east

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

ROAD (0.00 + 38.63 + 0.00) = 38.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-75	-45	0.25	67.70	0.00	-4.59	-8.57	0.00	0.00	-15.91	38.6

Segment Leq : 38.63 dBA

Total Leq All Segments: 58.38 dBA

TOTAL Leq FROM ALL SOURCES: 58.38

CARTIER ST.
McKEOWN AVE.
CAR CARE CENTRE
CHAMPLAIN ST.
120m
180m
70°
70
130m
Reserve #5
1392 cars
22 mc
36 h

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:04:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_1699.te Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes 1999 Oakdale Rear Yards

Road data, segment # 1: Mck west

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Mck west

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east

Angle1 Angle2 : -70.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: Mck west

Source height = 1.26 m

ROAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

Segment Leq : 45.03 dBA

Segment # 2: McK east

Source height = 1.26 m

ROAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

Segment Leq : 45.03 dBA

Total Leq All Segments: 48.04 dBA

TOTAL Leq FROM ALL SOURCES: 48.04

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:07:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_16fut.te Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes future Oakdale Rear Yd

Road data, segment # 1: Mck west

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Mck west

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east

Angle1 Angle2 : -70.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: Mck west

Source height = 1.26 m

ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

Segment Leq : 49.13 dBA

Segment # 2: McK east

Source height = 1.26 m

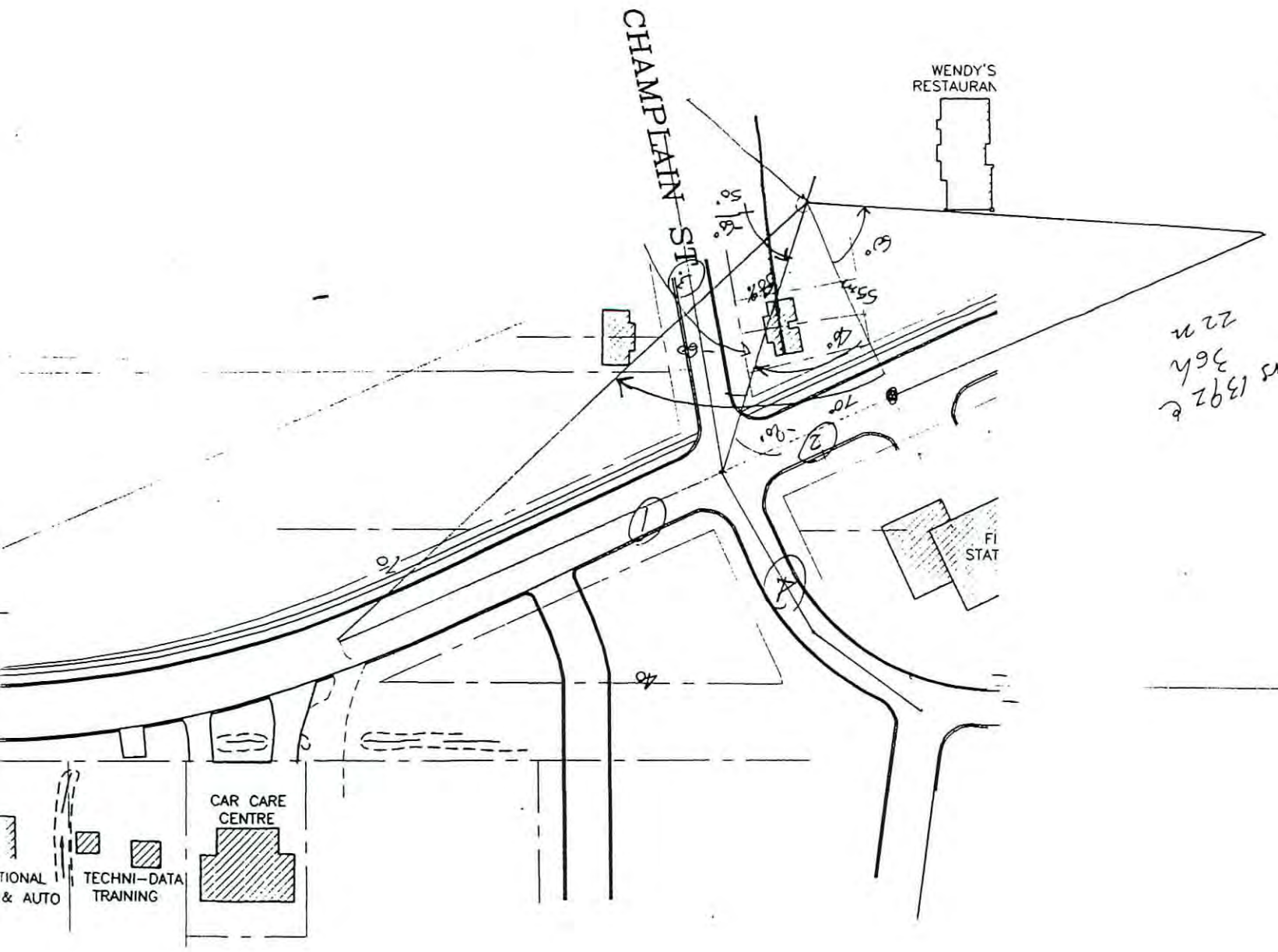
ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

Segment Leq : 49.13 dBA

Total Leq All Segments: 52.14 dBA

TOTAL Leq FROM ALL SOURCES: 52.14



#6
Leaving from Champlain.

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:12:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16fut.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes future Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 40.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 80 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
Heavy truck volume : 670 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : 0.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 30.00 deg Angle2 : 40.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: mck east 1

Car traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
Heavy truck volume : 670 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1

Angle1 Angle2 : -60.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: Champ north

Car traffic volume : 2970 veh/TimePeriod
Medium truck volume : 36 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Champ north

Angle1 Angle2 : -60.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 60.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

.oad data, segment # 5: Champ south

Car traffic volume : 3123 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 36 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: Champ south

Angle1 Angle2 : -70.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 42.95 + 0.00) = 42.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.66	67.70	0.00	-9.37	-9.43	0.00	-5.95	0.00	42.9

Segment Leq : 42.95 dBA

Segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

ROAD (51.46 + 33.91 + 0.00) = 51.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
0	30	0.66	68.74	0.00	-9.37	-7.91	0.00	0.00	0.00	51.4
30	40	0.31	68.74	0.00	-7.38	-12.82	0.00	0.00	-14.64	33.9

Segment Leq : 51.54 dBA

Segment # 3: mck east 1

Source height = 1.26 m

ROAD (0.00 + 52.84 + 0.00) = 52.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-60	0	0.66	68.74	0.00	-10.57	-5.33	0.00	0.00	0.00	52.

Segment Leq : 52.84 dBA

Segment # 4: Champ north

Source height = 0.97 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.97	1.50	1.63	1.63

ROAD (0.00 + 34.51 + 0.00) = 34.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-60	60	0.38	57.21	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.

Segment Leq : 34.51 dBA

Segment # 5: Champ south

Source height = 1.03 m

ROAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36

Segment Leq : 36.53 dBA

Total Leq All Segments: 55.59 dBA

TOTAL Leq FROM ALL SOURCES: 55.59

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:44:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16_99.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes 1999 Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 40.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 80 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 12528 veh/TimePeriod
Medium truck volume : 198 veh/TimePeriod
Heavy truck volume : 324 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : 0.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier
Barrier angle1 : 30.00 deg Angle2 : 40.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: mck east 1

Car traffic volume : 12528 veh/TimePeriod
Medium truck volume : 198 veh/TimePeriod
Heavy truck volume : 324 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1

Angle1 Angle2 : -60.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: Champ north

Car traffic volume : 2920 veh/TimePeriod
Medium truck volume : 36 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Champ north

Angle1 Angle2 : -60.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 60.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 5: Champ south

Car traffic volume	: 3123	veh/TimePeriod
Medium truck volume	: 27	veh/TimePeriod
Heavy truck volume	: 36	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 5: Champ south

Angle1 Angle2	: -70.00	deg	-60.00 deg
Wood depth	: 0		(No woods.)
No of house rows	: 0		
Surface	: 1		(Absorptive ground surface)
Receiver source distance	: 35.00	m	
Receiver height	: 1.50	m	
Topography	: 1		(Flat/gentle slope; no barrier)
Reference angle	: 0.00		

Segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 42.97 + 0.00) = 42.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
40	70	0.66	63.60	0.00	-5.00	-9.43	0.00	-6.20	0.00	42.9

Segment Leq : 42.97 dBA

Segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

ROAD (48.31 + 30.75 + 0.00) = 48.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
0	30	0.66	65.59	0.00	-9.37	-7.91	0.00	0.00	0.00	48.3
30	40	0.31	65.59	0.00	-7.38	-12.82	0.00	0.00	-14.64	30.7

Segment Leq : 48.38 dBA

Segment # 3: mck east 1

Source height = 1.26 m

ROAD (0.00 + 49.68 + 0.00) = 49.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-60	0	0.66	65.59	0.00	-10.57	-5.33	0.00	0.00	0.00	49.6

Segment Leq : 49.68 dBA

Segment # 4: Champ north

Source height = 0.98 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.98	1.50	1.64	1.64

ROAD (0.00 + 34.47 + 0.00) = 34.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-60	60	0.38	57.17	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.4

Segment Leq : 34.47 dBA

Segment # 5: Champ south

Source height = 1.03 m

ROAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36..

Segment Leq : 36.53 dBA

Total Leq All Segments: 52.76 dBA

TOTAL Leq FROM ALL SOURCES: 52.76

APPENDIX 3

VISUAL PAVEMENT INSPECTION AND GEOTECHNICAL REVIEW

Merlex Engineering Ltd.

4351

MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

RECEIVED
FEB 18 1999

Reference No. 99/02/99009

February 12, 1999

Northland Engineering Ltd.
1850 Bond Street
North Bay, Ontario
P1B 8G5

Attention: Mr. Dave Richards, P. Eng.

Re: Preliminary Visual Assessment
McKeown Avenue

Dear Sir:

As per your letter of authorization dated February 9, 1999, we have carried out the preliminary visual field review of pavement condition on McKeown Avenue from Algonquin Avenue to Gormanville Road and present our findings and comments in this brief letter report.

VISUAL PAVEMENT REVIEW

On February 10, 1999, a visual pavement review was carried out by our Pavement Designer, Mr. Howie Pattenden, and his comments and observations are contained on Enclosure No. 1.

For this commentary, McKeown Avenue has been broken down into four sections.

Section 1 - Hwy 11 (Algonquin Ave.) to Cartier Street (4 lane section)

Section 2 - Cartier Street to McNamara Avenue (2 lane section)

Section 3 - McNamara Avenue to 50 m past west entrance to MTO

Section 4 - 50 m west of west entrance to MTO to Gormanville Road

We have carried out a review of past geotechnical investigations, undertaken by our firm, for various developments to the north and south of the McKeown Avenue right of way, between Algonquin and Gormanville Road. The subgrade conditions, based on this desk review, vary from silt and clay deposits underlying surficial organic layers to fine sands with varying silt content to silty fine sands. The groundwater table was generally recorded at a shallow depth below existing grade on the previous investigation.

COMMENTS

Based on the available historical information (old design pavement structure cross section) and our visual assessment of the existing pavement surface conditions, we have the following comments dealing with reconstruction for the above noted road.

Section 1 - Algonquin Ave. to Cartier Street

The road section between Highway 11 (Algonquin) to Cartier Street is curb and gutter with four lanes. It is understood that this section was reconstructed around 1992 with 140 mm of asphalt overlying 150 mm of Granular A followed by 600 mm of Granular B Type I. Perforated drains (150 mmø) were installed below both the north and south curbs.

This section of road has responded relatively well over the last 7 years. One minor dip was observed at a catch basin lead on the outside eastbound lane. This is probably due to the presence of granular trench backfill within the depth of frost penetration (i.e. non-uniform subgrade cross section). To rehabilitate this section of road, a dig out may be considered at the location of this storm sewer lateral. The remainder of road

rehabilitation could consist of milling off 50 mm of existing asphalt and repaving with 50 mm HL4 modified.

Section 2 - Cartier Street to McNamara

This section of road is predominantly two lanes with curb and gutter. It is understood that it was constructed around 1979 and that the pavement structure consisted of 80 mm of HL4 asphalt underlain by 150 mm of Granular A and 375 mm of Granular B Type I with trenched in 150 mmø perforated subdrains below the curb.

A visual review indicated moderate to transverse cracking of an intermittent nature with few slight alligator cracks. Slight wheel track rutting was also observed.

This section of road has stood up relatively well for the last 20 years with selective resurfacing. We therefore suggest that reconstruction could consist of in-place full depth processing, a granular lift of some 200 mm to 300 mm of Granular A followed by 130 mm of asphalt pavement consisting of 40 mm HL4 modified, 50 mm of heavy duty upper binder and 50 mm heavy duty lower binder be considered for this section of road. It is likely that the subdrain system will also have to be replaced. If profile grade cannot be increased by this amount, it will then be necessary to carry out an excavation to reconstruct the pavement structure to a section of 130 mm asphalt, 150 Granular A and 600 mm Granular B Type I with subdrains both sides.

Section 3 - McNamara to 50 m west of west entrance to MTO

It is understood that a typical section of McKeown Avenue between Gormanville and McNamara dated 1978 consisted of 125 mm of asphalt underlain by 150 mm of Granular A and 300 mm of Granular B Type I. The section between McNamara and west of MTO

exhibits moderate wheel track rutting in front of Lucky 13 with moderate distortions and poor drainage between Lucky 13 and the west entrance to the MTO building. There is no ditch to the north side of McKeown Avenue between Lucky 13 and the MTO. Some selective resurfacing has been carried out over this area in the past years.

A geotechnical investigation carried out for the Lucky 13 indicated that the subgrade conditions probably consist of silt and clays. It is probable that the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to higher traffic load during the latter part of its life.

To correct this section it will probably be necessary to excavate to allow reconstruction of a pavement structure consisting of 130 mm of asphalt, 150 mm of Granular A and 600 mm of Granular B Type I with 150 mmø perforated drain both north and south to ensure proper drainage of subgrade.

Section 4 - 50 m west of MTO west Entrance to Gormanville Road

There are two areas where slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking have been observed and must be investigated. The remaining portion of this section of McKeown Avenue can probably be rehabilitated with a milling off of 50 mm and repaving with 50 mm HL4 modified.

General

If widening is required, the above pavement sections must be carried across for the new lanes.

CLOSURE

Merlex Engineering Ltd. has carried out a visual pavement condition survey combined with a desktop review of geotechnical conditions in the McKeown Avenue area. The comments contained in this report are intended to be used only for preliminary estimating purposes. A detailed field investigation involving sampled boreholes and laboratory testing, etc., must be carried out to further delineate the cause of distresses as identified in this report. Following a detailed investigation and laboratory test program, a more specific pavement design can be compiled.

We trust the enclosed comments are sufficient for your initial preliminary purposes. Should you have any queries or if we could be of further assistance, please do not hesitate to contact the undersigned.

Yours very truly,

MERLEX ENGINEERING LTD.

M.A. Merleau, P. Eng.

MAM/cl

Encl.

99009 - Visual and Historical Assessment Report

VISUAL PAVEMENT REVIEW

McKeown Avenue (from Algonquin Avenue to Gormanville Road)
carried out on February 10, 1999

Area A - Algonquin Ave. to Cartier Street (4 Lane Section)

- Longitudinal cracks in each inside lane from improper paving.
- Moderate intermittent cracks.
- Moderate frost heave in eastbound lane over sewer lateral, east of Champlain St.
- Slight few longitudinal meander and midlane cracking.

Area B - Cartier Street to McNamara (2 lane section)

- Moderate transverse cracking intermittent.
- Slight few alligator cracking.
- Slight wheel track rutting.
- Few sections with poor surface drainage.
- Slight to moderate longitudinal meander and midlane cracking.
- Moderate wheel track rutting (front of Lucky 13).
- Moderate distortion and poor drainage between Lucky 13 and MTO Building.
- Some selective resurfacing has been carried out.

Area C - McNamara to Gormanville Road

- Moderate distortion and alligator cracking (MTO west entrance W'ly 50 m).
- Moderate intermittent transverse cracking.
- Slight few alligator cracking.
- Slight to moderate wheel track rutting between two curves.
- Moderate intermittent C/L cracking.
- Moderate distortion between two curves.
- Slight few longitudinal meander midlane cracking.

APPENDIX 4

MCKEOWN AVENUE TRAFFIC STUDY

AND ADDENDUM

Algonquin Avenue to Gormanville Road

McKeown Avenue Traffic Study

Algonquin Avenue to Gormanville Road

prepared for

the City of North Bay



by

Tranplan Associates

October 1999



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A	Capacity Analysis Reports
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1. INTRODUCTION

In 1997-98 the City of North Bay conducted a traffic study of the McKeown Avenue/Josephine Street area. The final report, entitled "McKeown Avenue / Josephine Street Traffic Study, June 1998" presented the findings of the study together with detailed recommendations for improvements to McKeown Avenue between Algonquin Avenue and Champlain Street. In summary, the report recommended that, within the study area, McKeown Avenue be widened from four lanes to five lanes, providing a centre fifth lane for two-way left turns, along with right turn tapers at selected locations, improvements to the Algonquin Avenue intersection and new traffic signals at Josephine Street.

Subsequently the City decided to conduct a similar traffic study for the section of McKeown Avenue from Champlain Street west to Gormanville Road. Due to the size of the study area and the extent of its impact, the project was undertaken as a Schedule C Municipal Environmental Assessment, with the associated traffic study undertaken as one of the technical background reports in support of the EA process. This report documents the traffic study which has been carried out for McKeown Avenue between Champlain Street and Gormanville Road. Together with the previous report for the section between Algonquin Avenue and Champlain Street, these two reports form the supporting technical traffic reports for the Class Environmental Assessment for McKeown Avenue between Algonquin Avenue and Gormanville Road.

The study conclusions and recommendations are presented in the next section (Chapter 2). Chapter 3 describes the existing conditions in the study area; Chapter 4 describes the projected future traffic volumes in the corridor; Chapter 5 evaluates the impact of the projected traffic on the existing road network and identifies the necessary improvements.

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

2.1 Findings from 1998 Traffic Study McKeown Avenue/Josephine Street

In response to expected development in the Josephine Street area, the City carried out an earlier study, "McKeown Avenue/Josephine Street Traffic Study - June 1998", which dealt with McKeown Avenue from Algonquin Avenue to Champlain Street. Along with improvements at the McKeown Avenue/Algonquin Avenue intersection (northbound double left turn and the addition of one lane on the McKeown Avenue and Airport Road approaches), the study recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). These improvements were to coincide with development of the vacant lands along Josephine Street and the nearby McKeown Avenue.

The current study supports the 1998 Study recommendations.

2.2 Champlain Street to Gormanville Road Existing Level of Service

From Champlain Street to Gormanville Road, McKeown Avenue is currently operating at an acceptable Level of Service, with the exception of the McKeown Avenue/Gormanville Road intersection where one movement, the left turn from McKeown to go south on Gormanville, is experiencing long delays at peak hours (see Exhibit 3.2). The McKeown Avenue /Gormanville Road intersection is close to the point of warranting traffic signals; with traffic signals, the intersection would operate at a very good Level of Service.

It is recommended that the intersection of McKeown Avenue and Gormanville Road be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

An analysis of Police accident reports confirms earlier findings from the 1998 study that the McKeown Avenue/Champlain Street intersection and McKeown Avenue at the Tim Hortons entrance are high accident locations (see Exhibits 3.2 and 3.3, and Table 3.1). The accident

frequency indicates problems at these locations in the existing road network even though the traffic capacity (Level of Service) is satisfactory.

It is recommended that the 1998 study recommendations be implemented at the McKeown Avenue/Champlain Street intersection (left turn lanes and left turn signal phasing) and on McKeown Avenue at the Tim Hortons entrance (consolidation of entrances and left turn storage lane, with traffic signals as new development occurs).

2.3 Future Development in the McKeown Avenue Corridor 2004 and Longer Term Future

McKeown Avenue between Algonquin Avenue and Gormanville Road is expected to see major development pressure over the next 15-20 years (see Table 4.1). For planning purposes it has been assumed that by 2004 the corridor will have approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, several new restaurant developments, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building, and development of a new hospital complex on 30-40 acres of land west of Gormanville Road.

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (mostly on Education Centre Lowlands), 500 new residential units, more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

2.4 Projected Growth in Traffic 2004 and Longer Term Future

Based on the projected development scenarios, future levels of traffic have been estimated for 2004 and a longer term planning horizon. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour. An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed. This new

traffic has been assigned to the existing road network based on the observed directional orientation of today's traffic (see Exhibit 4.2) and the results in 2004 are 65% and 100% increases in traffic at the east and west ends of McKeown Avenue respectively (see Exhibits 5.1 and 5.2). The ultimate (full development) traffic volumes are estimated to be 100% and 200% higher than today's traffic at the east and west ends respectively.

The impact of the added traffic in 2004 will be reduced Levels of Service ("D" and "E" at the key entry points and "E" and "F" at most internal locations - see Exhibit 5.3) if no improvements are made to the roads. With no road improvements and full development, the Levels of Service are almost all reduced to "F" (see Exhibit 5.4).

2.5 McKeown Avenue from Champlain Street to Gormanville Road Required Number of Through Lanes

Based on the projected traffic volumes along McKeown Avenue between Champlain Street and Gormanville Road, two through lanes in each direction will provide sufficient capacity over the planning period to full development. The section between Cartier Street and McNamara Street will require widening by 2004; between McNamara Street and Gormanville Road, one through lane in each direction may continue to be satisfactory through 2004, but will need widening within five years after 2004, with the section from McNamara Street to the Provincial Government Building being more critical.

It is recommended that two through lanes in each direction be adopted as the design standard for McKeown Avenue.

2.6 McKeown Avenue from Champlain Street to Gormanville Road Turning Lanes

Left turn storage lanes are currently required at Champlain Street, Cartier Street, McNamara Street and at the Ontario Government Building entrances. With the expected new development by 2004, left turn storage lanes will also be required at driveways between Champlain Street and Cartier Street and between Cartier Street and McNamara Street. Since

the tapers of these left turn storage lanes will overlap, a continuous centre two-way left turn lane should be provided from Champlain Street to the west side of the Ontario Government Building driveways. Between the Ontario Government Building and Gormanville Road, it would be possible to taper from five lanes to four lanes, but since the four lane section would only be approximately 100 metres long between tapers, it is proposed that the five lane section be carried through to Gormanville Road.

Right turn tapers or right turn channelizations would be desirable on McKeown Avenue at both approaches to Champlain Street, at Cartier Street, at McNamara Street and at the east entrance to the Ontario Government Building. These should only be provided if it can be done without adverse impact on pedestrians and adjacent properties.

It is recommended that the centre two-way left turn lane, which was previously recommended between Algonquin Avenue and Champlain Street, be continued through to Gormanville Road, and that consideration be given to providing right turn tapers or channelizations at Champlain Street (both approaches), at Cartier Street, at McNamara Street, and at the east entrance to the Ontario Government Building.

2.7 McKeown Avenue/Gormanville Road /College Drive Intersection

It is expected that the McKeown Avenue/Gormanville Road intersection will warrant traffic signals within the next few years. If the McKeown Avenue approach to the intersection is widened at the same time as the signals are installed, the intersection should operate at a very good Level of Service for a number of years. As the area approaches full development, the approaches to the intersection would require further improvements; however, full development may coincide with the construction of the new North Bay Bypass, which includes a new grade separated alignment for Gormanville Road with significant imrovements in traffic capacity.

It is recommended that traffic signals be installed at the McKeown Avenue/Gormanville Road intersection when the volumes reach the minimum warrant level, and that the McKeown Avenue approach to the intersection be widened before the signals are installed.

2.9 Gormanville Road /Highway 17 Intersection

The Gormanville Road/Highway 17 intersection is currently operating at a satisfactory Level of Service ("C"). By 2004 this will drop to "D", but widening both Gormanville Road approaches by one lane would maintain the Level of Service at "C". By full development, the Level of Service would again drop to "D", but full development is expected to coincide with the realignment of the Bypass and the grade separation of its new intersection with Gormanville Road, which would produce significant improvements in capacity.

2.10 Sidewalks

The expected traffic volumes and intensity of development along McKeown Avenue will justify a sidewalk along both sides of the road.

It is recommended that as development /redevelopment takes place, provision should be made for a sidewalk along the south side of McKeown Avenue.

3. EXISTING CONDITIONS

3.1 McKeown Avenue

Between Algonquin Avenue and Cartier Street, McKeown Avenue is a four lane undivided roadway with an urban cross-section (curb and gutter and storm sewers); west of Cartier Street, McKeown Avenue becomes a two lane roadway with curb and gutter. The speed limit is 50 km/h. There is a sidewalk along the north side between Algonquin Avenue and the west entrance to the Provincial Government Building west of McNamara Street.

Traffic signals are located at the Algonquin Avenue (Highway 11) intersection and at the Champlain Street intersection; a STOP sign faces McKeown Avenue traffic at Gormanville Road. The Algonquin Avenue intersection has channelized right turn lanes (and left turn storage lanes on Algonquin Avenue); there are no turning lanes or channelizations along McKeown Avenue between Algonquin Avenue and Gormanville Road.

3.2 Gormanville Road

Gormanville Road is an important north-south through road linking Main Street to McKeown Avenue/College Drive with a signalized intersection at Highway 17. North of McKeown Avenue, Gormanville Road is a cul-de-sac providing access to local properties (primarily OPP Buildings, MTO maintenance facilities and Nipissing University Residence). On both sides of Highway 17 (Eloy Road to McKeown Avenue), Gormanville Road is a four-lane roadway; north of McKeown Avenue and south of Eloy Road, it tapers to a two-lane roadway. The speed limit is 50 km/h.

3.3 College Drive

College Drive is a two-lane roadway which links McKeown Avenue and Gormanville Road up the escarpment to Nipissing University/Canadore College and the residential area north of the Education Centre. The posted speed limit on the escarpment is 70 km/h. Its intersection with Gormanville Road includes a channelized free flow right turn movement.

3.4 Existing Traffic Volumes

Exhibit 3.1 shows recent traffic count data for the study area for a morning and afternoon peak hour. The date and time of each count is indicated; some of the counts were recorded by City staff, while others were recorded byTranplan personnel. The detailed count sheets are included in Appendix A.

3.5 Accident Records

Detailed accident reports were made available by North Bay City Police for those accidents falling under their jurisdiction during 1996, 1997 and 1998. The Ministry of Transportation provided a computerized listing summarizing key elements of accident reports from the O.P.P. at the Algonquin Avenue (Highway 11)/McKeown Avenue (Airport Road) intersection and at the Highway 17/Gormanville Road intersection for the years 1995, 1996 and 1997. Table 3.1 summarizes the number of accidents at selected intersections and indicates the accident rate at the intersection for all accidents and for personal injury accidents. Exhibits 3.2, 3.3 and 3.4 show collision diagrams for the City data; Exhibits 3.5 and 3.6 shows collision diagrams reconstructed from the MTO data.

Table 3.1 summarizes the number of accidents and the accident rate at selected intersections; all data is over a three year period, except for the Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection, where four years of data was reviewed (21 months before reconstruction was completed in the Fall of 1996 and 27 months after reconstruction).

The highest number of accidents and the highest accident rates are at the Highway 17 /Gormanville Road intersection (22 collisions in total, or 1.3 collisions per million vehicles entering the intersection, with 10 personal injury accidents, or 0.6 personal injury accidents per million vehicles entering the intersection). Exhibit 3.6 shows a collision diagram for the 22 accidents reported at the Highway 17/Gormanville intersection from 1995 through 1997 prior to its reconstruction; fourteen of the 22 involved left turns, which should be reduced by the recent improvements to the intersection (the intersection was rebuilt with significant changes in the signal phasing during 1998 and 1999.

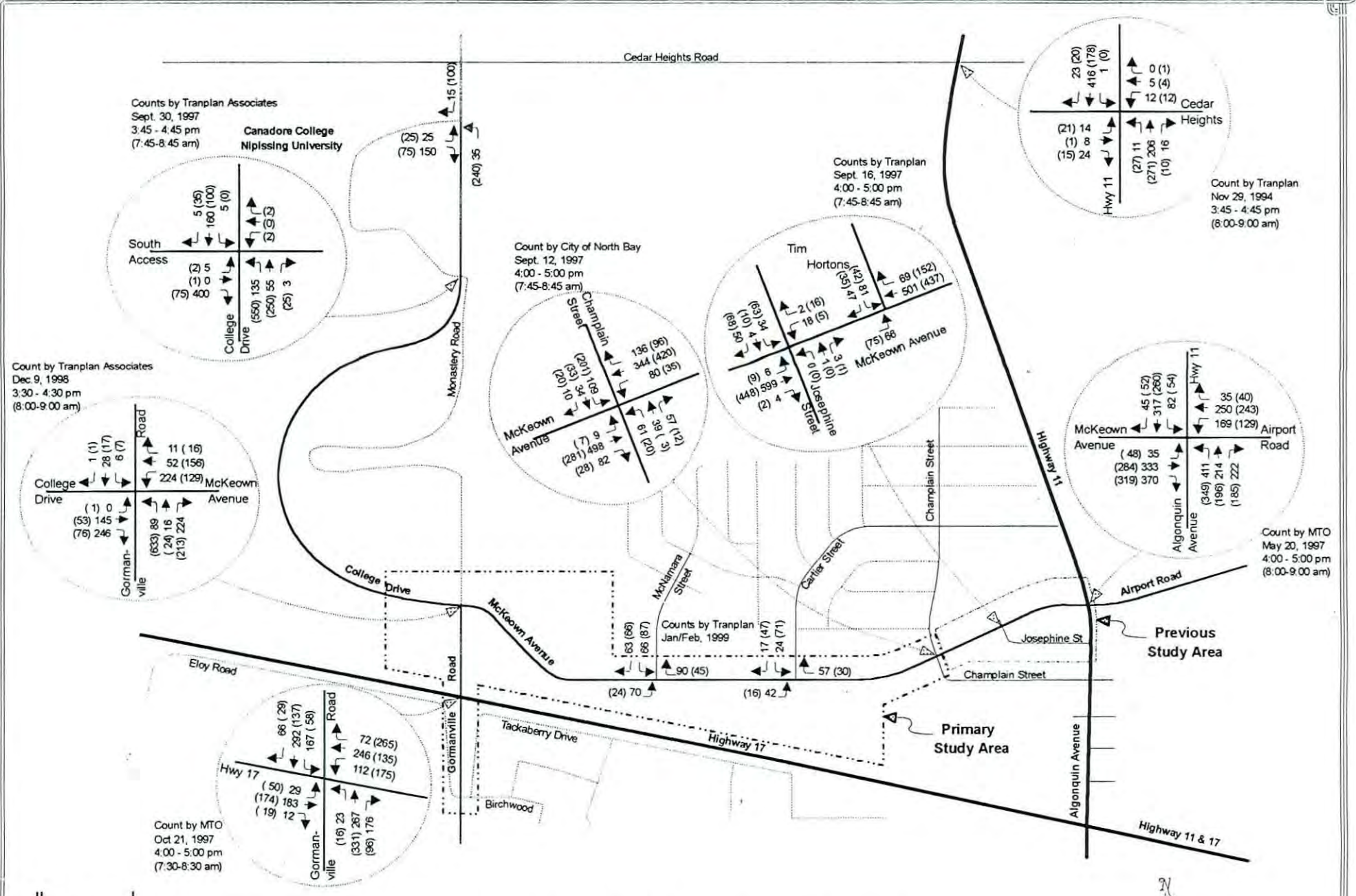


Exhibit 3.1 Existing Traffic Volumes

tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Table 3.1 Accident Rates at Selected Intersections

Intersection	Total No. of Accidents (3 yrs)	Accident Rate[1] (all accidents per million vehicles)	Personal Injury Accidents (3 yrs)	Accident Rate[2] (injury accidents per million vehicles)
McKeown Avenue /Champlain Street	16	1.2	5	0.4
McKeown Avenue /McNamara Street	5	0.5	0	0.0
McKeown Avenue /Gormanville Road	5	0.4	3	0.2
McKeown Avenue /Tim Horton's Entrance	12	0.9	1	0.1
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) Before Reconstruction 1995-1996 (21 months)	19	1.3	4	0.3
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) After Reconstruction 1996-1998 (27 months)	12	0.7	6	0.3
Highway 17 /Gormanville Road	22	1.3	10	0.6

1 No. of accidents (all reported accidents) per million vehicles entering the intersection.

2 No. of personal injury accidents per million vehicles entering the intersection.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection experienced a similar high accident rate before it was reconstructed in 1996; after reconstruction, total collisions dropped from 1.3 to 0.7 collisions per million vehicles entering the intersection, but the personal injury accident rate did not show any improvement. Exhibit 3.5 shows the collision diagrams for the intersection before and after its reconstruction. During the 21 month period before reconstruction was completed, 19 collisions were reported (four involved personal injury); during the 27 months after reconstruction, 12 collisions were reported (six involved personal injury). It would appear that the reconstruction (including changes to the traffic signals) has been responsible for a 50% drop in the total number of collisions at this intersection, although the number of personal injury accidents has not dropped.

The McKeown Avenue/Champlain Street intersection has a high accident rate similar to the two MTO intersections before they were reconstructed (1.2 total collisions and 0.4 personal injury collisions per million vehicles entering the intersection). Exhibit 3.3 shows a collision diagram for the accidents at Champlain Street. Sixteen accidents occurred at the signalized Champlain Street intersection over the three year period, with the majority involving left turns from McKeown Avenue into Champlain Street (six westbound and three eastbound). Two accidents involved left turns from Champlain Street out onto McKeown Avenue, and three involved right angle collisions between McKeown Avenue and Champlain Street traffic. The high incidence of accidents at Champlain Street appears to be related to the absence of left turn storage lanes on McKeown Avenue and the lack of left turn phases in the signal timing.

The Tim Horton's driveway is the only other City intersection with a high accident rate (0.9 accidents per million vehicles entering the intersection). Exhibit 3.2 shows these accidents in collision diagram form. Twelve accidents occurred at the Tim Horton's driveway, with eleven of these being almost identical, involving a westbound vehicle along McKeown Avenue colliding with a vehicle making a left turn out from the Tim Horton's driveway. In comparison, only three similar collisions have been reported at the driveway adjacent to the McDonald's Restaurant. The significant incidence of accidents at the Tim Horton's driveway, appears to be the result of several factors, including the high volume of left turns and conflicting movements at this unsignalized location along McKeown Avenue, sight restrictions created by high volumes of

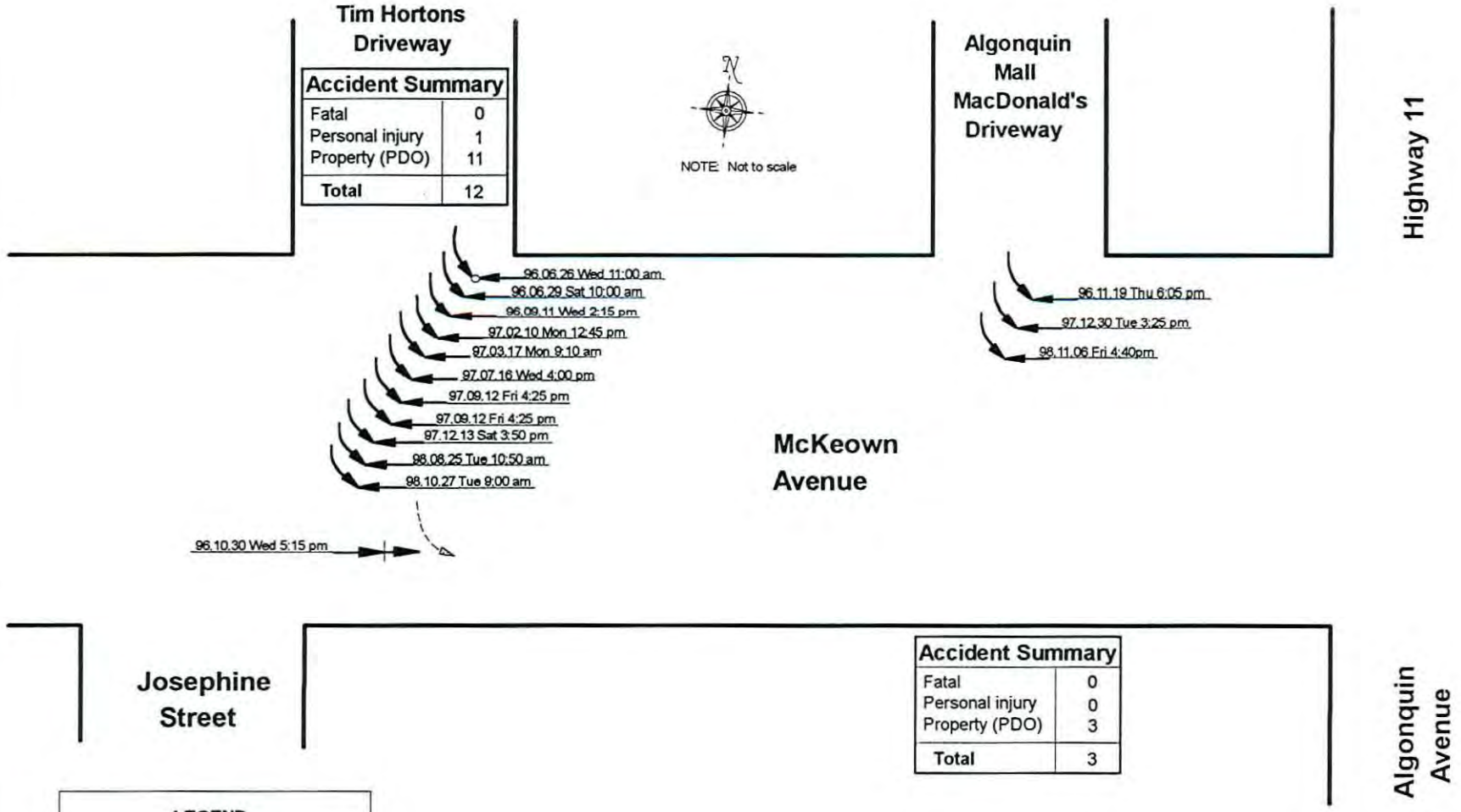


EXHIBIT 3.2
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Josephine St to Algonquin Ave

Tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel (705) 522-0272 Fax (705) 522-1733

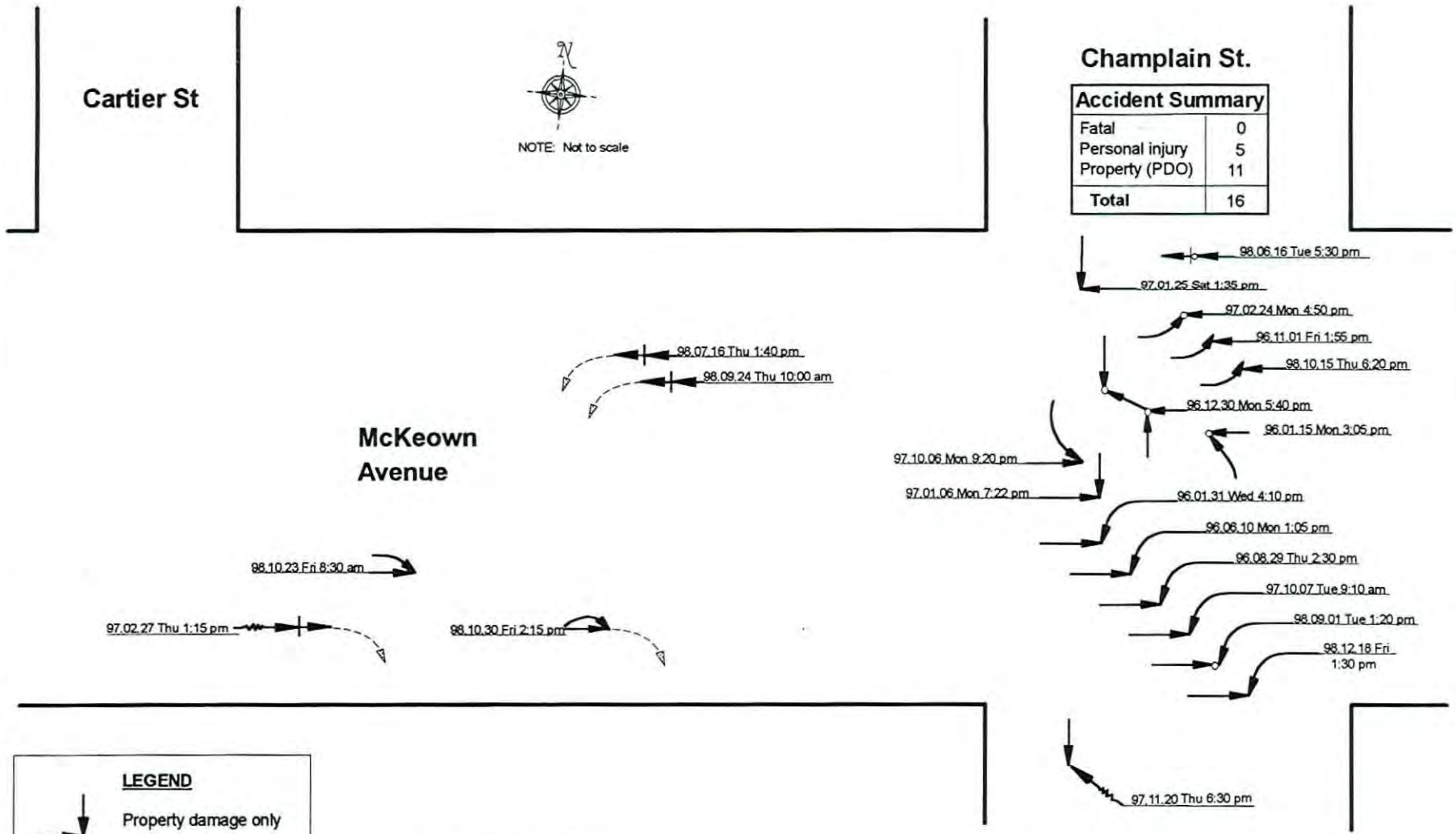


EXHIBIT 3.3
COLLISION DIAGRAM (1996-1998)
McKEOWN AVENUE
Cartier St to Champlain St

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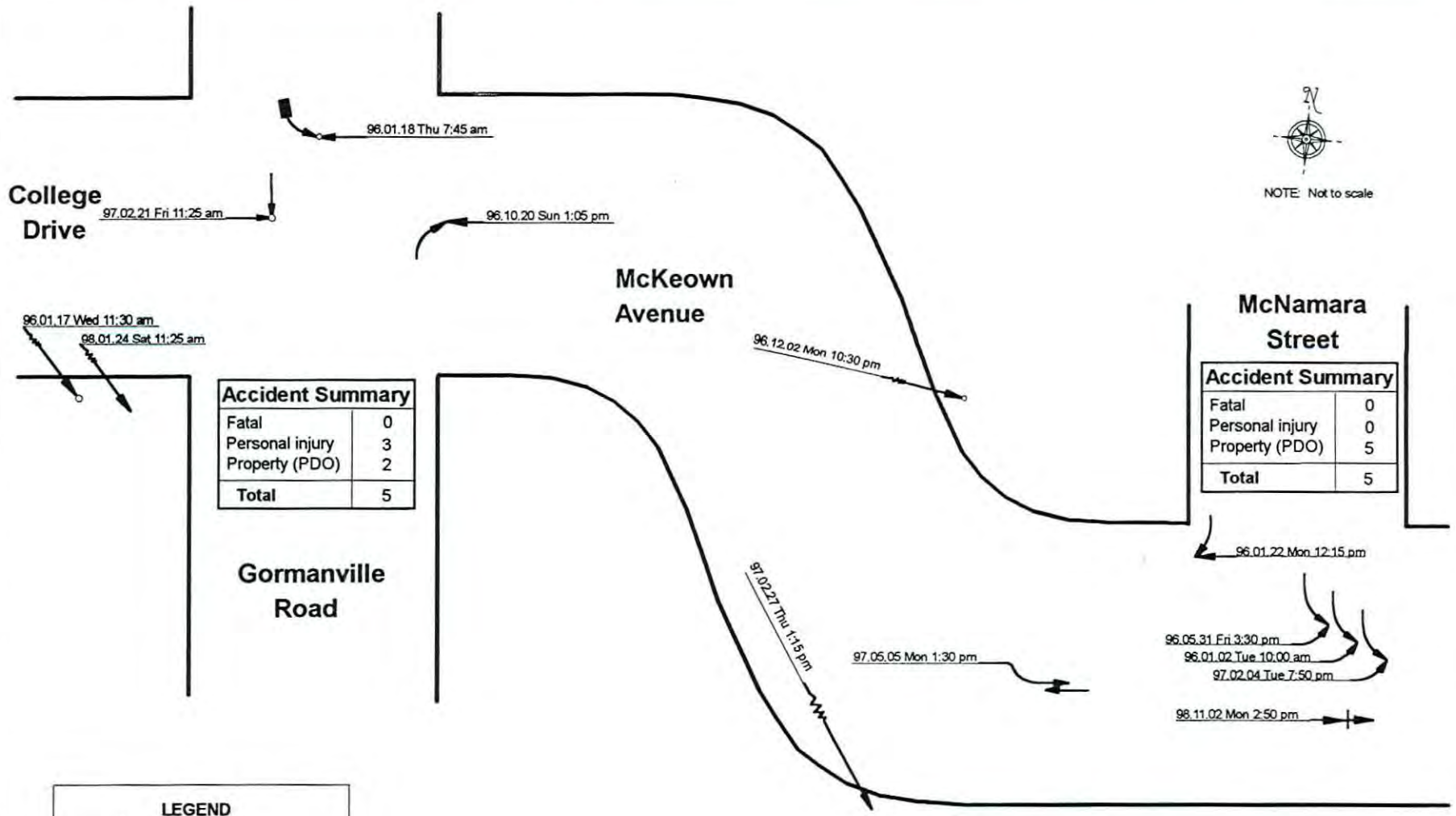
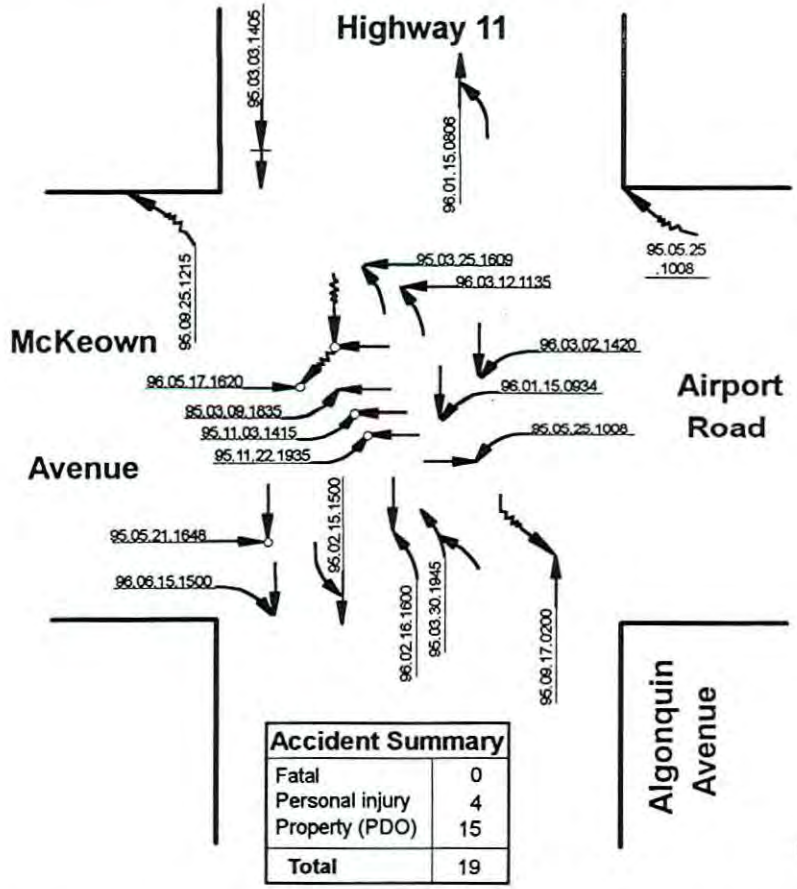


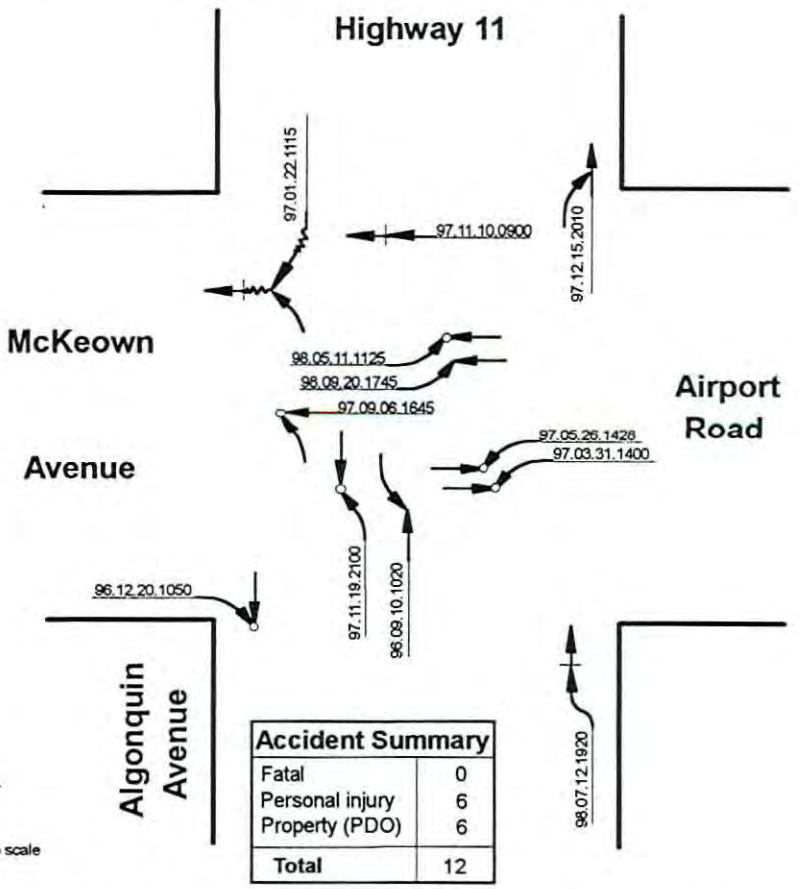
EXHIBIT 3.4
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Gormanville Rd to McNamara St

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PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733



Accident Summary	
Fatal	0
Personal injury	4
Property (PDO)	15
Total	19

NOTE: Not to scale



Accident Summary	
Fatal	0
Personal injury	6
Property (PDO)	6
Total	12

(a) Before Reconstruction 1995-96 (21 months)

NOTE: Collisions reconstructed from MTO computerized listings of coded data. Not based directly on OPP reports.

(a) After Reconstruction 1996-98 (27 months)

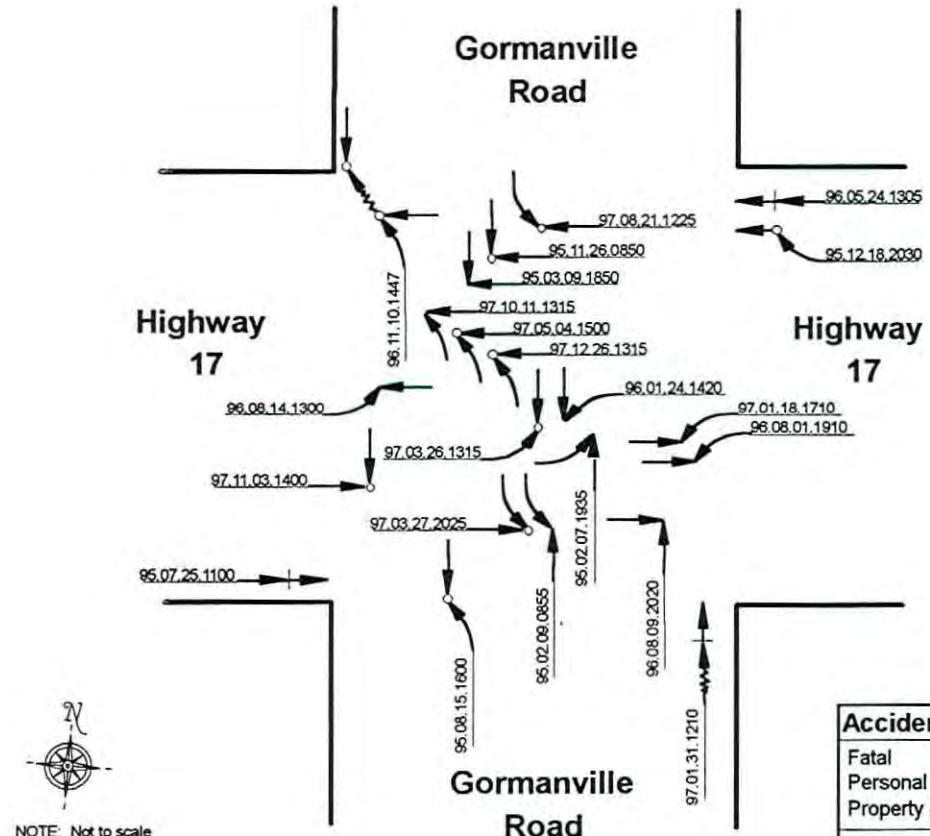
NOTE: Collisions reported in 1996 and 1997 reconstructed from MTO computerized listings of coded data. 1998 collisions based on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.5
COLLISION DIAGRAMS
McKeown Avenue at Highway 11

Trianon associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733



Accident Summary	
Fatal	0
Personal injury	10
Property (PDO)	12
Total	22

NOTE: Collisions reconstructed from MTO computerized listings of coded data.
Not based directly on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.6
COLLISION DIAGRAM 1995-1997
Gormanville Road at Highway 17

Trans plan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

westbound vehicles in the curb lane along McKeown Avenue turning right into the Tim Hortons driveway, and the congestion/confusion created by the proximity of the two driveways on either side of Tim Hortons.

Exhibit 3.4 shows the accidents reported at the McNamara Street and at the Gormanville Road intersections. Only five collisions occurred at the Gormanville Road intersection over the three year period, with the same number at the McNamara Street intersection. There is not a significant accident problem in this section of McKeown Avenue.

3.6 Existing Level of Service

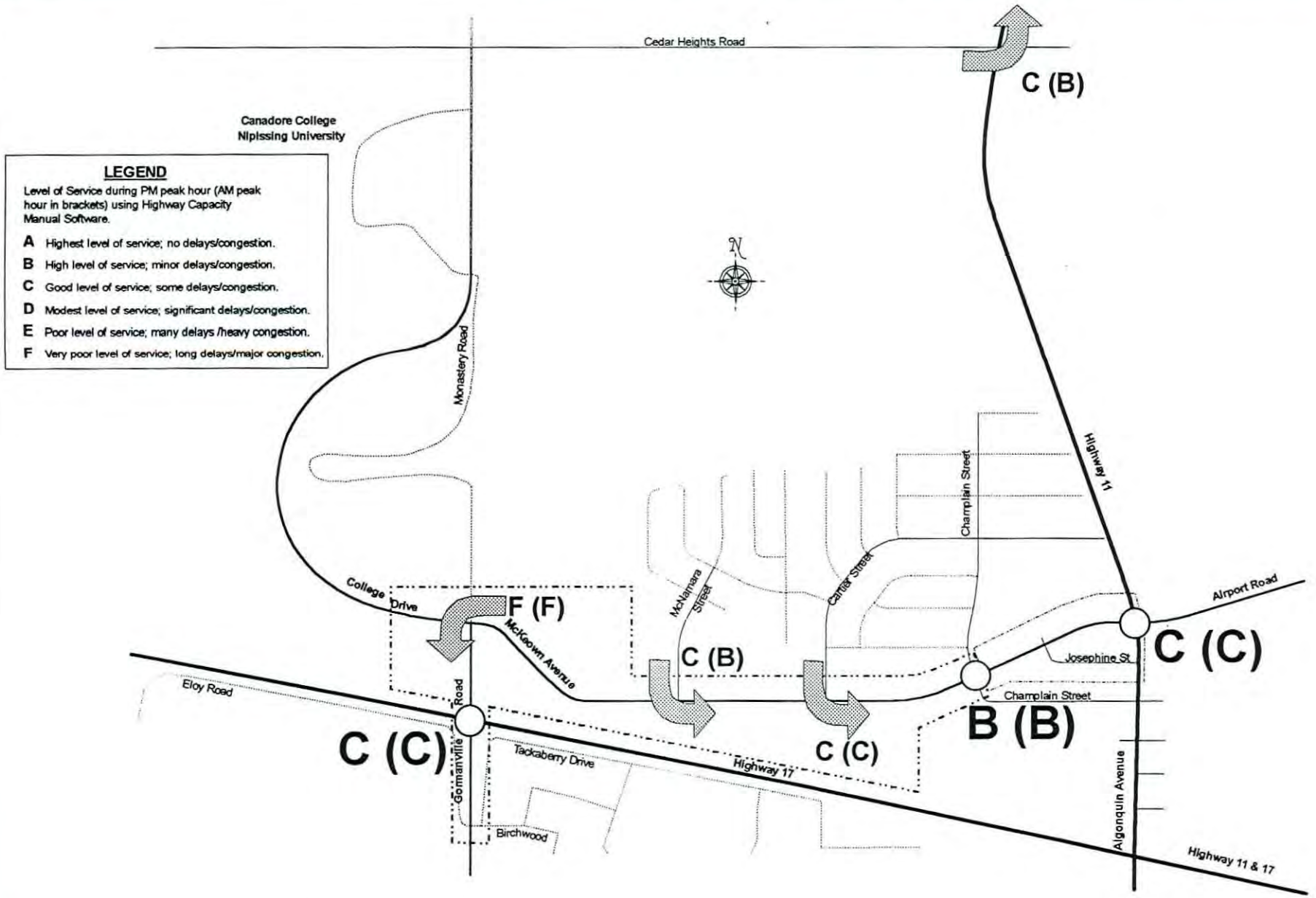
The traffic volumes shown in Exhibit 3.1 were assessed against the capacity of the intersections using the Highway Capacity Manual software. The Levels of Service[3] during weekday morning and afternoon peak hours are shown in Exhibit 3.7.

All intersections were found to be operating at a good Level of Service ("C" or better) except for the Gormanville/McKeown intersection where the westbound to southbound left turn is currently operating at Level of Service "F" in the morning and afternoon peak hours. All other movements at this unsignalized intersection are operating at Level of Service "B" or better.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection was calculated to be operating at Level of Service "C" during the AM and PM peak hours. The McKeown Avenue/Champlain Street intersection was found to be operating at Level of Service "B" during both AM and PM peak hours.

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[3] Level of Service (LOS) is commonly used in traffic engineering to describe the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing amounts of congestion with "F" representing a complete breakdown in traffic flow. Level of Service "C" and "D" are commonly used as design standards. The Highway Capacity Manual software for signalized and unsignalized intersections was used to calculate the Levels of Service.



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PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 3.7 Existing Level of Service

3.7 Turning Lanes

The previous study for the McKeown Avenue/Josephine Street area identified a need at the present time for left turn storage lanes at the driveway adjacent to the McDonald's Restaurant, at the driveway on the east side of the Tim Hortons, at Josephine Street (marginal), and at Champlain Street. Allowing for tapers, it was concluded that a continuous centre fifth lane should be provided between Algonquin Avenue and Champlain Street. Right turn tapers were also identified as being desirable wherever they can be accommodated without adverse impact on pedestrians and adjacent properties.

The current study examined the intersections west of Champlain Street to Gormanville Road. Left turn storage lanes are warranted at Cartier Street, McNamara Street and at Gormanville Road. Left turn lanes are also warranted at the McKeown Avenue driveway entrances to the Ontario Government Building, the Redpath Group complex and the Canadian Tire store.

The distance between Champlain Street and Cartier Street is approximately 375 metres; the tapers for the left turn lanes from Champlain Street and Cartier Street would end approximately 125 metres apart. The distance between Cartier Street and McNamara Street is approximately 350 metres; the tapers for the left turn lanes would end approximately 100 metres apart. The distance between McNamara Street and the Ontario Government Building west driveway is approximately 250 metres; the tapers for the left turn lanes would run into each other.

4. FUTURE TRAFFIC LEVELS

The planning for the traffic requirements for the area has been based on analysing the following two scenarios:

i) five year horizon (2004) assuming the level of development/redevelopment in the McKeown Avenue corridor that is considered by City Planning officials to be realistic for planning purposes (see Table 4.1).

ii) 15-20 year horizon ("full development" scenario) assuming all foreseeable development/redevelopment in the McKeown Avenue corridor (see Table 4.1).

The expected new development within five years includes approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, five new restaurant developments, 50 new houses above the escarpment, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building (former MTO Building), and development of a new hospital complex on 30-40 acres of land west of Gormanville Road[4].

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (200,000 square feet on College Lowlands), 500 new residential units (350 single family homes above the escarpment), two more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

4.1 Trip Generation by New Development/Redevelopment

The traffic impact of the two development scenarios has been estimated using trip generation rates provided in the Institute of Transportation Engineers' (ITE) Trip Generation Manual. There were two exceptions: growth factors (1.5% per annum) were applied to estimate growth in traffic Canadore College and Nipissing University, and Tranplan files were used for estimating trip generation by the hospital complex

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[4] If the Hospital does not select this site for its new building, it is expected that the lands will be developed with commercial retail and residential uses. Depending on the proportion of retail uses, the lands may generate approximately the same amount of traffic as the Hospital, or significantly more.

Table 4.1: Projected Changes in Land Use in Study Area

Description of Lands	Size (Approx.)	Assumed New Development /Redevelopment	Estimated Timing
1. McKeown Avenue from Algonquin Avenue to Champlain Street plus Josephine Street	Approx. 7 acres	22,500 sq ft of new retail; 15,000 sq ft of new offices; new fast food restaurant	0-5 yrs
2. McKeown Avenue from Champlain Street to Cartier Street	16 acres	110,000 sq ft of new retail; two new fast food restaurants	0-5 yrs
	5 acres	35-40,000 sq ft of new retail;	5-20 yrs
3. McKeown Avenue from Cartier Street to McNamara Street	2 acres	20-25,000 sq ft of new retail	0-5 yrs
	3 acres	30-40,000 sq ft of new retail;	5-20 yrs
4. McKeown Avenue from McNamara Street to Gormanville Road	2.5 acres	Two new fast food restaurants	0-5 yrs
	5 acres	Motel; two new restaurants	5-20 yrs
5. College Drive below Escarpment (Education Centre Lowlands)	30+ acres	Hospital complex	0-5 yrs
	30 acres	200,000 sq ft of new retail; 150 new residential units	5-20 yrs
6. College Drive above Escarpment		Canadore College/Nipissing University enrolment increase of 1.5% per annum	0-20 yrs
		50 new single family housing units	0-5 yrs
		350 new single family housing units	5-20 yrs

NOTE: Assumptions about future development have been made for planning purposes only, and do not necessarily reflect any specific knowledge of the intentions of the landowners.

(ITE trip rates for hospitals do not appear to be representative of Canadian/Ontario conditions).

Table 4.2 shows the projected trip generation by the new development/redevelopment included in the two scenarios. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour (800 inbound and 1,200 outbound). An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed.

4.2 Directional Orientation of New Traffic

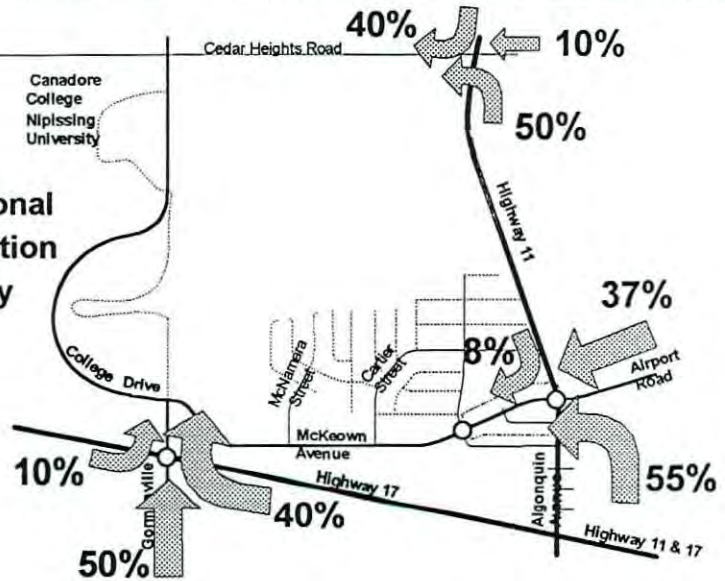
The directional orientation of the new traffic was based on observed movements at existing driveways and intersections along McKeown Avenue, including the key entry points at Algonquin Avenue and Gormanville Road (see Exhibit 4.1). A proportion of the overall traffic was assigned to the Cedar Heights/Highway 11 access route (50% of the new residential development on the escarpment, 15% of the new traffic to the University/College, and less than 10% of the other traffic to the corridor).

In the case of trips to the east end of the corridor (east of Champlain Street), 70% were assigned to approach from Algonquin Avenue; west of Champlain Street, the proportion was reduced to 60%. Of the trips which approach Nipissing University /Canadore College from the south (i.e. excluding the 15% that come via Cedar Heights Road), 80% come from Gormanville Road, as opposed to the 20% from McKeown Avenue. The Hospital and other developments on the Education Centre Lowlands are also expected to attract 80% of their traffic via Gormanville Road.

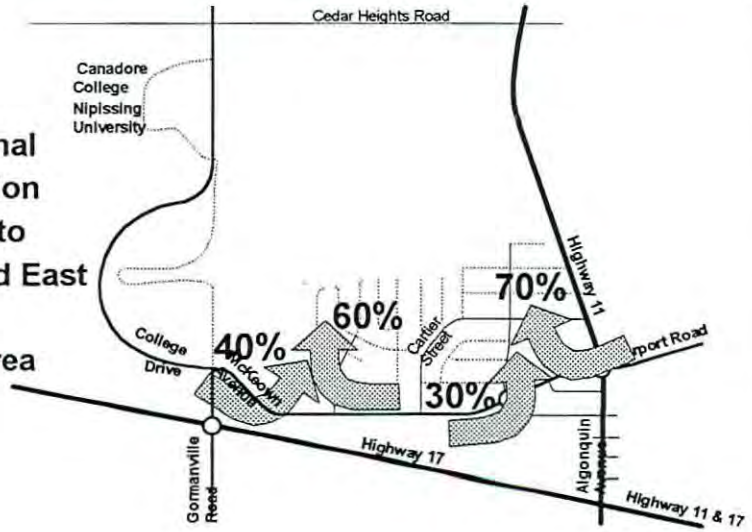
4.3 Growth in Background Traffic in the Study Area

Background traffic is defined as the traffic which passes through study area intersections, but which has neither an origin or a destination within the study area. Background traffic would include vehicles travelling through the study area along

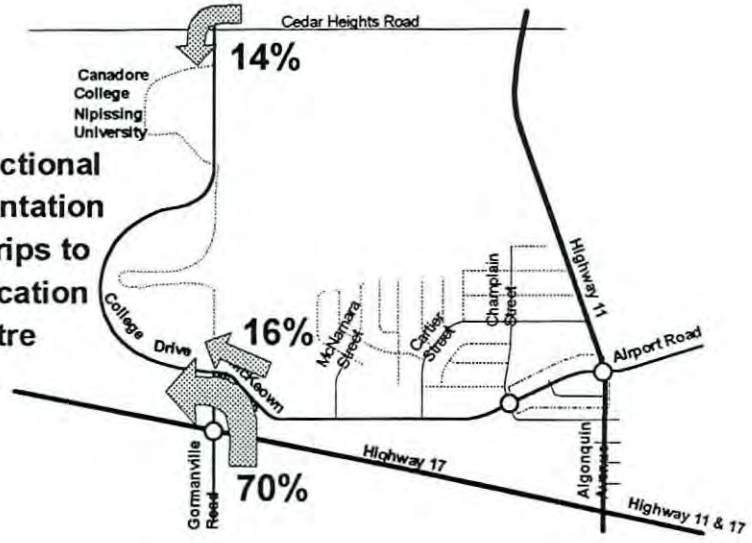
a) Directional Orientation at Study Area Entry Points



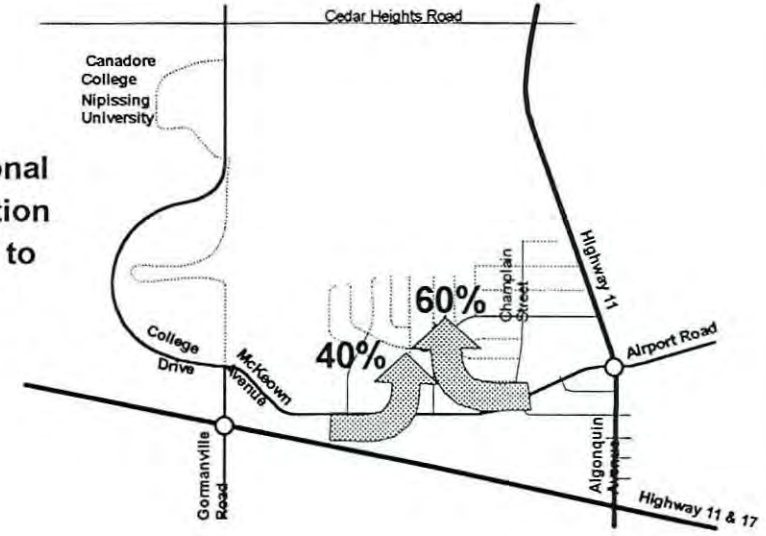
c) Directional Orientation of Trips to West and East Ends of Study Area



a) Directional Orientation of Trips to Education Centre



d) Directional Orientation of Trips to Cartier Street



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 4.1 Existing Trip Orientation

Table 4.2 ESTIMATED NEW TRIP GENERATION BY CHANGES IN LAND USE

PROJECTED CHANGES IN LAND USE			WITHIN 5 YEARS								6 - 20 YEARS							
LOCATION	EXISTING USE	ASSUMED NEW USE /CHANGE IN USE	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips		
				Total	In	Out		Total	In	Out		Total	In	Out		Total	In	Out
McKeown Avenue Algonquin to Champlain (including Josephine)	Undeveloped	22,500 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	43 **34**	27 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **97**	126 **105**								
	Undeveloped	15,000 sq ft offices (ITE TGM #710)	Driveway traffic	**48**	**43**	**5**	Driveway traffic	**51**	**9**	**42**								
	Undeveloped	Restaurant - 2,500 sq ft (ITE TGM #834)	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**								
McKeown Avenue Champlain to Cartier	Light industrial	110,000 sq ft retail (ITE TGM #815)	Driveway traffic Less pass-by traffic Less existing ind. traffic	240 192 **168**	151 121 **106**	89 71 **62**	Driveway traffic Less pass-by traffic Less existing ind. traffic	480 384 **364**	240 184 **174**	240 200 **190**								
	Undeveloped	2 restaurants-2,500 sq ft each (ITE TGM #834)	Driveway traffic Less pass-by traffic	280 **188**	143 **96**	137 **92**	Driveway traffic Less pass-by traffic	80 **54**	42 **28**	38 **26**								
	50% undeveloped 50% light industrial	38,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	120 96 **86**	73 59 **52**	47 37 **34**	Driveway traffic Less pass-by traffic Less existing ind. traffic	500 400 **385**	250 200 **195**	250 200 **190**
McKeown Avenue Cartier to McNamara	Undeveloped	25,000 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	44 **34**	26 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **101**	126 **101**								
	Light industrial	40,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	100 80 **60**	63 50 **35**	37 30 **25**	Driveway traffic Less pass-by traffic Less existing ind. traffic	380 304 **279**	198 152 **142**	182 152 **137**
McKeown Avenue McNamara to Gormanville	Undeveloped	3 fast food restaurants (ITE TGM #834)	Driveway traffic Less pass-by traffic	420 **281**	214 **144**	206 **138**	Driveway traffic Less pass-by traffic	270 **181**	140 **94**	130 **87**	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**
	Undeveloped	One sit down restaurant (ITE TGM #832)									Driveway traffic Less pass-by traffic	74 **59**	38 **30**	36 **29**	Driveway traffic Less pass-by traffic	65 **52**	36 **29**	29 **23**
	Undeveloped	Motel (ITE TGM #320)									Driveway traffic	**50**	**19**	**32**	Driveway traffic	**50**	**28**	**22**
College Drive Education Centre Lowlands	Undeveloped	Hospital complex (Tranplan library)	Driveway traffic	**750**	**575**	**175**	Driveway traffic	**750**	**225**	**525**	Driveway traffic	**150**	**100**	**50**	Driveway traffic	**200**	**75**	**125**
	Undeveloped	200,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic	250 **225**	158 **142**	93 **83**	Driveway traffic Less pass-by traffic	1000 **900**	500 **432**	500 **468**
	Undeveloped	150 residential units (ITE TGM #221)									Driveway traffic	**75**	**15**	**60**	Driveway traffic	**92**	**61**	**31**
College Drive Above Escarpment	Existing Colleg /University	Assume enrolment growth of 1.5% p.a.	New traffic after 5 yrs	**100**	**85**	**15**	New traffic after 5 yrs	**60**	**15**	**45**	New traffic 6-20 yrs	**200**	**170**	**30**	New traffic 6-20 yrs	**120**	**30**	**90**
	Undeveloped	400 residential units (ITE TGM #210)	50 D.U.'s within 5 yrs	**44**	**11**	**33**	50 D.U.'s within 5 yrs	**57**	**36**	**21**	350 more D.U.'s	**250**	**60**	**190**	350 more D.U.'s	**330**	**210**	**120**
TOTAL				**1785**	**1175**	**610**		**1980**	**810**	**1170**		**1249**	**670**	**579**		**2468**	**1233**	**1235**

Note: Numbers may not add up exactly due to rounding.

Algonquin Avenue/Highway 11, Airport Road, Highway 17, and the southerly portion of Gormanville Road without turning onto McKeown Avenue or College Drive.

All background traffic has been assumed to grow at approximately 2% per annum (i.e. 10% growth in background traffic by 2004 and 30% growth in background traffic by the time of full development.

4.4 Pass-by Trips/Linked Trips

Based on information contained in the Institute of Transportation Engineers Trip Generation Manual, pass-by trips can comprise 50% of all traffic to a fast food restaurant and 25% of all trips to a retail mall. Pass-by trips consist of cars stopping at the development as they drive past it; these trips do not add traffic to the major road network, but may add, or shift turning movements along the major road.

Linked trips consist of people making two or more stops within the site. For example, a person working in the general area may drive to the site at lunch time to do their weekly banking and to have lunch at one of the restaurants. These two trips (one to the bank and the other to the restaurant) are only one additional vehicle trip on the roads and at the entrances.

This study has assumed that pass-by trips make up 33% of fast food restaurant traffic and 20% of retail mall traffic. No pass-by traffic has been assumed in the case of other land uses.

5. ANALYSIS OF FUTURE TRAFFIC VOLUMES

5.1 Combined Site and Background Traffic

Exhibit 5.1 shows the total afternoon peak hour traffic volumes as they currently exist and as projected to 2004 and at the time of Full Development. Exhibit 5.2 shows the same information for the morning peak hour. Exhibit 5.3 shows the computed Level of Service at key locations in 2004 if the expected development/redevelopment takes place and the existing roads are not improved. Exhibit 5.4 shows the Level of Service at the same locations with Full Development if no improvements are made to the road system.

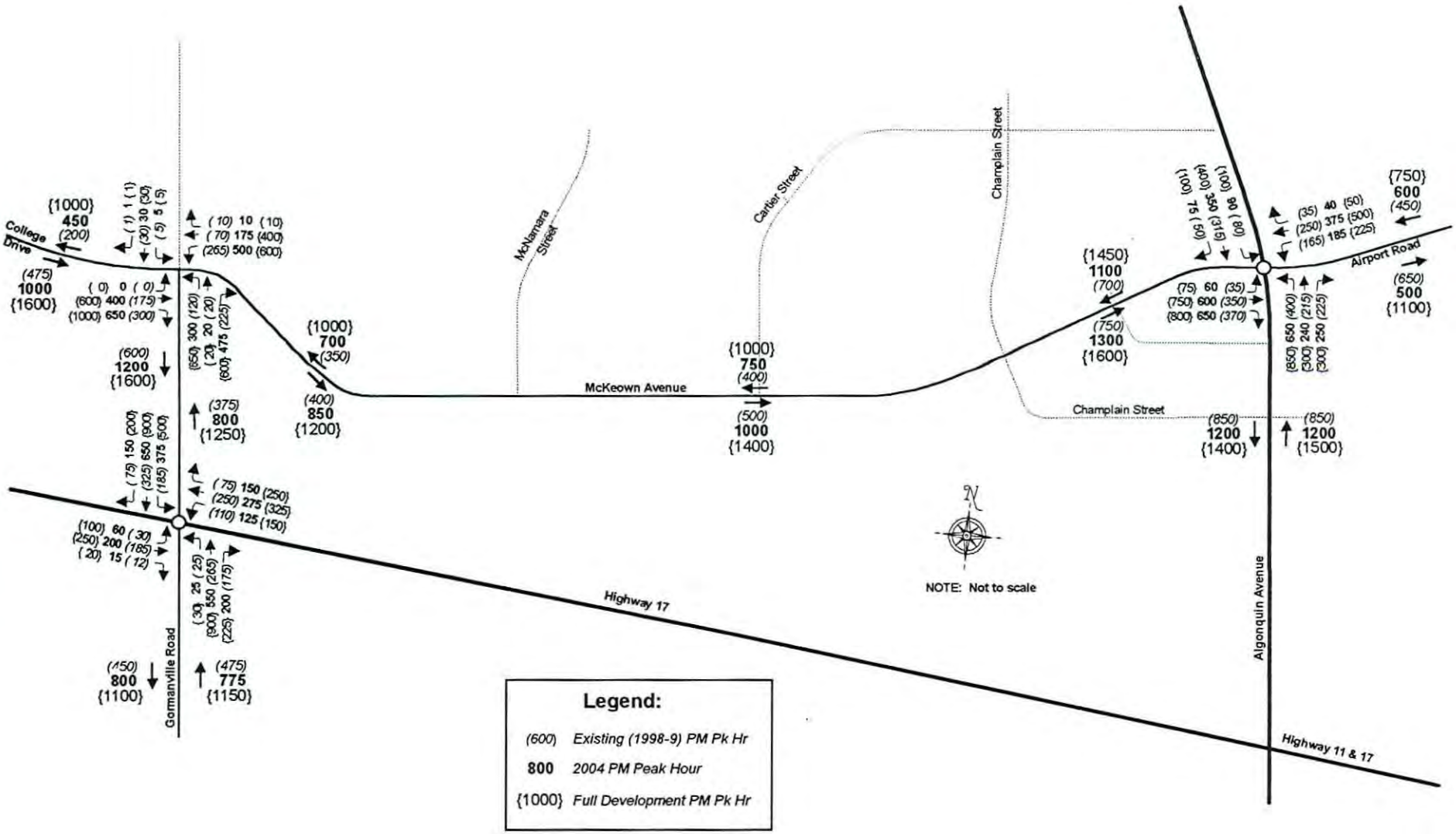
As shown in Exhibit 5.3, the Level of Service would deteriorate to "D" and "E" levels at several locations, including the two main access points, and internal unsignalized intersections would be faced with Level of Service "F" for most left turns from side streets. By Full Development (Exhibit 5.4) most locations are reduced to Level of Service "F".

5.2 McKeown Avenue at Algonquin Avenue

The McKeown Avenue-Airport Road/Algonquin Avenue-Highway 11 intersection is currently operating satisfactorily at Level of Service "C". By 2004 it is projected that the intersection will be operating at Level of Service "E" in the afternoon peak hour. However, converting the existing northbound lanes on Algonquin Avenue to a double left turn would maintain the intersection at Level of Service "C-D" through 2004. With Full Development, Level of Service "C-D" can be maintained by widening McKeown Avenue and Airport Road by one lane on their approaches to Algonquin Avenue.

5.3 McKeown Avenue from Algonquin Avenue to Champlain Street

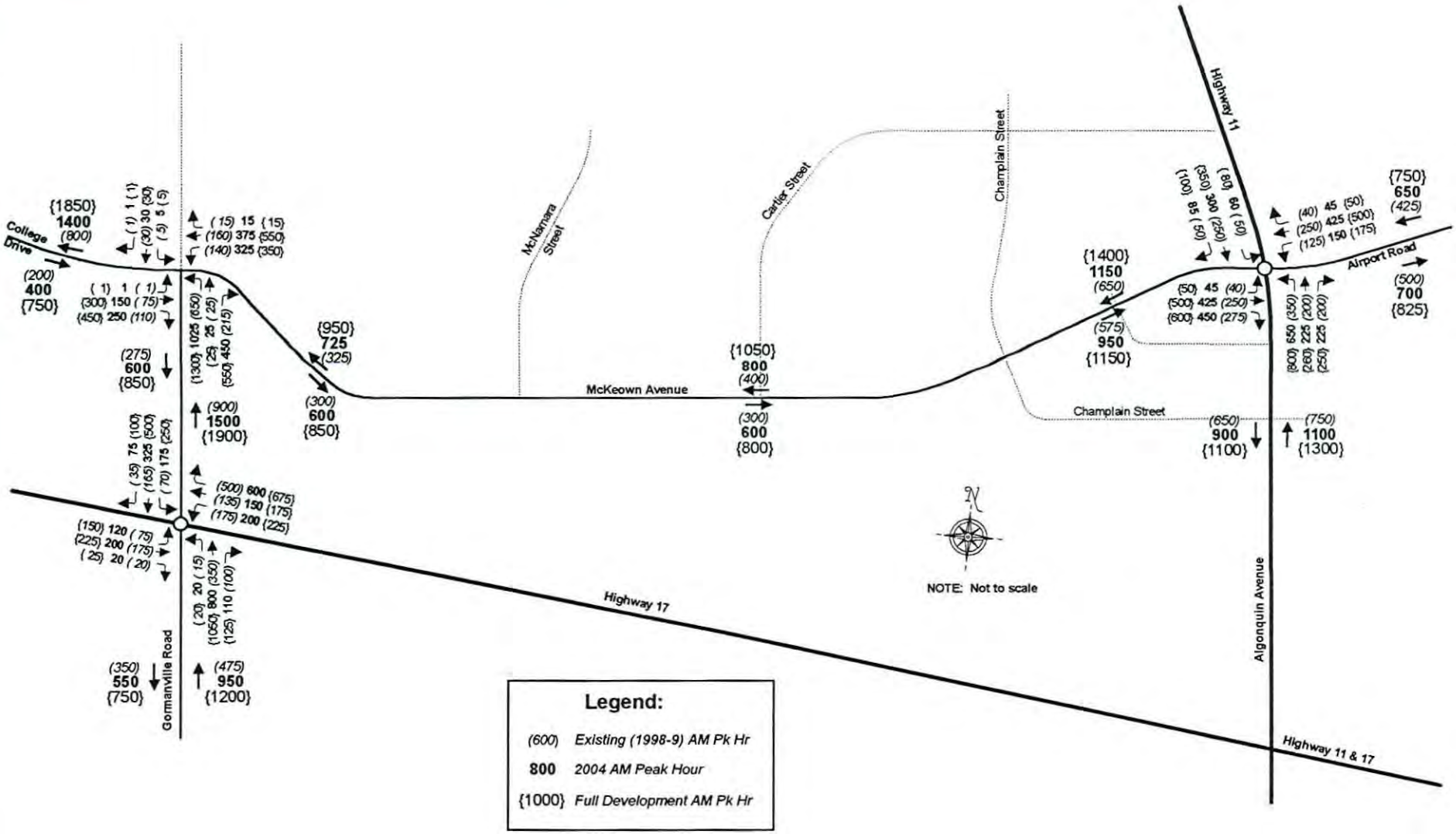
The earlier study "McKeown Avenue/Josephine Street Traffic Study" dealt with



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PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 5.1 Projected Afternoon Peak Hour Traffic

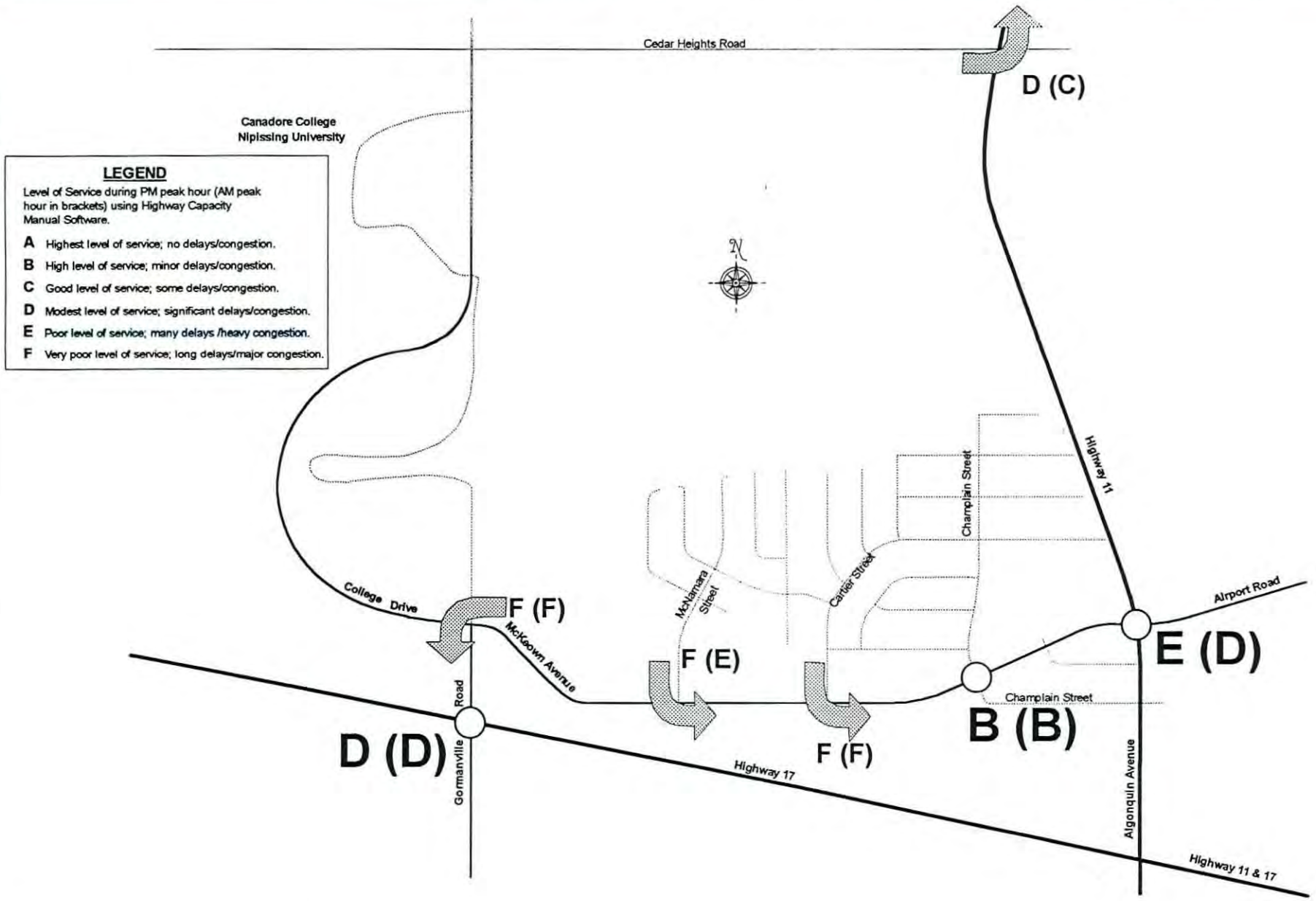
Existing, 2004 and Full Development



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
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Exhibit 5.2 Projected Morning Peak Hour Traffic

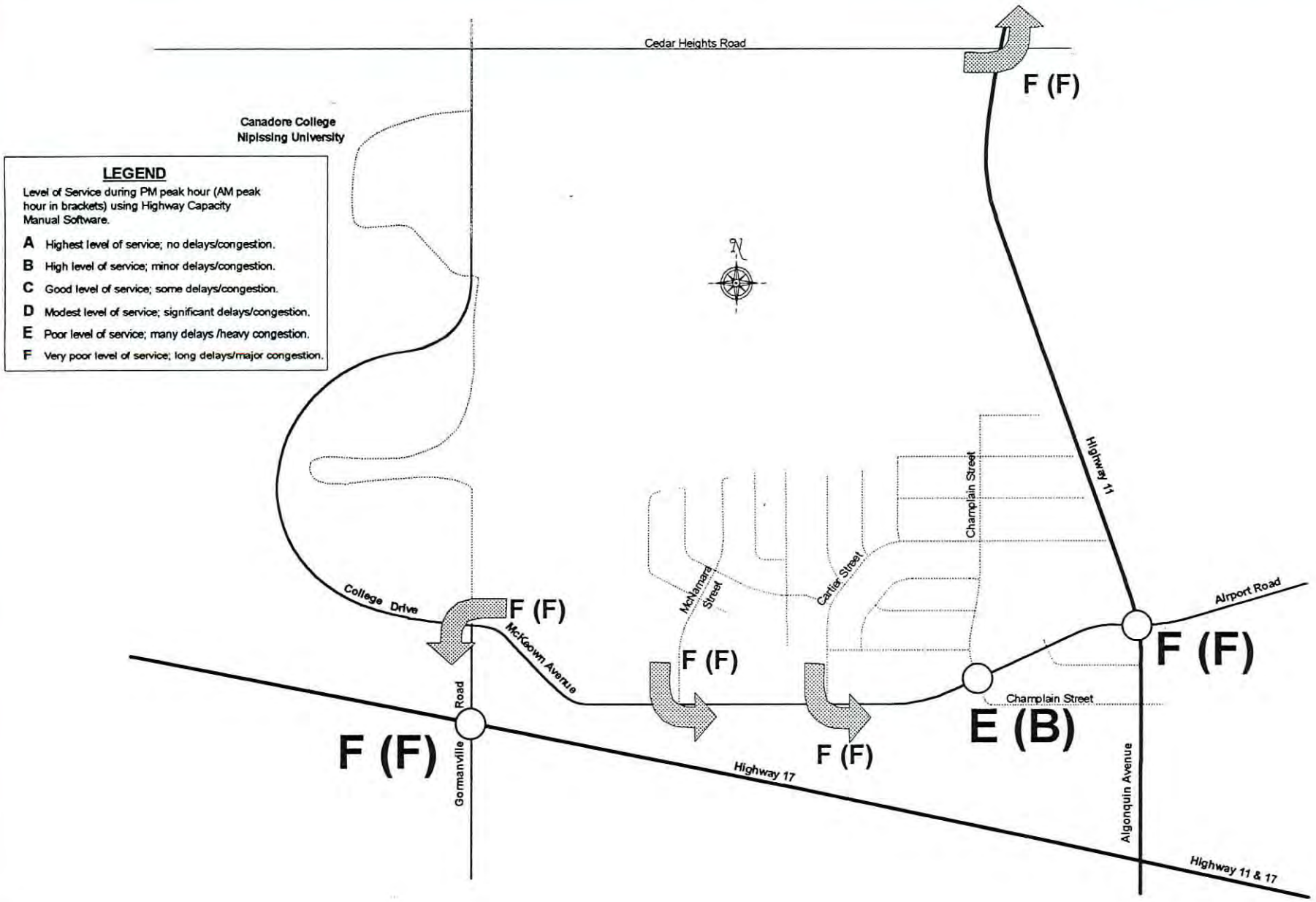
Existing, 2004 and Full Development



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 5.3 Projected Level of Service - 2004

(2004 Traffic With Existing Roadways)



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Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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Exhibit 5.4 Projected Level of Service at Full Development

Existing Roadways with Traffic at Full Development Levels

Table 5.1
Summary of Intersection Analysis
Using Highway Capacity Manual Software

Location Time of Day	1999 Existing Conditions			2004 Projected Development			Full Development (approx 2015 - 2020)		
	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio
Gormanville Rd / Highway 17									
i) Existing roads (as built)									
AM Peak Hour	C	18.5	0.6	D	35.8	1.0	F	n/a	>1.0
PM Peak Hour	C	15.1	0.5	D	35.0	0.9	F	n/a	>1.0
ii) Gormanville Rd approaches widened									
AM Peak Hour				C	19.1	0.7	D	25.1	0.9
PM Peak Hour				C	20.7	0.7	D	28.3	1.0
McKeown Ave (College Dr) / Gormanville Rd									
i) Existing roads with traffic signals									
AM Peak Hour	B	11.5	0.7	F	n/a	>1.0	F	n/a	>1.0
PM Peak Hour	B	8.7	0.5	F	n/a	>1.0	F	n/a	>1.0
ii) McKeown approach widened to 2 lanes									
AM Peak Hour				B	14.4	0.7	F	n/a	>1.0
PM Peak Hour				C	15.5	0.9	F	n/a	>1.0
iii) NB, WB and EB approaches widened*									
AM Peak Hour							C	19.4	0.9
PM Peak Hour							C	18.5	0.8
McKeown Ave (Airport Rd) / Algonquin Ave									
i) Existing road configuration									
AM Peak Hour	C	15.9	0.5	D	26.3	0.8	F	n/a	>1.0
PM Peak Hour	C	15.8	0.6	E	52.8	1.0	F	n/a	>1.0
ii) Algonquin Ave NB double left turn**									
AM Peak Hour				C	19.8	0.6	F	n/a	>1.0
PM Peak Hour				C	23.7	0.8	F	n/a	>1.0
iii) McKeown/Airport widening by one lane***									
AM Peak Hour				C	17.4	0.6	C	20.5	0.7
PM Peak Hour				C	19.6	0.7	C	24.8	0.9
McKeown Ave/Champlain Street									
i) Existing road configuration									
AM Peak Hour	B	8.4	0.4	B	9.0	0.6	B	10.1	0.6
PM Peak Hour	B	8.9	0.4	B	13.1	0.6	E	53.7	1.0
ii) Left turn lanes added to McKeown Ave									
PM Peak Hour							B	10.6	0.8
Cedar Heights Rd / Hwy 11 (unsignalized)									
- left turns from Cedar Heights to Hwy 11 N									
AM Peak Hour	B	8.7		C	13.4		F	47.9	
PM Peak Hour	C	11.2		D	20.7		F	614.8	
McNamara St/McKeown Ave (unsignalized)									
- left turns from McNamara to McKeown EB									
AM Peak Hour	B	9.4		E	38.5		F	530.0	
PM Peak Hour	C	11.3		F	163.6		F	>999.9	
Cartier St/McKeown Ave (unsignalized)									
- left turns from Cartier to McKeown EB									
AM Peak Hour	C	10.4		F	97.5		F	>999.9	
PM Peak Hour	C	12.3		F	72.0		F	>999.9	

Note *: College Dr approach widened by one lane; McKeown Ave approach widened to two lanes; Gormanville Rd NB approach widened by one lane.

Note **: Algonquin Ave NB approach changed to two left turn lanes and one through lane.

Note *** McKeown Avenue and Airport Road approaches widened by one lane (plus double left turn lane on Algonquin Ave NB)

McKeown Avenue from Algonquin Avenue to Champlain Street. It recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). The current study supports those recommendations.

5.4 McKeown Avenue at Gormanville Road

The existing unsignalized intersection is currently operating with lengthy queues and delays for westbound McKeown Avenue traffic turning left to proceed south on Gormanville Road during peak hours. The current traffic volumes were compared against the minimum warrants for traffic signals and the key portion of the warrant is shown in Exhibit 5.5. Conditions are at 93% of the minimum standard for traffic signals. It is expected that growth within the corridor will justify traffic signals in the near future (one to five years).

Consideration was given to potential benefits from realigning the intersection to provide through movements from Gormanville Road to College Drive or to McKeown Avenue. Preliminary designs were prepared and a traffic analysis of the alternatives was carried out. Due to a combination of geometric design reasons and traffic efficiency, it was determined that the existing intersection configuration is preferred.

With traffic signals and the existing roads (configuration and number of lanes), the intersection would operate at Level of Service "B". By 2004 the Level of Service would drop to "F", but can be improved to "B-C" readily by widening the McKeown Avenue approach from one lane to two lanes. With Full Development the intersection would again be reduced to Level of Service "F"; a further widening of the McKeown Avenue approach to three lanes and the widening of the College Drive and Gormanville Road approaches by one lane would allow the intersection to operate at Level of Service "C" through the long term.

B.2.03.08 TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signals for roadways with two or more lanes.

Major street ..... *Gormanville Road* No. of lanes *1/2*
Minor street ..... *McKeown Avenue*

FREE FLOW CONDITIONS (RURAL) ☐
RESTRICTED FLOW CONDITIONS (URBAN) ☑

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100 % SATISFIED - YES ☐ NO ☑
80 % SATISFIED - YES ☑ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	0830	0930	1230	1330	1430	1530	1630	1730	TOTAL ACROSS	
A. ALL APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)	*975*	*950*	*900*	*950*	*725*	*850*	*1050*	*820*		
	100% FULFILLED				*100%*	*100%*	*100%*	*100%*			*100%*		*500%*	
	80% FULFILLED								*80%*	*80%*		*80%*	*240%*	SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE												*0%*	
												TOTAL DOWN	*740%*	/8 = *93%*
B. MINOR STREET BOTH APPROACHES	120* (95)*	170* (135)*	120* (95)*	170* (135)*	*350*	*340*	*400*	*500*	*350*	*500*	*675*	*475*	TOTAL ACROSS	
	100% FULFILLED				*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*800%*	
	80% FULFILLED												*0%*	SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE												*0%*	
												TOTAL DOWN	*800%*	/8 = *100%*

* FOR 'T' INTERSECTIONS THESE VALUES SHOULD BE INCREASED BY 50%

2 - DELAY TO CROSS TRAFFIC

100 % SATISFIED - YES ☐ NO ☐
80 % SATISFIED - YES ☐ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐									TOTAL ACROSS	
A. MAJOR STREET BOTH APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)										
	100% FULFILLED													
	80% FULFILLED													SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE													
												TOTAL DOWN		/8 =
B. TRAFFIC CROSSING MAJOR STREET	50 (40)	75 (60)	50 (40)	75 (60)									TOTAL ACROSS	
	100% FULFILLED													
	80% FULFILLED													SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE													
												TOTAL DOWN		/8 =

fFebruary, 1982

Exhibit 5.5: Traffic Signal Warrant Form - McKeown Avenue at Gormanville Road

5.5 Gormanville Road at Highway 17

The Gormanville Road/Highway 17 intersection is currently operating at Level of Service "C". By 2004 the Level of Service would drop to "D" if no improvements are made. If Gormanville Road is widened by one lane on both approaches, Level of Service "C" would be maintained. With Full Development, the Level of Service would again drop to "D".

It is anticipated that in the longer term future, as part of the realignment of the North Bay Bypass, Gormanville Road will be grade separated from Highway 17 along a more westerly alignment. This plan would deal with the capacity requirements and provide satisfactory Levels of Service into the long term future.

5.6 McKeown Avenue at Cartier Street and McNamara Street

At current levels of traffic, left turn lanes are warranted at both Cartier Street and McNamara Street for vehicles turning into both streets from mcKeown Avenue. The left turns out from both side streets are currently operating at satisfactory Levels of Service ("B" and "C"). As volumes increase along McKeown Avenue, the left turns out will become more difficult and by 2004 it is projected that they will be at Level of Service "E" and "F" during peak hours. Neither location will warrant traffic signals; it is expected that Champlain Street will act as the safety valve - neighbourhood motorists will increase their use of Champlain Street, particularly when exiting towards the east.

In the longer term, benefits may be possible from future development particularly on the south side of McKeown Avenue. While the prospects do not appear to be promising in the near term, there may be future opportunities to combine signalized access to a new development with either Cartier Street or McNamara Street.

5.7 McKeown Avenue Between Champlain Street and Cartier Street

It is expected that there will be several significant new developments within this block

by 2004 and more in the longer term. While not all the expected development will require direct driveway access from McKeown Avenue, at least one or two major new driveways can be expected. The driveways will require left turn storage lanes and when these storage lanes and their tapers are combined with the requirements at Champlain Street and at Cartier Street, the result is a continuous centre fifth lane on McKeown Avenue from Champlain Street to Cartier Street.

5.8 McKeown Avenue Between Cartier Street and McNamara Street

This section of McKeown Avenue currently has a two-lane cross-section which carries approximately 8,000 vehicles per day. By 2004 this volume is expected to double to approximately 16,000 vehicles per day. This volume is beyond the capacity of a two-lane roadway operating in an urban environment with intersecting streets, private driveways, transit and school buses and pedestrian traffic. Two through lanes in each direction will be required in this section.

It is expected that there will be at least two significant new developments in this block by 2004 with one or two major new driveways. At least one of the driveways (probably both) will require a left turn storage lane; when the storage lane and its tapers are combined with the requirements at Cartier Street and McNamara Street, the result is a continuous centre turning lane from Cartier Street to McNamara Street (i.e. a five lane section).

5.9 McKeown Avenue Between McNamara Street and Gormanville Road

McKeown Avenue between McNamara Street and Gormanville Road also has a two-lane cross-section; it carries approximately 7,000 vehicles per day. The volume is expected to reach approximately 14,000 vehicles per day by 2004 and is expected to continue to grow to approximately 20,000 vehicles per day by the time Full Development is reached. The 14,000 volume is not beyond the capacity of a two-lane roadway in an area with limited access and side friction, but would require four lanes in an urban area with relatively large turning movements and high side friction. While

this road section from McNamara Street to Gormanville Road will eventually need to be four lanes (most likely within ten years), the project can be deferred for a few years and/or implemented in stages (first from McNamara Street to the Ontario Government Building, second from the Government Building to Gormanville Road). The timing will be somewhat dependent on the speed of development on the Education Centre lands (especially the Hospital and the retail commercial uses).

As previously noted the existing traffic volumes warrant a left turn storage lane on McKeown Avenue at McNamara Street and at the Provincial Government Building Entrances. The tapers from these two turning lanes overlap and a continuous centre turning lane should be provided from McNamara Street to the west entrance to the Ontario Government Building.

While it is expected that there will be some significant new developments on the vacant lands between Gormanville Road and Hopper Motors, there may not be any new driveways west of the Government Building. If there are no new driveways, it would be possible to stop the continuous centre turning lane at the Government Building west entrance; if there is a major new driveway west of the Government Building, the centre turning lane should be continued through to Gormanville Road.

5.10 College Drive

The lane configuration of College Drive will need to be assessed as the plans for the Education Centre lands become clearer and when the Ministry of Transportation has firmer plans for the North Bay Bypass. It is likely, however, that the section of College Drive between Gormanville Road and the access points to the lands below the escarpment will need to be four laned (plus turning lanes) as development occurs.

5.11 Sidewalks

The projected future traffic volumes along McKeown Avenue, and the level of pedestrian activity which can be expected due to adjacent residential areas and the City

bus route usage, appear to justify a sidewalk along both sides of McKeown Avenue. The existing sidewalk is along the north side. Construction of a sidewalk along the south side could be phased over a number of years as development/redevelopment takes place along the south side of the road.

APPENDIX A

INTERSECTION ANALYSIS REPORTS
(Highway Capacity Manual)

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	50	174	19	175	135	265	16	331	96	58	137	29
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	18.0A	29.0P			Green	5.0A	28.0A		
Yellow/AR	5.0	5.0			Yellow/AR	5.0	5.0		

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6

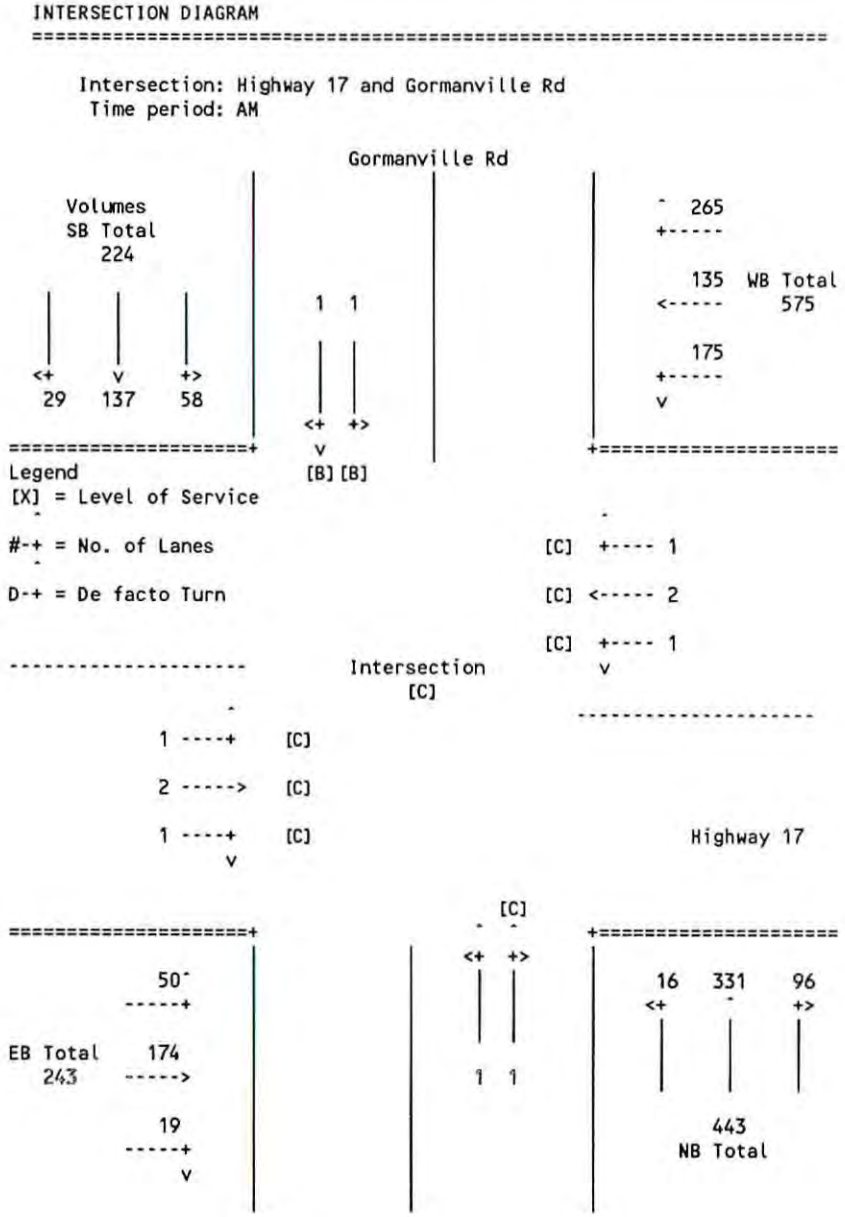
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	354	1770	0.158	0.200	21.4	C	17.2	C
	T	1155	3725	0.176	0.310	16.3	C		
	R	488	1574	0.043	0.310	15.6	C		
WB	L	354	1770	0.548	0.200	24.6	C	20.6	C
	T	1155	3725	0.136	0.310	16.1	C		
	R	488	1574	0.603	0.310	20.4	C		
NB	LTR	993	3311	0.521	0.300	19.2	C	19.2	C
SB	L	251	1770	0.255	0.400	12.7	B	12.9	B
	TR	714	1784	0.258	0.400	13.0	B		

Intersection Delay = 18.5 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.556

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M204A.HC9

Area Type: Other 3-16-99 AM

Comment: 2004

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	> 2 <			1	1 <	
Volumes	120	200	20	200	150	600	20	800	110	175	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	14.0A	35.0P			Green	8.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

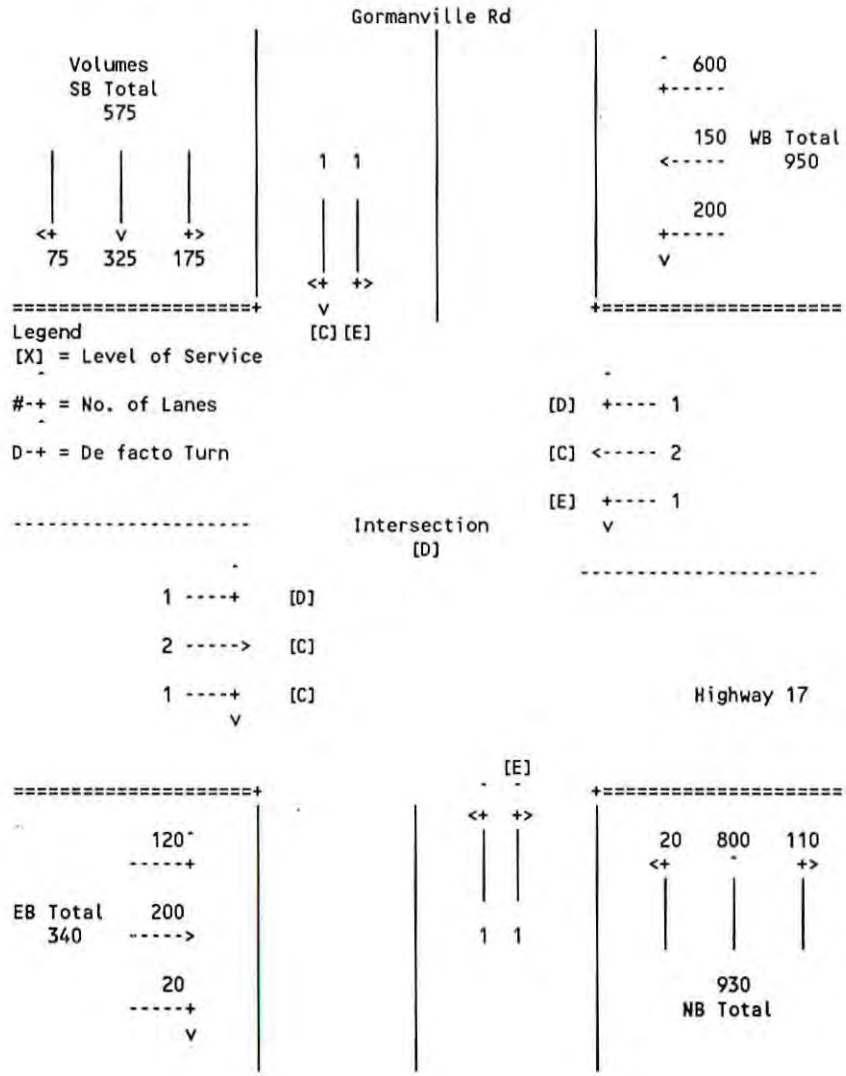
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.551	0.136	30.7	D	21.5	C
	T	1217	3619	0.191	0.336	16.7	C		
	R	529	1574	0.042	0.336	15.9	C		
WB	L	241	1770	0.920	0.136	56.6	E	36.8	D
	T	1217	3619	0.144	0.336	16.4	C		
	R	701	1574	0.951	0.445	35.6	D		
NB	LTR	1076	3198	1.009	0.336	46.7	E	46.7	E
SB	L	212	1770	0.915	0.445	44.4	E	24.1	C
	TR	793	1780	0.560	0.445	15.2	C		

Intersection Delay = 35.8 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.968

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development - no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1 <	
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right	*	*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	14.0A	30.0P			Green	12.0A	36.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

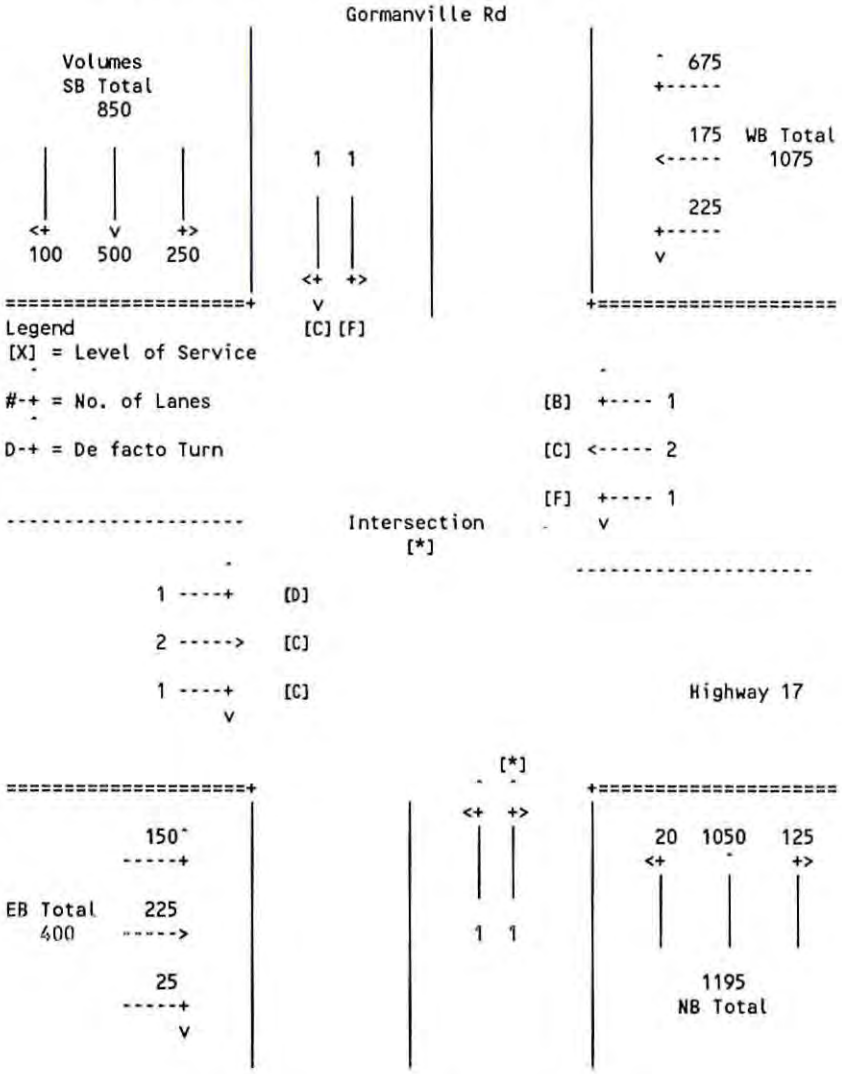
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.692	0.136	34.8	D	24.9	C
	T	1053	3619	0.249	0.291	19.3	C		
	R	456	1566	0.061	0.291	18.2	C		
WB	L	241	1770	1.036	0.136	86.4	F	30.1	D
	T	1053	3619	0.194	0.291	18.9	C		
	R	940	1566	0.798	0.600	14.4	B		
NB	LTR	1060	3067	1.316	0.345	*	*	*	*
SB	L	277	1770	1.004	0.491	63.7	F	31.1	D
	TR	876	1784	0.762	0.491	17.5	C		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2FDAI.HC9
Area Type: Other 3-16-99 AM
Comment: Full development - ~~no improvements~~ Gormanville Rd. widened

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2	1	1	2	<
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right	*	*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	18.0A	16.0P			Green	15.0A	43.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

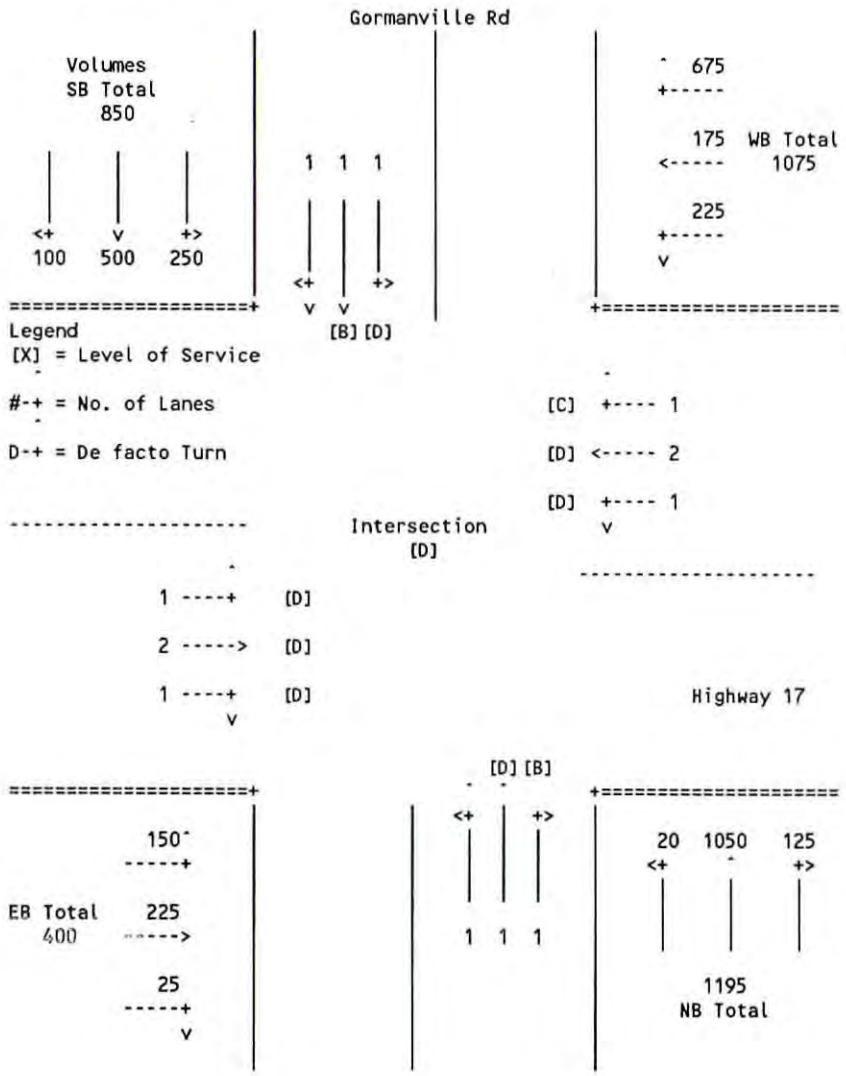
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	306	1770	0.546	0.173	28.4	D	27.5	D
	T	592	3619	0.442	0.164	27.2	D		
	R	256	1566	0.109	0.164	25.3	D		
WB	L	306	1770	0.818	0.173	39.1	D	27.0	D
	T	592	3619	0.344	0.164	26.5	D		
	R	840	1566	0.893	0.536	23.2	C		
NB	LT	1310	3203	0.952	0.409	31.4	D	29.6	D
	R	630	1541	0.220	0.409	13.7	B		
SB	L	325	1770	0.855	0.582	33.6	D	15.1	C
	TR	2093	3598	0.334	0.582	7.8	B		

Intersection Delay = 25.1 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.919

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2XP.HC9

Area Type: Other 3-16-99 PM

Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	> 2 <			1	1	<
Volumes	30	185	12	110	250	75	25	265	175	185	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*	*			SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	7.0A	38.0P			Green	7.0A	40.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

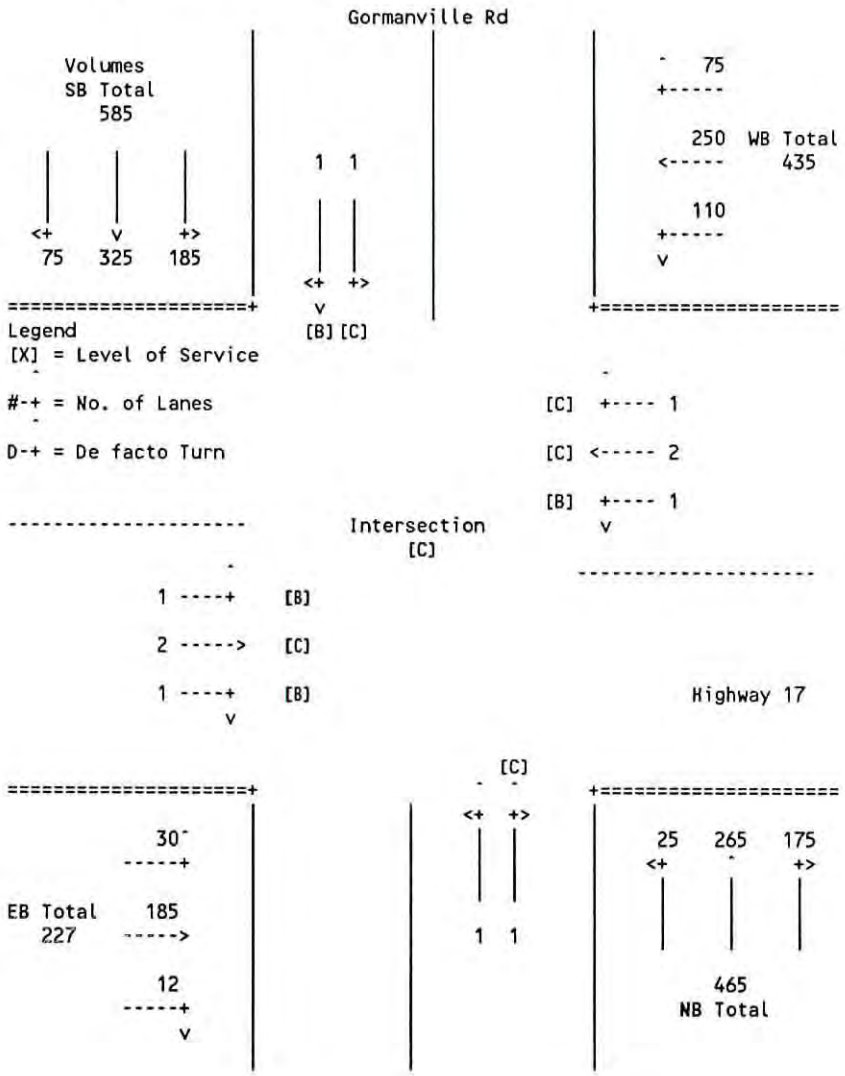
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	437	1770	0.076	0.464	10.5	B	14.6	B
	T	1355	3725	0.159	0.364	15.3	C		
	R	572	1574	0.023	0.364	14.5	B		
WB	L	500	1770	0.244	0.464	11.1	B	14.4	B
	T	1355	3725	0.216	0.364	15.6	C		
	R	572	1574	0.145	0.364	15.2	C		
NB	LTR	1077	2820	0.503	0.382	17.1	C	17.1	C
SB	L	300	1770	0.687	0.482	15.9	C	14.0	B
	TR	858	1780	0.518	0.482	13.2	B		

Intersection Delay = 15.1 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.463

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M204PI.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 with Gormanville Rd widened by one lane on each approach

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2	1	1	2	<
Volumes	60	200	15	125	275	150	25	550	200	375	650	150
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	14.0A	21.0P			Green	22.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

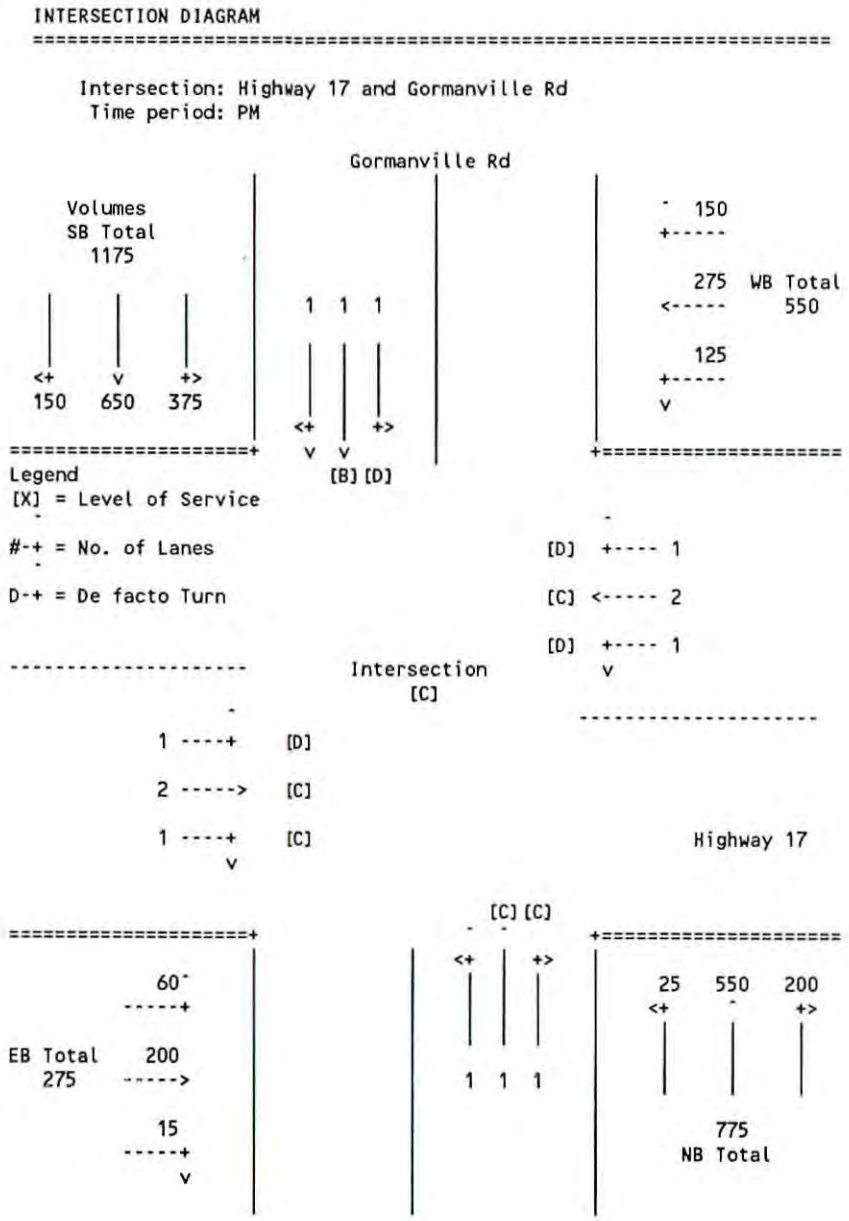
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.278	0.136	27.7	D	24.5	C
	T	779	3725	0.299	0.209	23.8	C		
	R	327	1566	0.052	0.209	22.5	C		
WB	L	241	1770	0.576	0.136	31.2	D	26.4	D
	T	779	3725	0.412	0.209	24.5	C		
	R	327	1566	0.510	0.209	26.0	D		
NB	LT	929	2763	0.722	0.336	22.6	C	21.6	C
	R	518	1541	0.428	0.336	18.6	C		
SB	L	459	1770	0.908	0.573	33.3	D	16.4	C
	TR	2053	3585	0.454	0.573	8.9	B		

Intersection Delay = 20.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.715

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDP.HC9

Area Type: Other 3-16-99 PM

Comment: Full development with existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	12.0A	12.0P			Green	22.0A	46.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

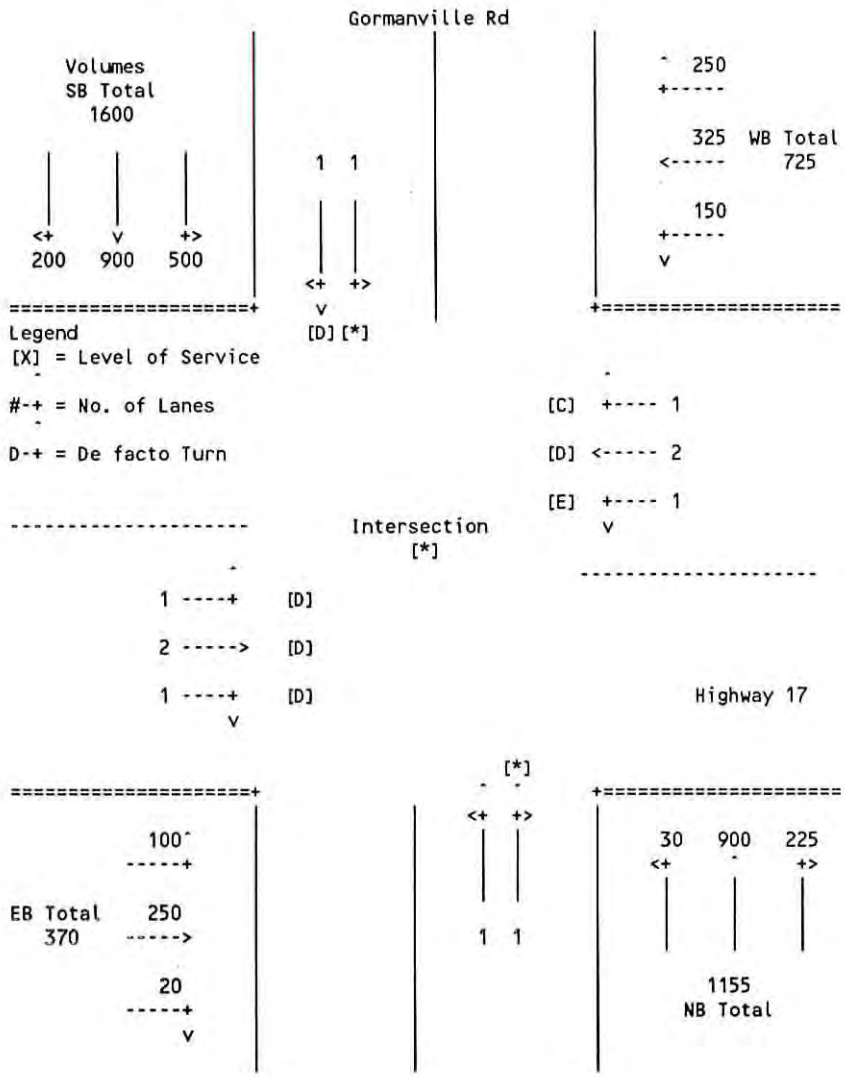
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	209	1770	0.531	0.118	31.5	D	31.0	D
	T	474	3725	0.616	0.127	31.1	D		
	R	199	1566	0.110	0.127	27.5	D		
WB	L	209	1770	0.798	0.118	43.4	E	31.7	D
	T	474	3725	0.799	0.127	36.6	D		
	R	569	1566	0.488	0.364	18.0	C		
NB	LTR	963	2206	1.399	0.436	*	*	*	*
SB	L	438	1770	1.269	0.673	*	*	*	*
	TR	1197	1780	1.020	0.673	36.7	D		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDPI.HC9

Area Type: Other 3-16-99 PM

Comment: Full development with Gormanville widened by one lane each side

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	<	1	2	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

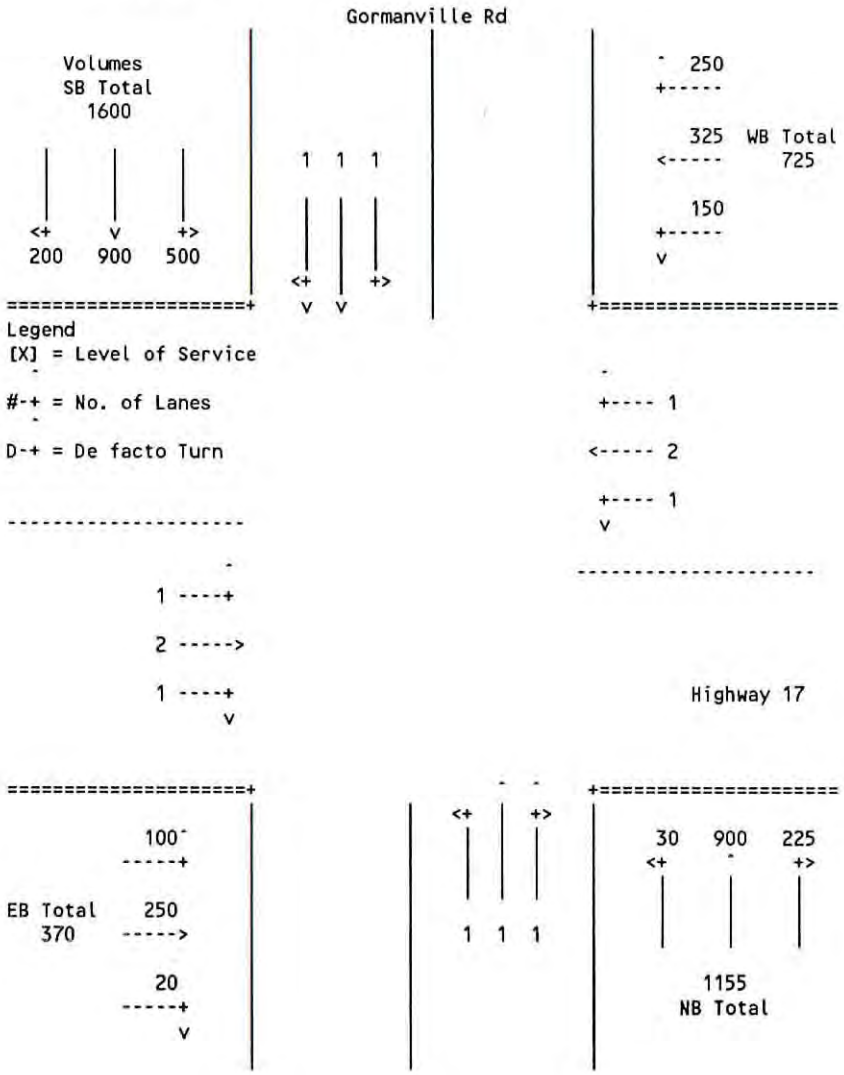
Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	10.0A	14.0P			Green	28.0A	40.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	48	284	319	129	243	40	349	196	185	54	260	52
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*	*		
Green	5.0A	24.0A			Green	14.0A	18.0A	26.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

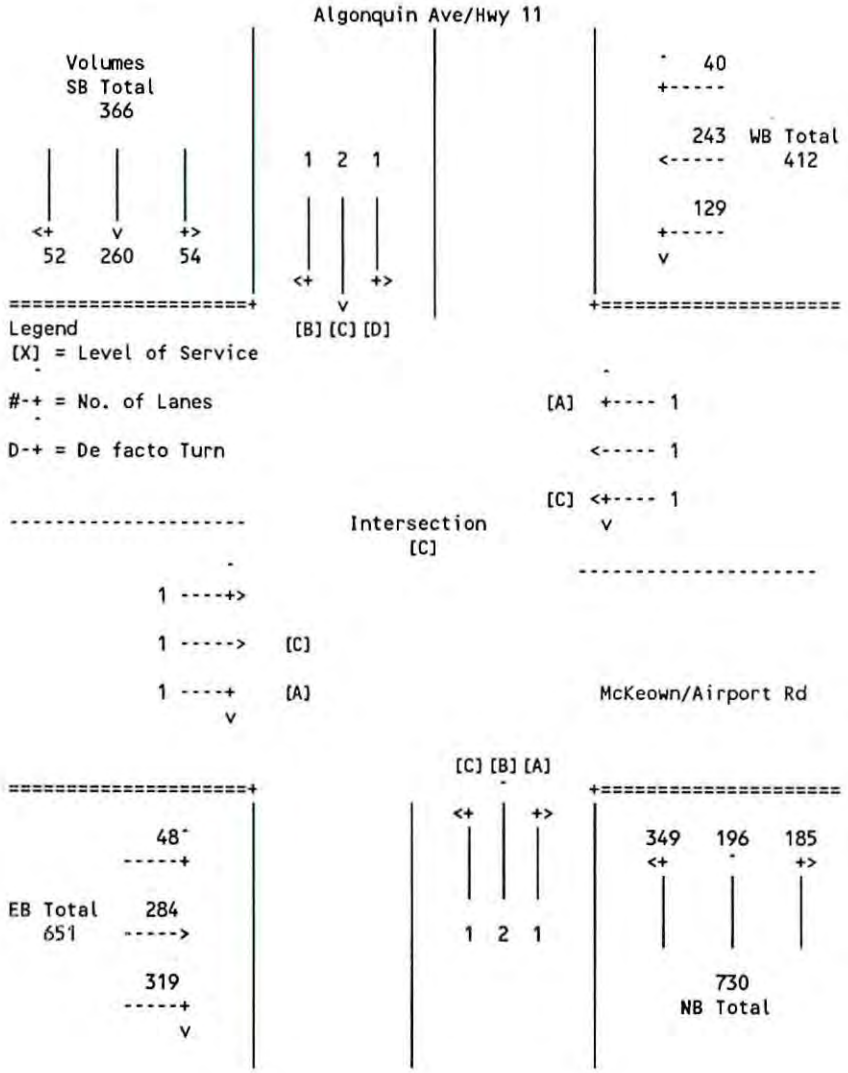
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	668	2828	0.579	0.236	24.9	C	15.1	C
	R	1087	1574	0.326	0.691	4.4	A		
WB	LT	925	2908	0.469	0.318	19.7	C	18.2	C
	R	1087	1574	0.040	0.691	3.5	A		
NB	L	611	1770	0.635	0.345	21.0	C	13.0	B
	T	1678	3619	0.136	0.464	10.9	B		
	R	1531	1574	0.135	0.973	0.0	A		
SB	L	241	1770	0.249	0.136	27.5	D	20.2	C
	T	921	3619	0.329	0.255	21.6	C		
	R	987	1574	0.059	0.627	5.1	B		

Intersection Delay = 15.9 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.492

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304A.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*	*	*	
Green	5.0A	24.0A			Green	14.0A	28.0A	16.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

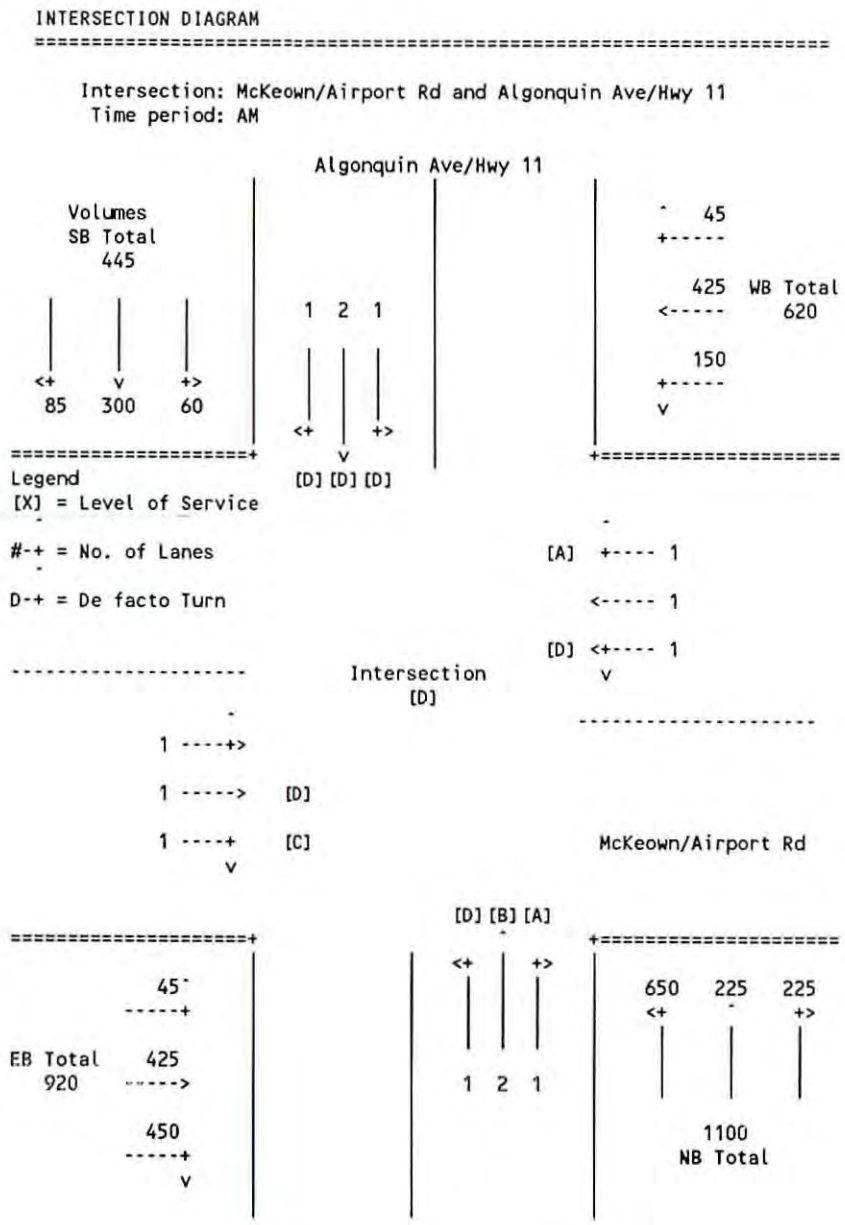
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	603	2551	0.909	0.236	39.1	D	31.7	D
	R	630	1574	0.794	0.400	23.6	C		
WB	LT	807	2535	0.832	0.318	27.7	D	25.7	D
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	772	1770	0.935	0.436	32.4	D	21.3	C
	T	1678	3619	0.156	0.464	11.0	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	241	1770	0.278	0.136	27.7	D	28.2	D
	T	592	3619	0.591	0.164	28.7	D		
	R	258	1574	0.365	0.164	26.8	D		

Intersection Delay = 26.3 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.838

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304AI.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 with ~~no improvements~~ 2 LT lanes on Algonquin NB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left		*			NB	Left	*	*		
Thru		*				Thru		*	*	
Right		*				Right	*	*	*	
Peds		*				Peds		*	*	
WB Left	*	*			SB	Left	*			
Thru	*	*				Thru			*	
Right	*	*				Right			*	
Peds		*				Peds		*	*	
NB Right	*	*			EB	Right	*			
SB Right					WB	Right	*	*	*	
Green	5.0A	30.0A			Green		12.0A	16.0A	24.0P	
Yellow/AR	4.0	5.0			Yellow/AR		4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

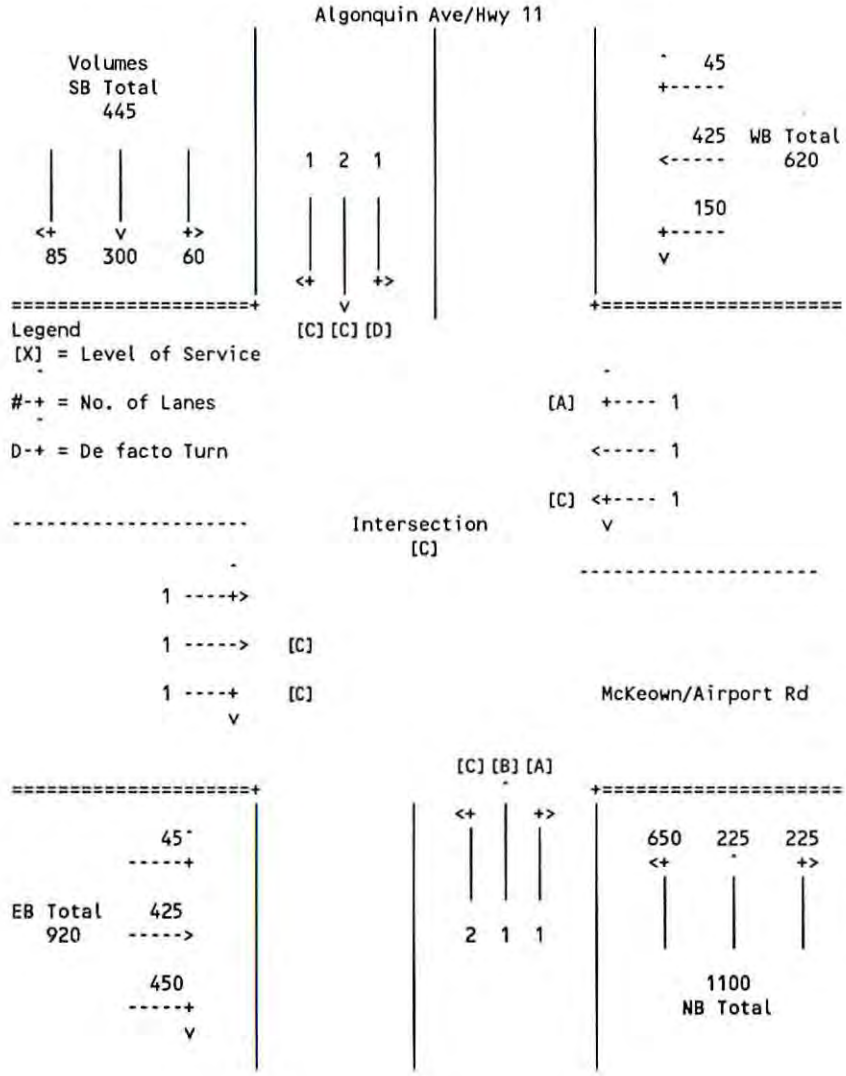
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	757	2602	0.724	0.291	25.0	C	22.3	C
	R	687	1574	0.728	0.436	19.3	C		
WB	LT	945	2535	0.710	0.373	20.8	C	19.3	C
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	1094	3539	0.680	0.309	22.7	C	16.3	C
	T	773	1810	0.323	0.427	13.6	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	209	1770	0.320	0.118	29.0	D	23.7	C
	T	855	3619	0.409	0.236	23.1	C		
	R	372	1574	0.253	0.236	22.1	C		

Intersection Delay = 19.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.623

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M3FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development with NB double left and extra lanes EB and WB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	50	500	600	175	500	50	800	260	250	80	350	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	10.0A	24.0A			Green	16.0A	14.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

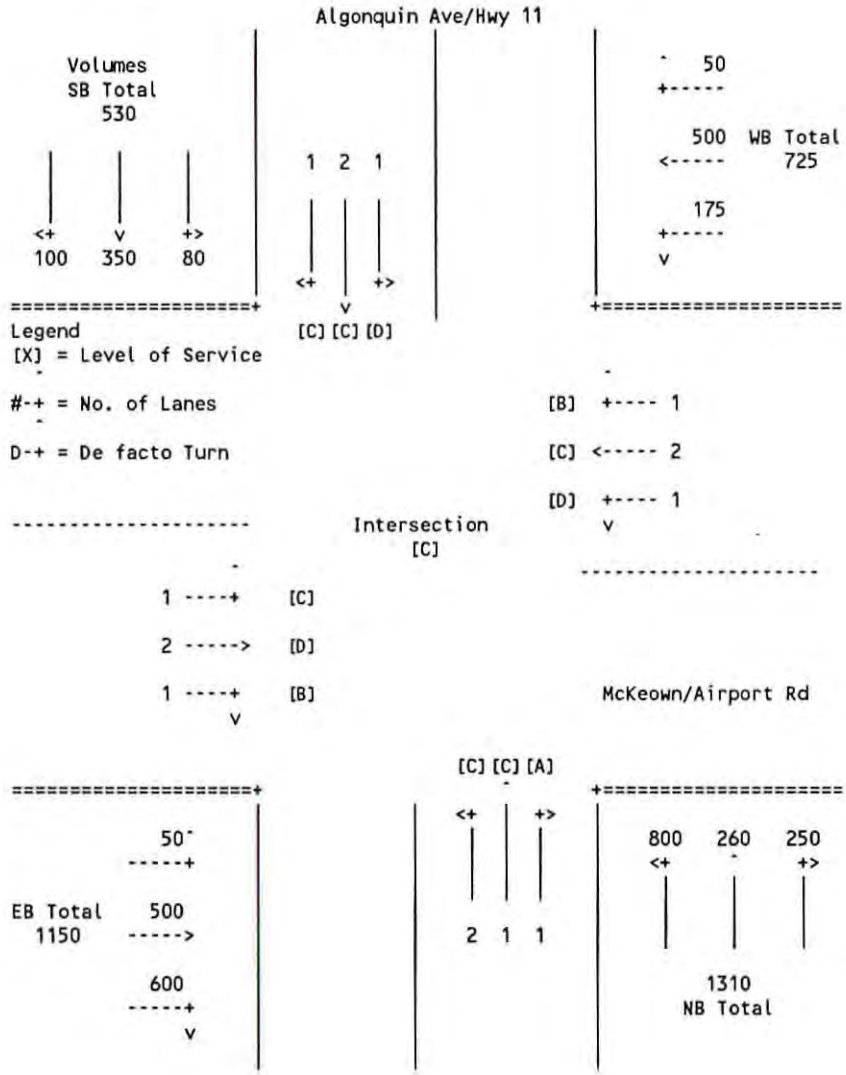
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	126	532	0.445	0.236	24.8	C	18.9	C
	T	880	3725	0.663	0.236	25.9	D		
	R	930	1574	0.717	0.591	12.2	B		
WB	L	245	1770	0.792	0.364	28.2	D	19.1	C
	T	1355	3725	0.431	0.364	17.2	C		
	R	859	1574	0.065	0.545	7.6	B		
NB	L	1158	3539	0.791	0.327	24.4	C	18.1	C
	T	724	1810	0.399	0.400	15.4	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	274	1770	0.325	0.155	27.0	D	24.5	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.310	0.227	23.0	C		

Intersection Delay = 19.4 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.693

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 03-22-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XP.HC9
Area Type: Other 3-16-99 PM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	35	350	375	165	250	35	400	215	225	80	315	50
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

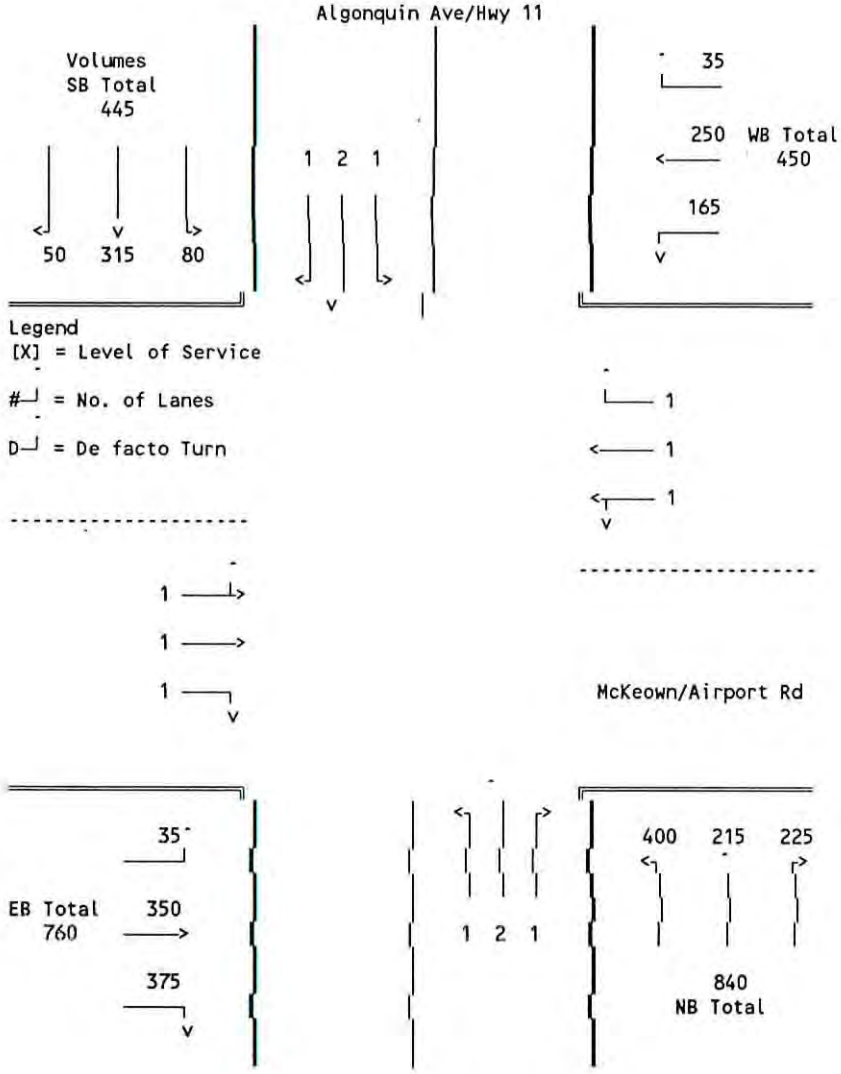
Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	5.0A	22.0A			Green	10.0A	18.0A	20.0P	
Yellow/AR	5.0	5.0			Yellow/AR	3.0	6.0	6.0	

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6 #7

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304P.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 - existing roads as is

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	10.0A	31.0A			Green	10.0A	26.0A	10.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

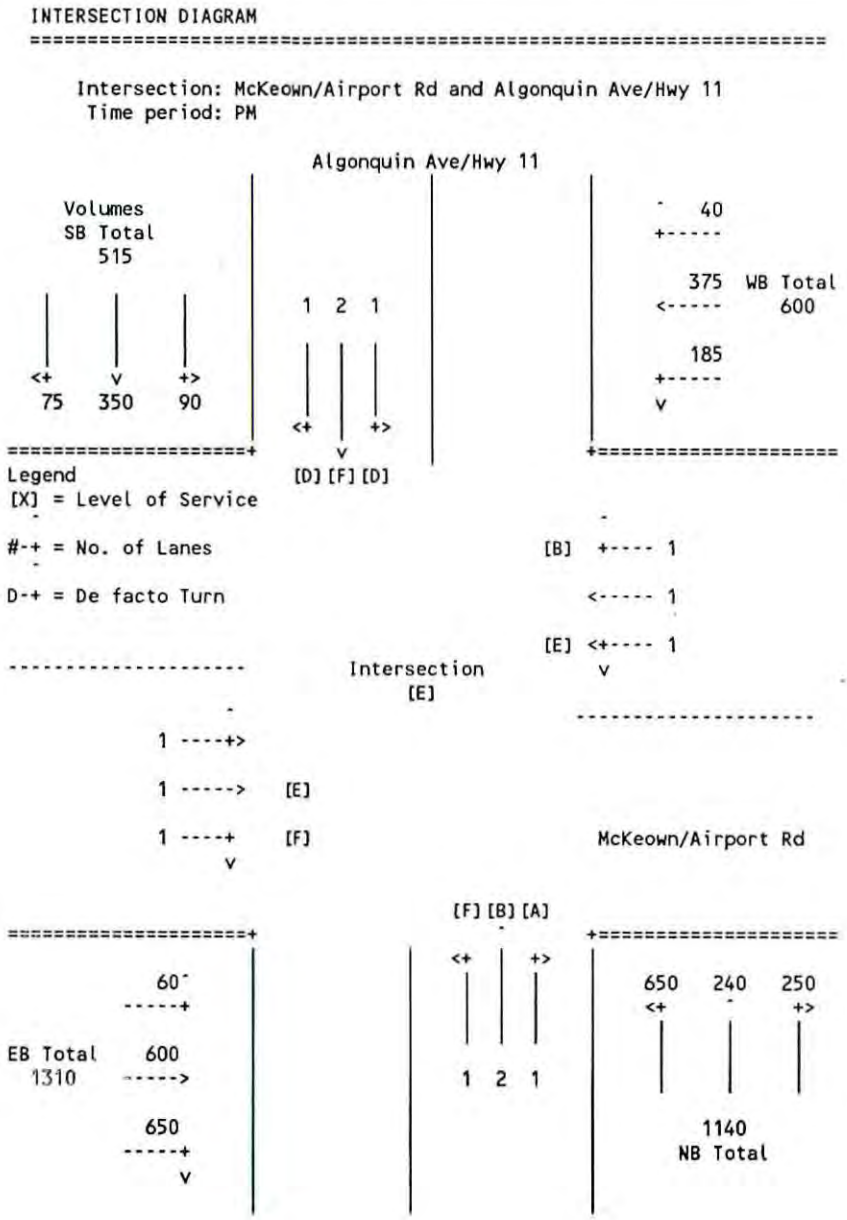
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	779	2598	0.989	0.300	47.1	E	58.2	E
	R	673	1574	1.074	0.427	70.1	F		
WB	LT	637	1492	1.026	0.427	54.7	E	51.7	E
	R	873	1574	0.050	0.555	7.3	B		
NB	L	676	1770	1.068	0.382	69.6	F	42.4	E
	T	1415	3619	0.198	0.391	14.3	B		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	177	1770	0.565	0.100	33.6	D	62.7	F
	T	395	3619	1.033	0.109	76.1	F		
	R	172	1574	0.483	0.109	31.5	D		

Intersection Delay = 52.8 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 1.044

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M304PI1.HC9
Area Type: Other 3-16-99 PM
Comment: 2004-Algonquin NB changed to double left turn (no other change)

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	6.0A	40.0A			Green	12.0A	10.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

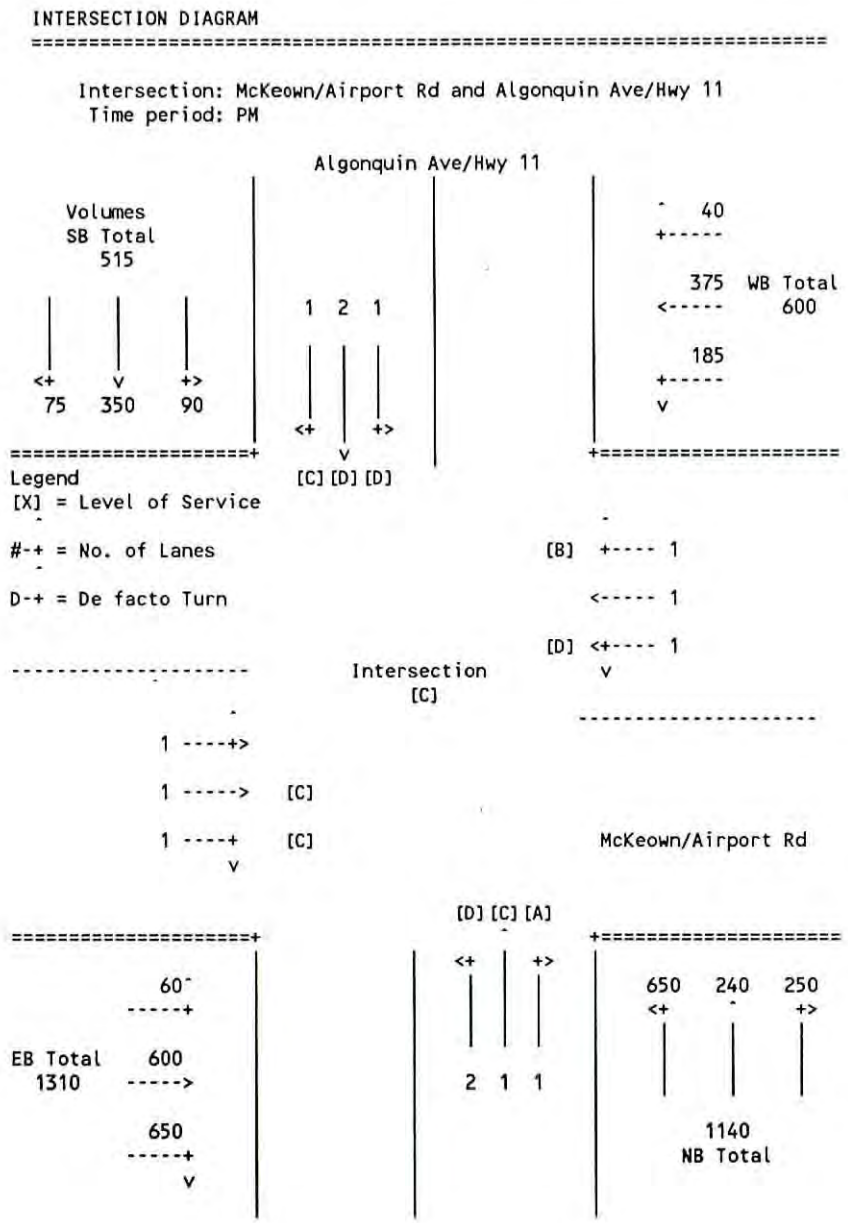
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	994	2603	0.776	0.382	22.0	C	21.9	C
	R	830	1574	0.870	0.527	21.7	C		
WB	LT	705	1492	0.927	0.473	30.9	D	29.3	D
	R	973	1574	0.045	0.618	5.3	B		
NB	L	901	3539	0.826	0.255	29.5	D	21.0	C
	T	592	1810	0.451	0.327	19.2	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	209	1770	0.478	0.118	30.6	D	27.4	D
	T	691	3619	0.591	0.191	27.2	D		
	R	300	1574	0.276	0.191	24.7	C		

Intersection Delay = 23.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.829

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304P12.HC9

Area Type: Other 3-16-99 PM

Comment: 2004-Algonquin NB double LT + McKeown/Airport widening

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	11.0A	26.0A			Green	18.0A	9.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

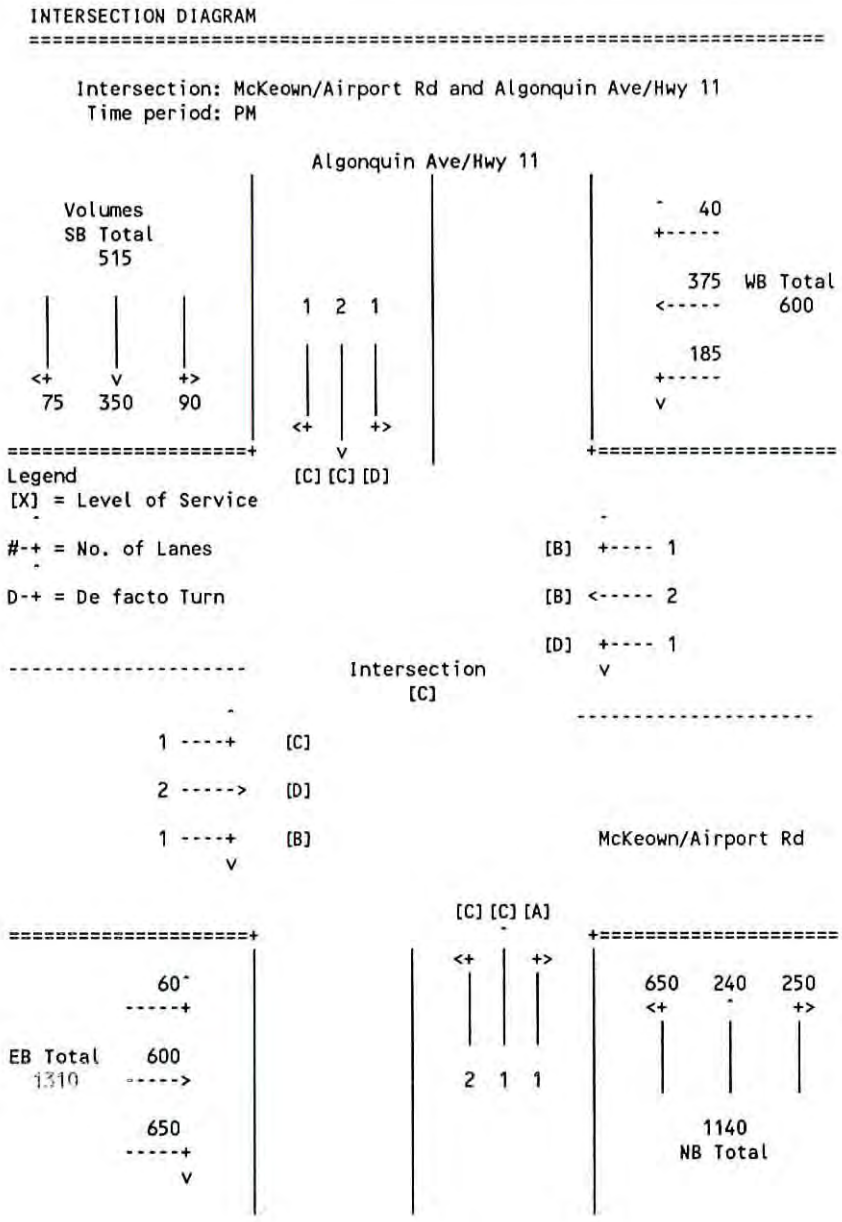
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	180	709	0.371	0.255	22.4	C	20.6	C
	T	948	3725	0.738	0.255	26.5	D		
	R	916	1574	0.788	0.582	14.7	B		
WB	L	261	1770	0.789	0.391	26.7	D	17.9	C
	T	1456	3725	0.301	0.391	15.0	B		
	R	930	1574	0.047	0.591	6.1	B		
NB	L	1062	3539	0.701	0.300	23.5	C	17.2	C
	T	642	1810	0.416	0.355	17.6	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	306	1770	0.327	0.173	26.0	D	24.3	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.232	0.227	22.5	C		

Intersection Delay = 19.6 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.741

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3FDP1.HC9
Area Type: Other 3-16-99 PM
Comment: Full development - McKeown/Airport widened, Algonquin NB 2LT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	75	750	800	225	500	50	850	300	300	100	400	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left		*			NB	Left	*	*		
Thru		*				Thru		*	*	
Right		*				Right	*	*	*	
Peds		*				Peds		*	*	
WB Left	*	*			SB	Left	*			
Thru	*	*				Thru			*	
Right	*	*				Right			*	
Peds		*				Peds		*	*	
NB Right	*	*			EB	Right	*	*		
SB Right					WB	Right	*			
Green	13.0A	28.0A			Green		18.0A	9.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR		4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

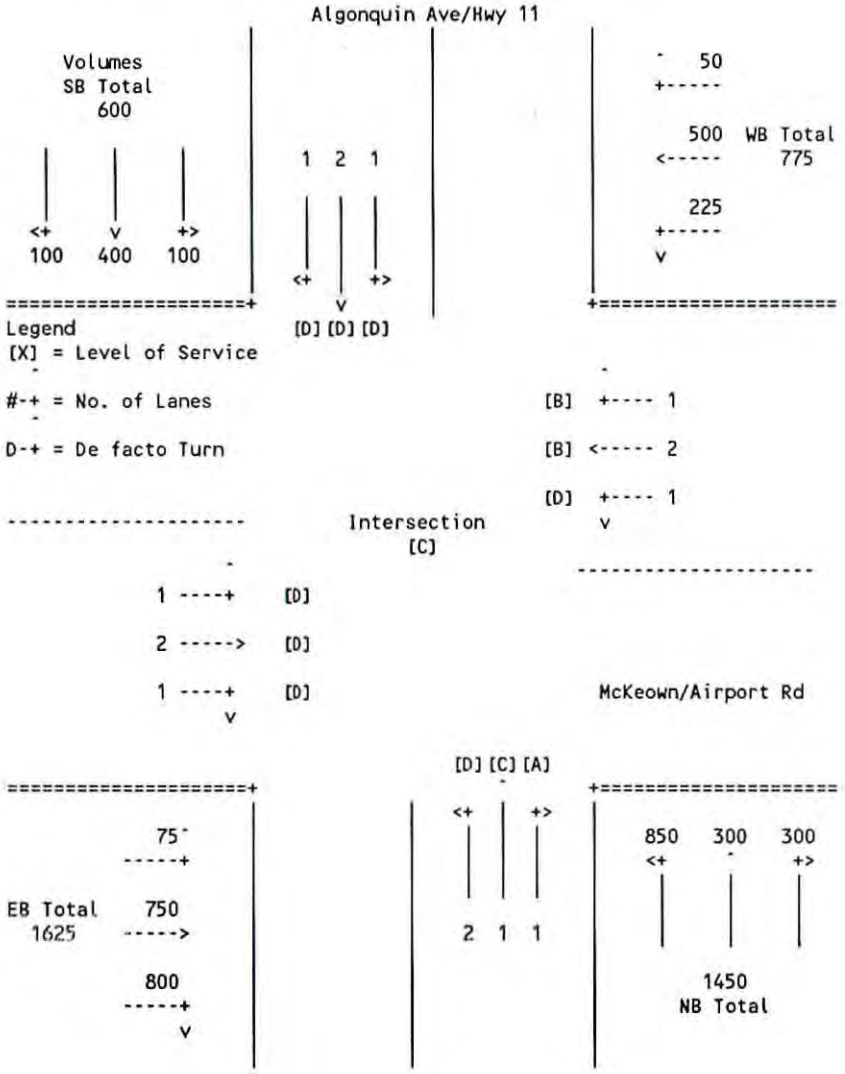
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	145	532	0.572	0.273	26.1	D	27.6	D
	T	1016	3725	0.861	0.273	30.0	D		
	R	944	1574	0.941	0.600	25.4	D		
WB	L	293	1770	0.853	0.427	31.9	D	18.4	C
	T	1592	3725	0.367	0.427	13.9	B		
	R	987	1574	0.057	0.627	5.1	B		
NB	L	1062	3539	0.916	0.300	32.7	D	23.8	C
	T	576	1810	0.578	0.318	21.3	C		
	R	1531	1574	0.217	0.973	0.0	A		
SB	L	306	1770	0.363	0.173	26.3	D	27.7	D
	T	691	3619	0.674	0.191	28.5	D		
	R	300	1574	0.369	0.191	25.4	D		

Intersection Delay = 24.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.894

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4XA.HC9

Area Type: Other 3-16-99 AM

Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	281	28	35	420	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

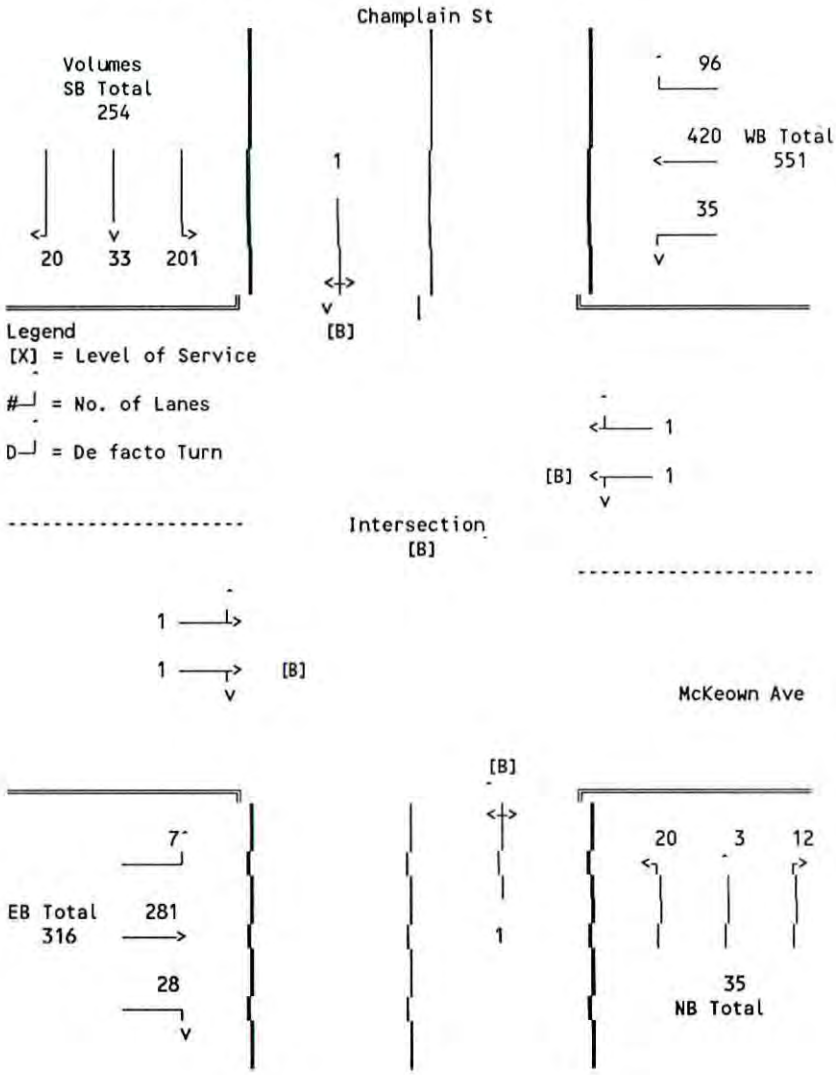
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1399	3279	0.259	0.427	9.0	B	9.0	B
WB	LTR	1971	3519	0.323	0.560	5.8	B	5.8	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 8.4 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.418

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M404A.HC9
Area Type: Other 3-16-99 AM
Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	550	28	35	800	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

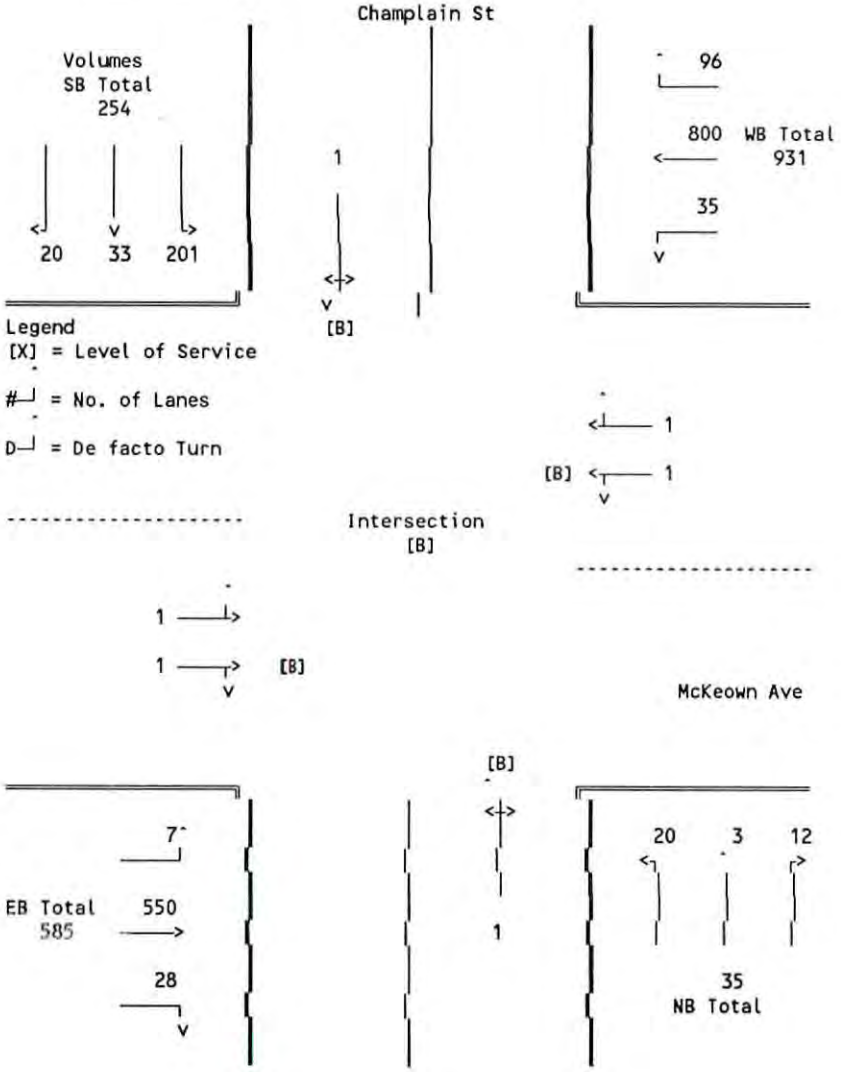
Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB LTR	1380	3234	0.490	0.427	10.3	B	10.3	B
WB LTR	1987	3548	0.544	0.560	7.0	B	7.0	B
NB LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 9.0 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.552

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4FDA.HC9

Area Type: Other Full development 3-16-99 AM

Comment: ~~2004~~ with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	750	28	35	1000	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

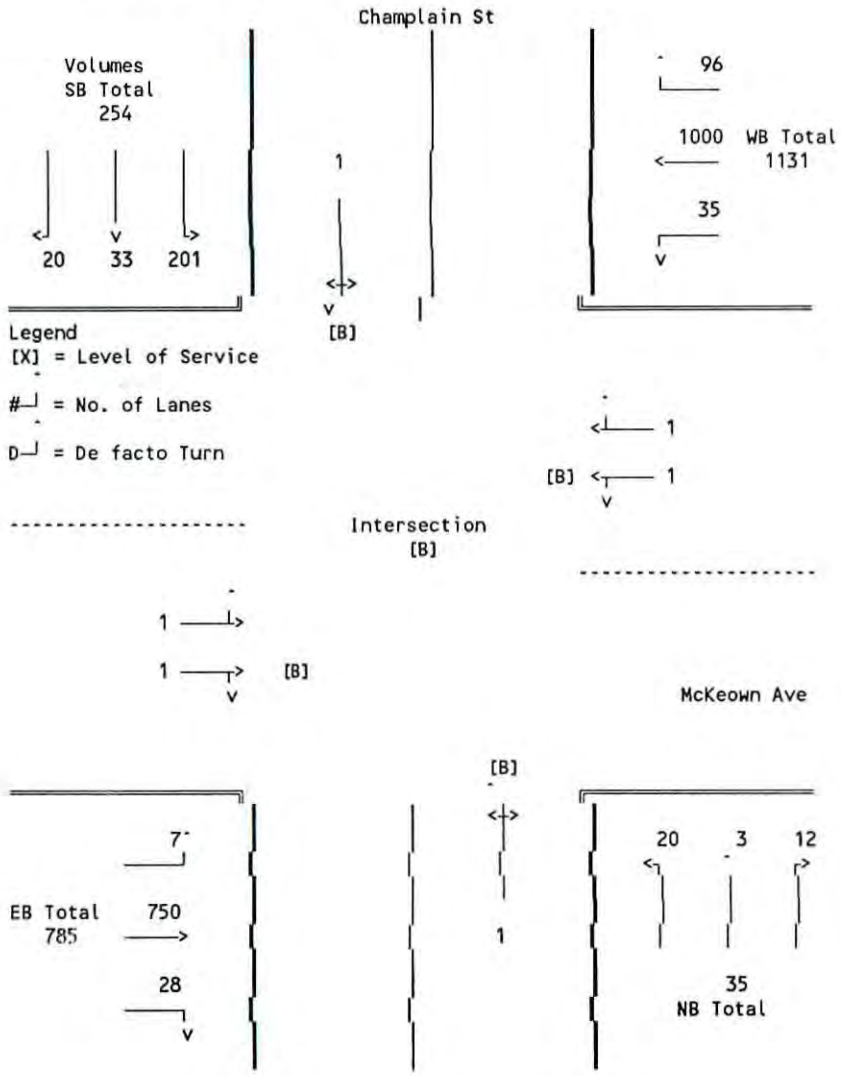
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1386	3248	0.656	0.427	11.9	B	11.9	B
WB	LTR	1973	3524	0.666	0.560	8.1	B	8.1	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 10.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.626

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M404P.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	963	82	80	712	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

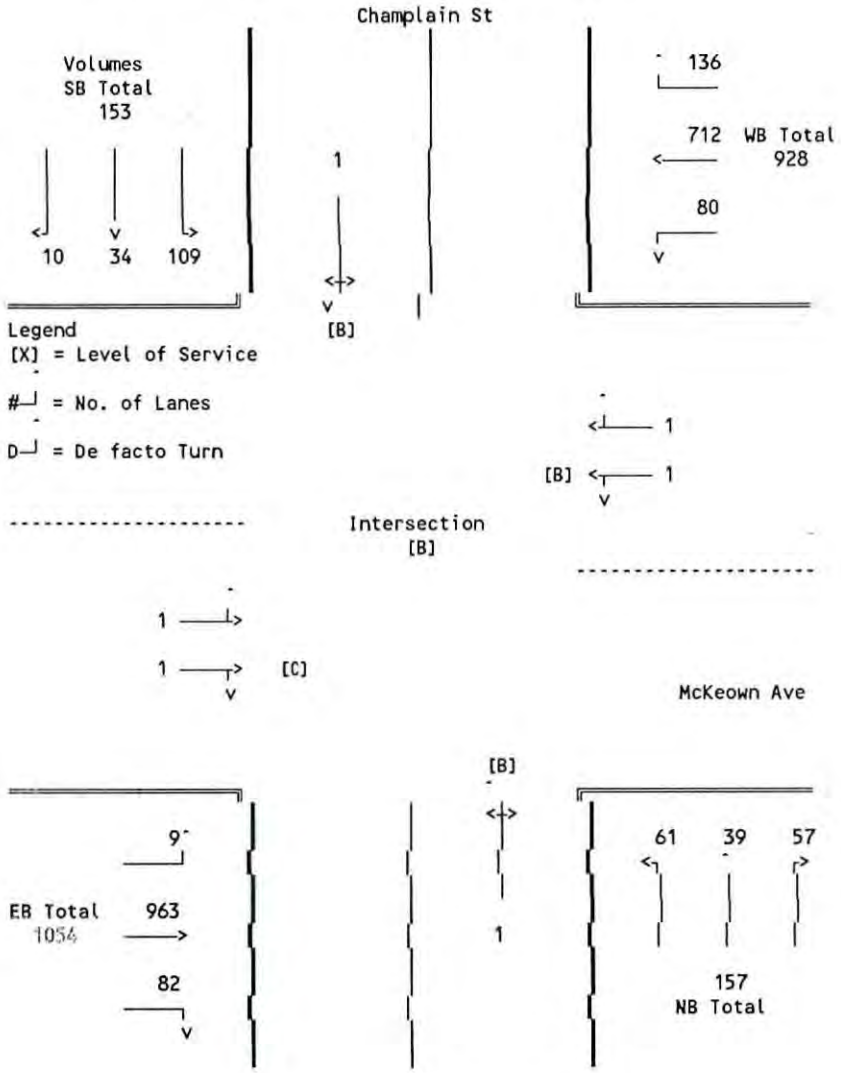
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1391	3260	0.879	0.427	17.6	C	17.6	C
WB	LTR	1589	2838	0.677	0.560	8.4	B	8.4	B
NB	LTR	434	1205	0.376	0.360	11.7	B	11.7	B
SB	LTR	385	1069	0.437	0.360	12.3	B	12.3	B

Intersection Delay = 13.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.583

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M4FDP.HC9
Area Type: Other 3-16-99 PM
Comment: Full Development - existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	69.0A				Green	13.0A			
Yellow/AR	5.0				Yellow/AR	5.0			

Cycle Length: 92 secs Phase combination order: #1 #5

Intersection Performance Summary

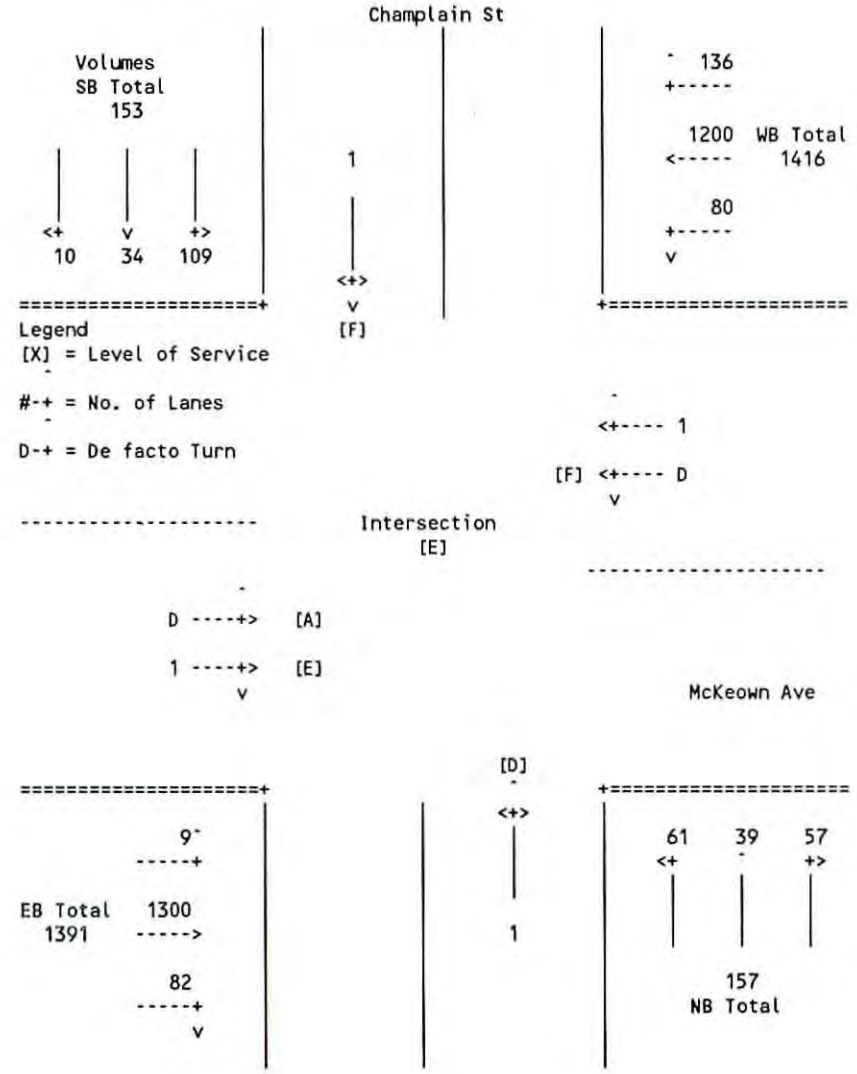
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	DfL	81	105	0.123	0.772	1.7	A	54.8	E
	TR	1401	1816	1.091	0.772	55.2	E		
WB	DfL	81	105	1.098	0.772	126.6	F	48.4	E
	TR	1391	1803	1.062	0.772	43.7	E		
NB	LTR	213	1309	0.764	0.163	33.9	D	33.9	D
SB	LTR	155	952	1.082	0.163	111.3	F	111.3	F

Intersection Delay = 53.7 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 1.096

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4FDPI.HC9

Area Type: Other 3-16-99 PM

Comment: Full Development - LT lanes on McKeown

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	<	>	1	<	>	1	<
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	45.0A				Green	25.0A			
Yellow/AR	5.0				Yellow/AR	5.0			

Cycle Length: 80 secs Phase combination order: #1 #5

Intersection Performance Summary

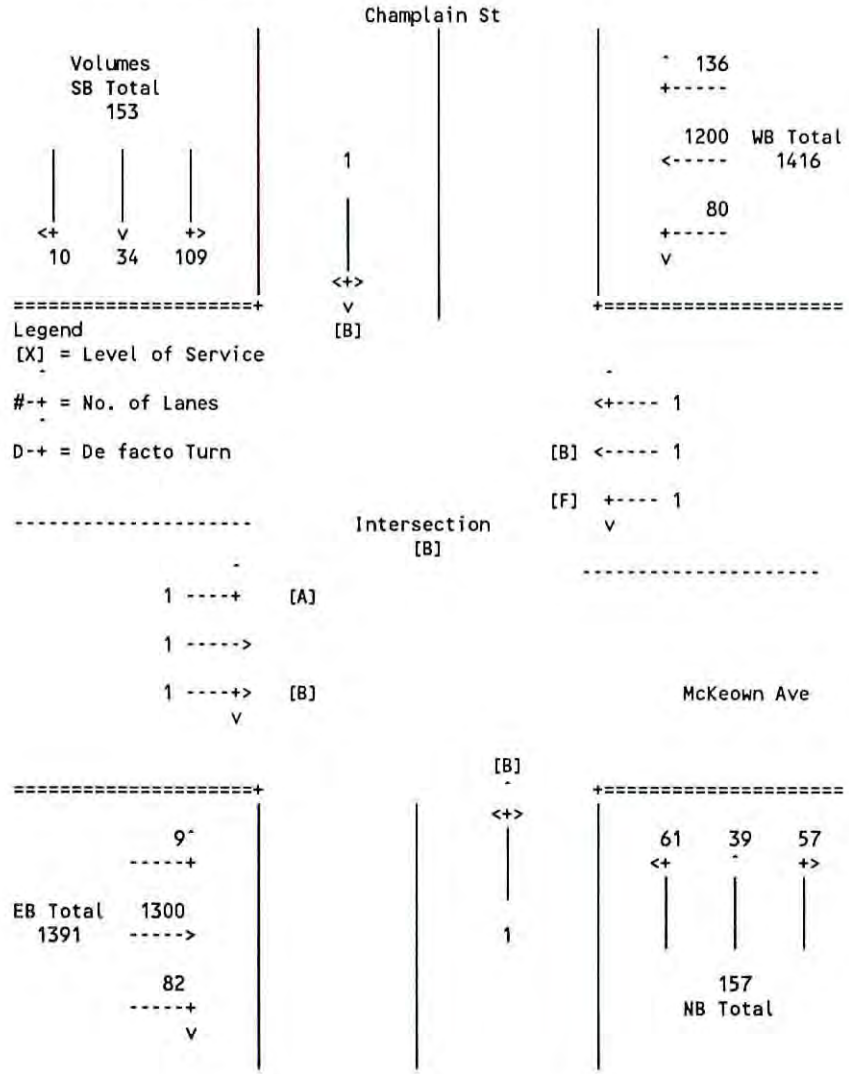
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	93	159	0.107	0.587	4.7	A	8.8	B
	TR	2151	3662	0.746	0.587	8.9	B		
WB	L	93	159	0.953	0.587	66.4	F	11.7	B
	TR	2136	3636	0.727	0.587	8.6	B		
NB	LTR	429	1271	0.380	0.338	13.3	B	13.3	B
SB	LTR	377	1116	0.446	0.338	13.9	B	13.9	B

Intersection Delay = 10.6 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.768

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



Streets: (N-S) Highway 11 (E-W) Cedar Heights Rd
Major Street Direction.... NS Length of Time Analyzed... 60 (min)
Analyst..... TR Date of Analysis..... 3/17/99
Other Information..... 1999 PM (estimated from 1994 and 1997 counts)
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 2	< 0	0	> 2	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	20	260	20	1	420	30	30	10	30	15	5	1
PHF	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	156	250
Potential Capacity: (pcph)	1154	1034
Movement Capacity: (pcph)	1154	1034
Prob. of Queue-Free State:	1.00	0.97
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	311	500
Potential Capacity: (pcph)	1167	924
Movement Capacity: (pcph)	1167	924
Prob. of Queue-Free State:	1.00	0.97
TH Saturation Flow Rate: (pcphpl)	3400	3400
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.97
Step 3: TH from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	823	818
Potential Capacity: (pcph)	360	362
Capacity Adjustment Factor due to Impeding Movements	0.97	0.97
Movement Capacity: (pcph)	349	351
Prob. of Queue-Free State:	0.98	0.97
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	796	798
Potential Capacity: (pcph)	328	327
Major LT, Minor TH Impedance Factor:	0.94	0.95
Adjusted Impedance Factor:	0.95	0.96
Capacity Adjustment Factor due to Impeding Movements	0.92	0.96
Movement Capacity: (pcph)	301	314

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	36	314	>					
EB	T	12	351	>	457	9.6	0.7	B	9.6
EB	R	36	1034	>					
WB	L	19	301	>					
WB	T	7	349	>	321	12.2	0.2	C	12.2
WB	R	1	1154	>					
NB	L	24	924			4.0	0.0	A	0.3
SB	L	1	1167			3.1	0.0	A	0.0

Intersection Delay = 1.2 sec/veh

ADDENDUM
McKeown Avenue Traffic Study

Background

As the McKeown Avenue Environmental Assessment Study was being finalized, the North Bay Health Centre site selection committee was evaluating potential sites throughout the City. The committee eventually selected a site on the west side of College Drive between Highway 17 and the base of the escarpment. The selection of this site affects the traffic forecasts for McKeown Avenue and this addendum has been prepared to assess the impact of the decision.

The current plans for the Health Care Centre consist of North Bay General Hospital with 277 beds and the Northeast Mental Health Centre with 113 beds, for a total of 390 beds. These are scheduled to be built and ready for occupancy by 2004-5. In subsequent years it is expected that ancillary facilities will locate there (e.g. medical offices, etc.). As of June, 2001, the Health Care Centre Board has proceeded with preliminary site planning studies and has prepared functional plans showing access and parking locations. These plans are preliminary in nature and are subject to a further Class Environmental Assessment that will review the options for access to the site. The preliminary plans proposed the primary access to the site to be via a signalized driveway intersection on Highway 17 west of the College Drive hill, and a secondary access via an unsignalized driveway from College Drive near the base of the hill.

Regardless of the access configuration chosen, access to the site will undergo major changes when the MTO proceeds with the construction of the Route 6 alignment of the North Bay Bypass. The new Bypass will eliminate at-grade intersections, including the existing signalized intersection at Gormanville Road. Gormanville Road is to be realigned to a grade separated interchange on Highway 17 at the base of the College Drive hill, with the existing Gormanville Road being closed at Highway 17. If the Health Centre proceeds as expected with its primary access via a signalized driveway onto Highway 17, this access is likely to be closed when the new Bypass is built. Primary access to the Health Centre would then shift to an entrance from College Drive/realigned Gormanville Road, with a secondary entrance possibly via a ramp from Highway 17.

Route 6 is currently only in MTO plans as a corridor to be protected for when it may become needed in the long-term future. There is no timetable for its construction and it is not included in any MTO funding programs. Any estimate of when it might be built would be speculative, and in fact, it is unlikely to be built within twenty years. Therefore, Route 6 and the associated changes to the road network are considered to be beyond the planning period for the McKeown Avenue EA Study.

Assumptions Included in McKeown Avenue Traffic Forecasts

The land use forecasts included in the McKeown Avenue Traffic Study, developed with North Bay Planning Department staff, included major new development on the Education Centre Lowlands (i.e. University and College lands at the base of the escarpment). It was assumed for planning purposes that the Lowlands would include a hospital, a commercial/retail mall, and residential buildings. It was projected that the development would occur in phases over the planning period, with only a hospital in the short-term period (1-5 years).

The following is a summary of the assumptions for the Lowlands area, as taken from Table 4.1 and Table 4.2 in the Traffic Study report (Appendix 4 of the McKeown Avenue EA Study report):

Short Term (1-5 years)	Basic hospital complex	750 vehicle trips in peak hours; access from College Drive only
Longer Term (5-20 years)	Expansion of Hospital site	200 additional trips in pk hr
	200,000 sq ft of new retail	1,000 vehicle trips in pk hr access from College Drive
	150 new residential units	90 new vehicle trips in pk hr; access from College Dr

In addition, the Traffic Study assumed that additional traffic would be generated from above the escarpment. Growth in University/College enrolment was assumed at 1.5 % per annum over the next 20 years, and an allowance was made for 400 new houses in new subdivisions over 20 years (50 houses in five years). The study also assumed a motel and restaurants on vacant Provincially owned lands adjacent to Gormanville Road at McKeown Avenue/College Drive.

Current Expectations for College Drive Area

In June 2001, the Hospital planners are projecting approximately 700 vehicle trips to/from the Health Care site after it opens its doors; this may increase to 800 over the longer term as the trend to more out-patient care grows. In the longer term, the Hospital planners also expect ancillary facilities to locate on the site, but the exact nature of these is unclear at this time.

The remaining Education Centre Lowlands area is expected to develop with residences and retail uses as previously projected. However, the residential use appears to be proceeding more quickly and at a larger scale than previously projected, while the retail may be somewhat smaller than the earlier estimates.

Comparison of Previous and Current Expectations

The following summarizes a comparison of the traffic impact differences between the assumptions in the McKeown Avenue Traffic Study and current thinking on development in the College Drive area.

Hospital Complex

The McKeown Avenue Traffic Study projected traffic volume levels, which are still valid for the short term and the long term planning periods (750 vehicle trips in the short term and 950 in the long term). However, detailed site location and the access have changed significantly.

With the signalized entrance on Highway 17, 85% of the Hospital traffic is expected to enter/leave directly via Highway 17. Thus Hospital traffic will have much less impact on the Gormanville Road/College Drive/McKeown Avenue intersection, but will have a greater impact on the Highway 17/Gormanville Road intersection.

Lowlands Residential

The development of student residences in the Lowlands area appears to be proceeding at a greater pace than previously projected. Nipissing University is currently building a second residence housing 304 beds and Canadore has also expressed interest in proceeding. The Traffic Study assumed 150 units over 20 years with none in the first five years.

These student residences are expected to generate very low numbers of vehicle trips. Thus, while the number of units is much higher than previously projected, the impact in terms of vehicle trips is expected to be modest, in the range of 200 additional vehicle trips in the peak hour.

Lowlands Retail

The size of the area remaining to be developed for retail is significantly reduced from the projections made during the Taffic Study. It was previously assumed that 200,000 sq.ft. of retail could be developed on the remaining Lowlands, generating 1,000 vehicle trips in the peak hour. The likely maximum now may be closer to 100,000 sq.ft.; if we assume 150,000 sq.ft., the trip generation is decreased from 1,000 to 800 vehicle trips.

Above the Escarpment

The University enrolment has been increasing at greater rates than was assumed in the Traffic Study. The trend appears to be strong, but it is difficult to forecast if this will continue into the longer-term future. While College enrolment

has not been growing, there are plans to consolidate off-campus facilities (Commerce Court in 2004) at the main campus, thereby increasing traffic flows to/from the main campus above the escarpment. In addition, the double cohort arriving from the high schools in 2003 will have an impact for a number of years. Overall, it is possible that the previously projected 30% growth over twenty years may be closer to 90%-100%. This could have the impact of increasing peak hour flows by an additional 200 vehicles within five years and by an additional 400-500 vehicles in the Full Development scenario.

The previous forecasts for the residential subdivisions above the escarpment appear to remain valid.

In summary, it is now expected that the area above the escarpment will generate approximately 200 more trips in the peak hour than previously projected within the next five years and up to 500 more trips in the peak hour in 15-20 years.

Other Development

The previous forecasts for the Provincially owned lands adjacent to Gormanville Road appear to remain valid for planning purposes.

Summary

Current information on expected development in the College Drive corridor indicates the following changes to the forecasts prepared for the McKeown Avenue Traffic Study for the flows expected to pass through the College Drive /McKeown Avenue/Gormanville Road intersection:

Development	***5 Year Horizon***	***15-20 Year Horizon[1]***
Health Care Centre	Reduction of 600 vehicles	Reduction of 750 vehicles
Lowlands Residential	Increase of 200 vehicles	Increase of 300 vehicles
Lowlands Retail	No change	Reduction of 200 vehicles
Education Centre	Increase of 200 vehicles	Increase of 500 vehicles
Other Development	No Change	No change
Net Change	***Reduction of approx. 200 vehicles***	***Reduction of approx. 200 vehicles***

The projected net decrease of 200 vehicles through the Gormanville Road /College Drive/McKeown Avenue intersection in five years represents a reduction of less than 10% from the previous forecast; in the case of the longer term forecast, the reduction is approximately 5%. These net reductions are modest and do not change the conclusions in the McKeown Avenue Traffic Study, although it may allow the implementation of the recommended improvements to be delayed by a few years.

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[1] The 15-20 Year Horizon assumes the road network without the new Highway 17 Route 6 alignment. Main Health Centre access is via a signalized entrance on Highway 17.

On the other hand, the Highway 17/Gormanville Road intersection will experience greater impacts in terms of volume and the pattern of peak traffic movements and will require improvements to accommodate the demand. The determination of the requirements at that intersection are not within the scope of the McKeown Avenue Environmental Assessment Study, and will be assessed by the current Hospital planning studies.

APPENDIX 5

PROPERTY REQUIREMENTS

McKeown Avenue Class Environmental Assessment
Alternative B - Property Requirements

City of North Bay (Fire Station No. 2)
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

Canadian Tire Corporation Ltd.
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

J.S. Redpath Holdings Inc. / J.S. Redpath Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Board of Governors of Canadore College
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Management Board Secretariat, Director of Subsidies Branch
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
Alternative B may require a wedge for day lighting.

McKeown Avenue Class Environmental Assessment
Alternative C - Property Requirements

1003130 Ontario Inc. / 881359 Ont. Inc. (Loeb)
a wedge tapering from 3.0 m (approximate) at the east side of the west entrance to Tim Horton's opposite Josephine Street along the McKeown Avenue frontage of the property to provide for a right turn taper into the property. A wedge tapering from 1.0 m to accommodate a return taper on the opposite side of the entrance is also needed with additional width for day lighting at both sides of the entrance.

The existing east entrance to Tim Horton's would be closed with the Alternative 'C' under consideration.

McDonald's Restaurant
A small triangle having a maximum width of approximately 1.2 m tapering from the east side of the existing entrance toward Algonquin Avenue.

Metz Furniture (Leon's)
A 1.0 m to 4.5 m strip tapering from the west edge of the property along the McKeown Avenue toward Algonquin Avenue.

Willis Enterprises Ltd.
A 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Josephine Street intersection.

Ontario Hydro
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the south-west corner of Josephine Street intersection and at the north-west corner of the Champlain Street intersection.

City of North Bay (Fire Station No. 2)
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

Canadian Tire Corporation Ltd.
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

James W. Neil Investments Ltd.
a short wedge from the north west corner of the property, described as the Remainder of Instrument No. 52566 (Techi Data Training) now Instrument No. 91879

J.S. Redpath Holdings Inc./J.S. Redpath Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Management Board Secretariat, Director of Subsidies Branch
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Board of Governors Canadore College
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
additional right-of-way width for day lighting at the Champlain Street intersection.

APPENDIX 6

COST ESTIMATES

COST ESTIMATE SUMMARY
McKeown Avenue

ALTERNATIVES	COST
'A'	$1,060,000.00 *
'B'	$2,780,000.00 *
'C'	$3,400,000.00 *

* Cost does not include improvements to existing storm sewer, sanitary sewer, watermains, utilities and improvements to the Algonquin Avenue/McKeown Avenue intersection.

COST ESTIMATES - ALTERNATIVE 'A'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	10,100	5.50	$55,550.00
2	Hot Mix H.L. 4	t	3,810	55.00	209,550.00
3	Hot Mix Miscellaneous	sq.m	4,005	10.00	40,050.00
4	Granular 'A'	t	5,655	8.50	48,068.00
5	Granular 'B'	t	13,393	5.50	73,662.00
6	Concrete Curb and Gutters	m	1,820	40.00	72,800.00
7	Concrete Sidewalks	sq.m	3,040	38.00	115,520.00
8	150 Diameter Subdrains	m	1,808	16.00	28,928.00
9	Removal of Pavement (Full Depth)	sq.m	9,145	4.50	41,153.00
10	Removal of Pavement (Partial Depth)	t	440	15.00	6,600.00
11	Removal of Concrete Curb and Gutters	m	1,820	10.00	18,200.00
12	Adjusting M.H. and C.B.	Each	39	250.00	9,750.00
13	Light Posts	Each	12	3,000.00	36,000.00
SUB-TOTAL					$755,831.00
14	Contingencies and Engineering (±40%)				$304,169.00
TOTAL					$1,060,000.00

COST ESTIMATES - ALTERNATIVE 'B'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	20,370	5.50	112,035.00
2	Hot Mix H.L. 4	t	7,422	55.00	408,210.00
3	Hot Mix Miscellaneous	sq.m	8,123	10.00	81,230.00
4	Granular 'A'	t	10,905	8.50	92,693.00
5	Granular 'B', Type 1	t	28,422	5.50	156,321.00
6	Concrete Curb and Gutters	m	4,012	40.00	160,480.00
7	Concrete Sidewalks	sq.m	3,670	38.00	139,460.00
8	150 Diameter Pipe Subdrains	m	3,110	16.00	49,760.00
9	300 Diameter Storm Sewers	m	355	110.00	39,050.00
10	1200 Diameter M.H.	Each	3	2,000.00	6,000.00
11	1500 Diameter M.H.	Each	3	2,800.00	8,400.00
12	600 x 600 C.B.	Each	43	1,100.00	47,300.00
13	600 x 1450 D.C.B.	Each	17	2,000.00	34,000.00
14	Adjusting M.H. and C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	12,346	4.50	55,557.00
16	Removal of pavement (Partial Depth)	t	557	15.00	8,355.00
17	Removal of Concrete Curb and Gutters	m	3,168	10.00	31,680.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Posts	Each	33	3,000.00	99,000.00
22	Property	Ha	0.24	330,000	79,200.00
SUB-TOTAL					$1,988,048.00
23	Contingencies and Engineering (±40%)				791,952.00
TOTAL					$2,780,000.00

COST ESTIMATES - ALTERNATIVE 'C'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	27,336	5.50	$150,348.00
2	Hot Mix H.L. 4	t	9,487	55.00	521,785.00
3	Hot Mix Miscellaneous	sq.m	7,420	10.00	74,200.00
4	Granular 'A'	t	13,630	8.50	115,855.00
5	Granular 'B' Type 1	t	37,042	5.50	203,731.00
6	Concrete Curb and Gutters	m	6,132	40.00	245,280.00
7	Concrete Sidewalks	sq.m	3,657	38.00	138,966.00
8	150 Diameter Pipe Subdrains	m	4,608	16.00	73,728.00
9	300 Diameter Storm Sewer	m	395	110.00	43,450.00
10	1200 Diameter Manholes	Each	3	2,000.00	6,000.00
11	1500 Diameter Manholes	Each	3	2,800.00	8,400.00
12	600 x 600 Catchbasins	Each	43	1,100.00	47,300.00
13	600 x 1450 Catchbasins	Each	17	2,000.00	34,000.00
14	Adjusting M.H., C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	13,158	4.50	59,211.00
16	Removal of Pavement (Partial Depth)	t	566	15.00	8,490.00
17	Removal of Curb and Gutters	m	4,027	10.00	40,270.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Post	Each	33	3,000.00	99,000.00
22	Property	Ha	0.55	330,000.00	181,500.00
SUB-TOTAL					$2,430,831.00
23	Contingencies and Engineering (±40%)				969,169.00
TOTAL					$3,400,000.00

EXISTING LAND USE

FUTURE LAND USE

LEGEND LAND USE

- RESIDENTAL
- COMMERCIAL
- INDUSTRIAL
- INSTITUTIONAL
- OPEN SPACE
- VACANT
- UTILITY CORRIDOR

Exhibit 5 - EXISTING AND FUTURE LAND USE

EXISTING CONDITIONS – PROPERTY OWNERSHIP

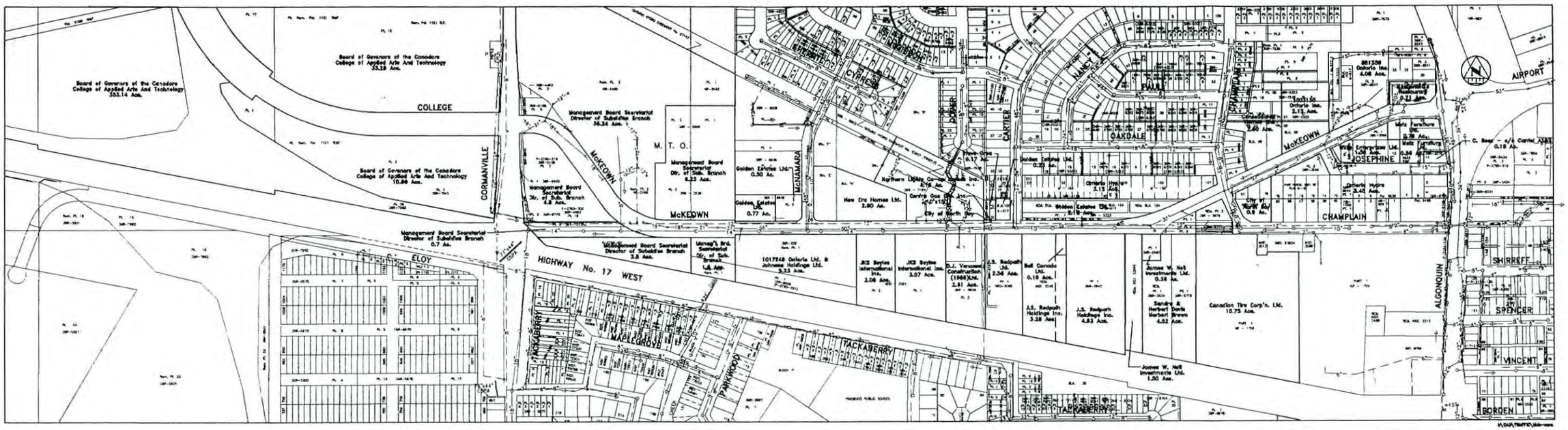


Exhibit 6 - EXISTING CONDITIONS PROPERTY OWNERSHIP

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA (DHV)

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates.
The predictions were made using the Ministry of Environment STAMSON* prediction program. These predictions are based on Design Hour Volume which is the heaviest traffic hour in the day.

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	55.44	59.04	3.6
2	centre of courtyard on New Era townhouses	42.76	46.39	3.63
3	rear of parking lot of New Era townhouses	57.31	61.48	4.17
4	centre of play/common area in backyards of Northern Lights co-op	56.72	60.89	4.17
5	backyards of the homes on south side of Oakdale Road	50.54	54.71	4.17
6	backyards of homes on east side of Champlain	54.97	58.11	3.14

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Exhibit 7 - NOSE PREDICTIONS present/future

3.3.4 Heritage Resources

The Ministry of Citizenship, Culture, and Recreation advised that the study area does not contain designated heritage resources or properties and, as a result of the study area being located away from major watercourses that a low potential for archaeological discoveries exist.

3.4 TRANSPORTATION

3.4.1 Study Area Streets

The Official Plan for the City of North Bay designates McKeown Avenue as a collector road. The major collector and arterial street system provides road links that connect the principal activity areas in the City. The street system at the north end of the City particular to this study includes Highway 17, Highway 11 North, Algonquin Avenue, McKeown Avenue, Gormanville Road and College Drive. Within this street system, McKeown Avenue is intended to carry traffic to and from the Belleview, Thibeault Terrace and Oakdale Highlands neighbourhoods of the Cedar Heights Planning District and to serve adjacent commercial, industrial and institutional lands in the corridor. It provides an east-west connection from Algonquin Avenue to Gormanville Road and also functions to carry through traffic to and from the College Education Centre north of the North Bay Escarpment. This roadway is presently four lanes from Algonquin Avenue to Cartier Street and two lanes from Cartier Street to Gormanville Road.

3.4.2 Structural Condition

A preliminary visual assessment of the structural and drainage condition of the pavement was undertaken by Merlex Engineering Ltd. in 1999. In addition, Merlex Engineering included a summary of geotechnical investigations performed by the firm on lands adjacent to McKeown Avenue to provide a preliminary characterization of subgrade and groundwater table conditions for the study area. The pavement inspection with geotechnical review was included in this study to identify a preliminary pavement structure and repair program as information for refining construction cost estimates.

The following is a summary of the investigation for four sections of McKeown Avenue from Algonquin Avenue to Gormanville Road.

Section 1 - Algonquin Avenue to Cartier Street

- the road section is four lanes (undivided) with curb and gutter
- reconstructed in 1992
- observed pavement conditions included longitudinal cracks in each inside lane, moderate intermittent cracks, a moderate frost heave in the eastbound lane over a sewer lateral (east of Champlain Street) and a few slight longitudinal meander and mid-lane cracking

Overall, this section of road has responded well over the last seven years.

Section 2 - Cartier Street to McNamara

- the road section is two lanes with curb and gutter
- constructed in 1979

- the visual review indicated moderate transverse cracking of an intermittent nature. Cracking included a few slight alligator cracks and slight wheel track rutting

Overall, this section of roadway has responded well over the last twenty years with selective resurfacing.

Section 3 - McNamara to 50 m West of West Entrance Into Ontario Government Office Building

- the road section is two lanes with curb and gutter
- constructed in 1978
- this section exhibits moderate wheel track rutting in front of the Lucky 13 store with moderate surface distortions and poor drainage between Lucky 13 and the west entrance to the Ontario Government Office Building

A preliminary geotechnical assessment of this short section suggests that due to the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to traffic load.

Section 4 - McNamara (50m west of Ont. Government Building) to Gormanville Road

- the road section is two lanes with curb and gutter
- constructed in 1978
- pavement conditions included slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking. Moderate intermittent centreline cracking was also observed

The detailed report of the preliminary geotechnical review with recommendations for further investigations to confirm a pavement design is included as Appendix 3.

3.4.3 Existing Traffic Conditions

At the present time, the traffic volumes along McKeown Avenue vary from approximately 14,000 vehicles daily at the east end (at Algonquin Avenue) to approximately 7,000 vehicles daily at the west end (at Gormanville Road). McKeown Avenue is currently operating at an acceptable Level of Service through the study area, except for the McKeown Avenue/Gormanville Road intersection where the left turns from McKeown to go south on Gormanville Road are facing unacceptably long queues and delays at peak hours. This intersection is getting close to warranting the installation of traffic signals; with signals, it would operate at a good level of service.

An analysis of the existing traffic volumes indicated the current need for left turn storage lanes on McKeown Avenue at McNamara Street, at Cartier Street, at Champlain Street, at the Algonquin Mall entrances and at the Provincial Government Building entrance.

3.4.4 Future Traffic Conditions

Future traffic volumes along McKeown Avenue are expected to increase dramatically based on the projected new development/redevelopment in the corridor over the next twenty years. Major growth is expected in the first five years (by 2004) but significant growth is expected to continue through to 2015 - 2020.

Daily traffic volumes at the east end (adjacent to Algonquin Avenue) are expected to increase from 14,000 vehicles to 22,000 vehicles by 2004, and to 28,000 vehicles by full development. At the west end (adjacent to Gormanville Road), daily traffic volumes are expected to increase from 7,000 vehicles to 14,000 vehicles by 2004, and to 20,000 vehicles by full development.

The three major institutional uses along College Drive which are expected to triple the traffic volumes are the existing university and college facilities and the proposed new hospital development. The increased traffic generation from the educational facilities accounts for approximately 700 vehicles at full development while an allowance for 140 vehicles has been assumed for the hospital development. The full impact of these increases on College Drive traffic will need to be reviewed in other development related studies.

To meet the future needs, McKeown Avenue will need two through lanes in each direction, a continuous centre fifth lane for two-way left turns, right turn tapers or channelization at key locations and new traffic signals at its intersection with Gormanville Road and Josephine Street. Traffic signals may also be required at an additional location, possibly at McNamara Street, in the long term future.

3.4.5 Accidents

A review of accident statistics within the study area identified two major problem areas:

- intersection of McKeown Avenue and Champlain Street
- McKeown Avenue at the Tim Horton Donuts driveway

A high accident frequency was also found at the Highway 17/Gormanville Road intersection, but this intersection has been rebuilt recently and it is expected that the situation has improved.

At Champlain Street, a high number of accidents have occurred involving left turns, including a high proportion of personal injury accidents. These statistics indicate a need for left turn storage lanes and special left turn phasing in the signal timing.

At the Tim Horton Donuts entrance, all the accidents involve left turning vehicles exiting the site. It is expected that these accidents could be significantly reduced by consolidating the existing entrances to a signalized intersection opposite Josephine Street with left turn storage lanes.

Apart from the above locations, there are relatively few accidents occurring within the study area. Some locations, such as the McKeown/Gormanville intersection, are noteworthy for the unexpectedly small number of accidents recorded over the past three years.

The transportation conditions of the study area are described in detail in the McKeown Avenue Traffic Study: Algonquin Avenue to Gormanville Road appended to this report (see Appendix 4).

3.5 UTILITIES

Bell Telephone - Extensive aerial and underground Bell cable facilities are found within the McKeown Avenue right-of-way. Plans identifying Bell facilities were provided to the Study Team as background material. Bell facilities include underground duct conduit (some with fibre optics), buried road crossings, direct buried cable and aerial cable. The plant included a remote switching

station on a small parcel owned by Bell Canada on the south side of McKeown Avenue at Cartier Street.

Union Gas - Plans identifying the location of Union Gas gas mains and service lines were provided to the study. Gas lines are present throughout the study area rights-of-way.

North Bay Hydro - North Bay Hydro provided distribution maps of the study area showing existing North Bay Hydro overhead and underground plant and the City of North Bay owned street lights. The overhead plant on McKeown Avenue includes an aerial pole line along the north side of McKeown Avenue extending from the Ontario Government Building easterly to the new realignment of McKeown Avenue where it crosses the road and follows the original McKeown Avenue road allowance to Champlain Street.

Ontario Hydro - Ontario Hydro owns a utility corridor that extends through the study area crossing McKeown Avenue at Champlain Street. The utility corridor contains a L5H Circuit 115 kV high tension line and is currently the only route for the facility through the City of North Bay. Parts of the facility where it crosses McKeown Avenue were recently relocated when the new McKeown Avenue re-alignment with Airport Road was built. Poles at this location are anchored with guys which are now located close to the street. These locations may be affected with a road widening alternative.

3.6 UNDERGROUND INFRASTRUCTURE

McKeown Avenue from Algonquin Avenue to Cartier Street
New sanitary sewer, storm sewer and watermain services were installed with the re-alignment of McKeown Avenue in 1992. It is not expected that the new infrastructure within this section of roadway would require upgrading or replacement when road improvements recommended in this study are scheduled for construction with the exception of the storm sewer which appears to be undersized from Champlain Street to Cartier Street on McKeown Avenue.

McKeown Avenue from Cartier Street to Gormanville Road
Camera and visual inspection reports on the underground services in this section of McKeown Avenue are not available. New storm sewer was installed in 1979 with the reconstruction and re-alignment of McKeown Avenue with College Drive. The sanitary sewer, which was constructed in 1970, and watermain, which was installed in 1963, were not replaced with the 1979 McKeown Avenue reconstruction. A camera inspection of underground infrastructure in this section is recommended in order to determine replacement and upgrading priorities to coincide with any future improvements to the road.

3.6.1 STORM SEWER

The existing storm sewer system on McKeown Avenue and its feeder lines appear to have been designed in the early 1970's based on a 2 year return storm design criteria that has been updated by the municipality. This more recent design criteria appears to reflect the actual conditions that occur within the City.

Based on the current design standards and assuming no new development, the McKeown Avenue

Storm Sewer system has sections that are deficient in capacity. An analysis of the drainage system has identified the following areas of concern:

(a) The outlet of the 66" storm sewer is situated below the invert of the Pinewood Creek as well as the culvert under Highway 17. This restricts the outflow from the storm sewer system;

(b) The storm sewer pipe system is undersized based on the current 5 year design storm from the outlet of the 66 inch storm sewer to the intersection of Champlain Street and McKeown Avenue. This analysis has assumed the following:

- That all future land development will be developed with the current philosophy of no increase in storm runoff.
- That there is a free outlet at the receiving stream.
- That the feeder lines to the McKeown Avenue pipe system were sized to accommodate the flow that results from the current design standards, and
- That overland flow relief will not provide substantial relief to the storm sewer pipe system.
- Current problems regarding basement flooding on McKeown Avenue and McNamara Street are to be controlled by pumps and backwater valves.

(c) If overland flow relief is considered to be an option, we would note the following:

- McKeown Avenue itself drains from Algonquin Avenue to approximately the outlet to Pinewood Creek.
- If we assume a standard cross-section with the normal curb and gutter the water depth on the street would vary from 0.075 m for the five year storm to in excess of 0.20 m for the 100 year storm; and
- This overland flow relief scenario will not eliminate the surcharging that currently exists within the pipe system.

CHAPTER 4 - EVALUATION OF ALTERNATIVES

4.1 ALTERNATIVES AND EVALUATION

This chapter describes the evaluation of the planning solutions and design alternatives that were developed to address the needs along McKeown Avenue in terms of existing and future traffic capacity, level of service and safety.

4.2 EVALUATION OF ALTERNATIVES

Under the Class Environmental Assessment for Municipal Road Projects, road improvements are developed in accordance with an approved environmental assessment procedure, which requires the systematic identification and evaluation of alternatives. The environmental assessment of alternatives in the study was carried out on a staged basis with the initial screening of alternative solutions (Phase 2) followed by a detailed evaluation of the design alternatives carried forward (Phase 3).

4.3 PHASE 2 INITIAL SCREENING OF SOLUTIONS

The Class Environmental Assessment process identifies a first step in Phase 2 as the identification of alternative solutions to the problem. Alternative solutions are defined as functionally different ways of addressing transportation problems and may include the consideration of alternate routes, operational adjustments, transit improvements and roadway improvements such as road widenings.

In the initial screening, alternatives that would not resolve identified transportation problems or future requirements of the roadway were screened out from further investigation. Solutions expected to partly or fully address the study area's transportation requirements were carried forward for detailed evaluation. The following solutions were evaluated in this study in the initial screening at a general level of detail:

- Do Nothing
- Improve Transit
- Improve Other Roadways
- Rehabilitate Existing Road
- Operational Improvements
- Widen Existing Roadway to 3, 4, or 5 lanes

The above solutions were initially presented at the first Phase 2 - Public Information Centre along with reasons for selecting the preferred solution for detailed evaluation.

4.3.1 Do Nothing

The do nothing alternative maintains the existing pavement, traffic capacity, operational and safety conditions which are unacceptable. This alternative does not accommodate the requirements for alleviating traffic capacity deficiencies and would result in unacceptable levels of service over the long term. This alternative would not accommodate future planned development in the study area.

The do nothing alternative was not carried forward.

4.3.3 Improve Transit

The City of North Bay is well served by urban transit services which currently operates three bus routes through the study corridor. North Bay Transit will play an important role as an alternative mode of travel especially to the College Education Centre (CEC) main campus and student residences. These routes now exhibit amongst the highest ridership levels in the City of North Bay. Transit service is also important for the adjacent residential areas. Although transit will continue to provide an important alternate mode of travel, a transit solution alone could not replace the auto mode in serving the existing and future large retail businesses along McKeown Avenue.

The transit alternative was not carried forward for detailed evaluation, but should be implemented as part of the overall transportation system.

4.3.3 Improve Other Roadways

The existing and particularly the future traffic on McKeown Avenue is predominantly destination traffic to locations along the corridor and neighbouring areas. Destination traffic does not have route choices and would therefore continue to use McKeown Avenue in the future. Through traffic to and from the College Education Centre and future development in the Cedar Heights area does have route choices including Highway 17, Highway 11, Algonquin Avenue and Cedar Heights Road. Future improvements to these alternate routes may attract some traffic from McKeown Avenue but would not be expected to solve the largest part of the identified traffic capacity and operational deficiencies.

This solution was not recommended to be carried forward for detailed evaluation, but it should be implemented as part of the overall transportation system.

4.3.4 Rehabilitate Existing Road

This alternative does not accommodate projected traffic volumes and would result in an unacceptable level of service over the long term. Although this alternative would improve existing pavement conditions which are deficient at some locations, the alternative would not accommodate future planned development in the study area.

Pavement and road structure rehabilitation was carried forward for detailed evaluation as part of the preferred solution.

4.3.5 Operational Improvements

Non-structural improvements such as optimizing signals, operational adjustments and minor road improvements lack the ability to relieve the present and future traffic congestion of the road system. This solution can improve the effectiveness of other road improvement alternatives.

Operational improvements were carried forward to be incorporated in the design of road widening alternatives.

4.3.6 Widen Existing Roadway to 3, 4, or 5 lanes

The reconstruction and widening of the existing roadway offers the potential to solve projected capacity, operational and structural deficiencies. Road widening options either individually or in combination would improve traffic conditions and support future planned and expected development.

Road widening options were carried forward for detailed evaluation.

4.4 PHASE 3 DETAILED EVALUATION OF DESIGN ALTERNATIVES

Based on the results of the Phase 2 initial screening, the following road design alternatives were developed:

Alternative A -Reconstruct McKeown Avenue to its Existing 2 Lane and 4 Lane Configuration (See Exhibit 8 - Drawings 1, 2 and 3)

Alternative B - 4 Traffic Lanes (See Exhibit 9 - Drawings 1, 2 and 3)

Alternative C - 5 Traffic Lanes (See Exhibit 10 - Drawings 1, 2 and 3)

The detailed evaluation was carried out with seven environmental factors representing the environment affected or most likely affected by the project alternatives. Sub-factors for each factor were developed to provide detail in the accounting of expected positive and negative environmental impacts. The seven factors were:

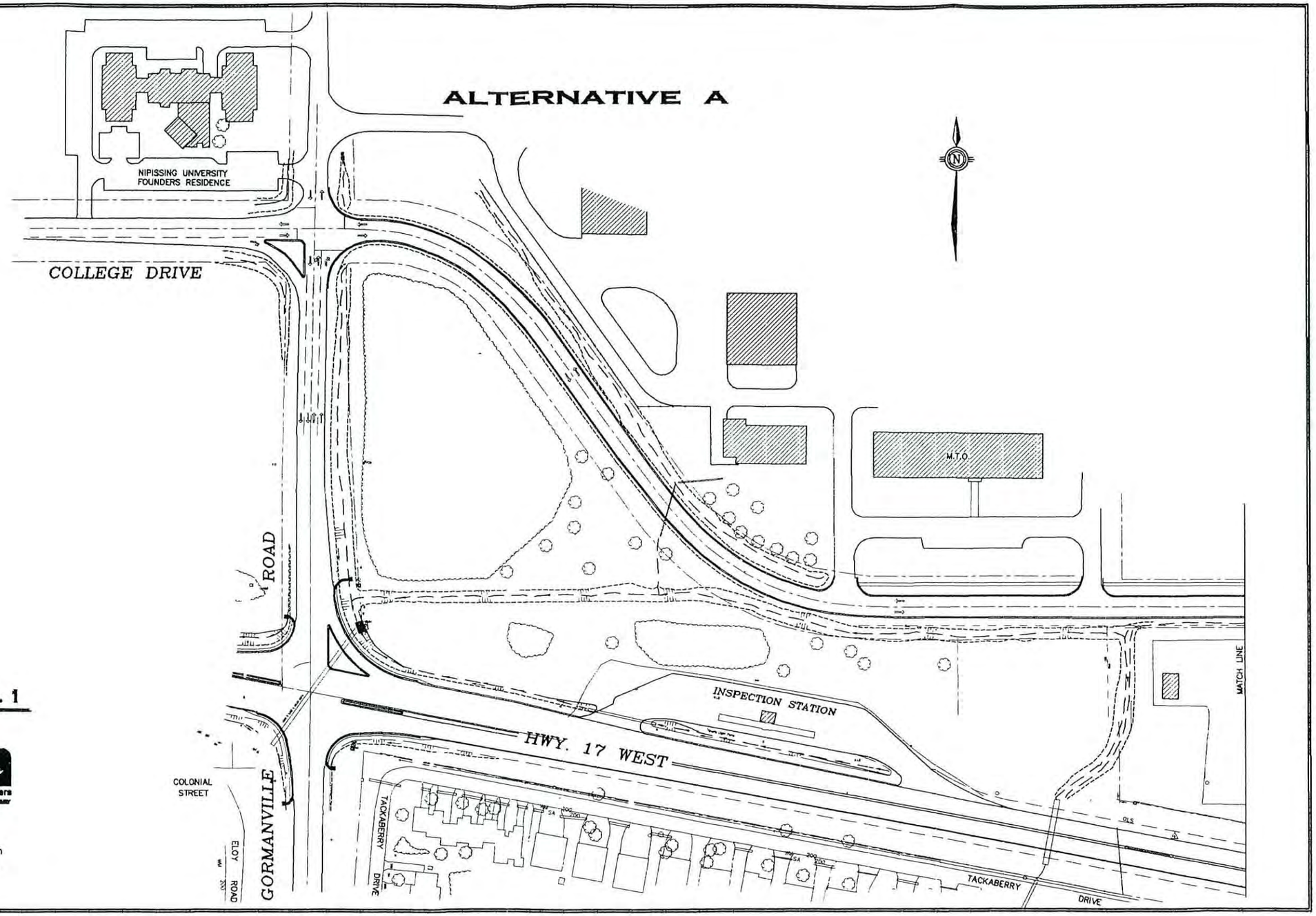
- Transportation
- Safety
- Land Use
- Social Environment
- Natural Environment
- Cost
- Public Preference

Descriptions of sub-factors used in the evaluation are presented in Exhibit 11.

The different road design alternatives were comparatively ranked against each detailed evaluation factor using a five point rating scale from most preferred to least preferred. A rank of most preferred indicated an alternative that provided the most benefit (e.g., met traffic capacity requirements) or least impact (e.g., minimized property requirements). Least preferred ratings were assigned to options that provided no or minimal benefits or which had the greatest negative impact. Ratings varied according to the alternative and sub-factor used. Exhibit 12 is an illustration of the rating scale used.

The results of the evaluation are presented in detail in Exhibit 13. The inventory of impacts as presented in the detailed evaluation table together with the following description of ranking results represents the rationale and documentation for the selection of the preferred alternative.

ALTERNATIVE A

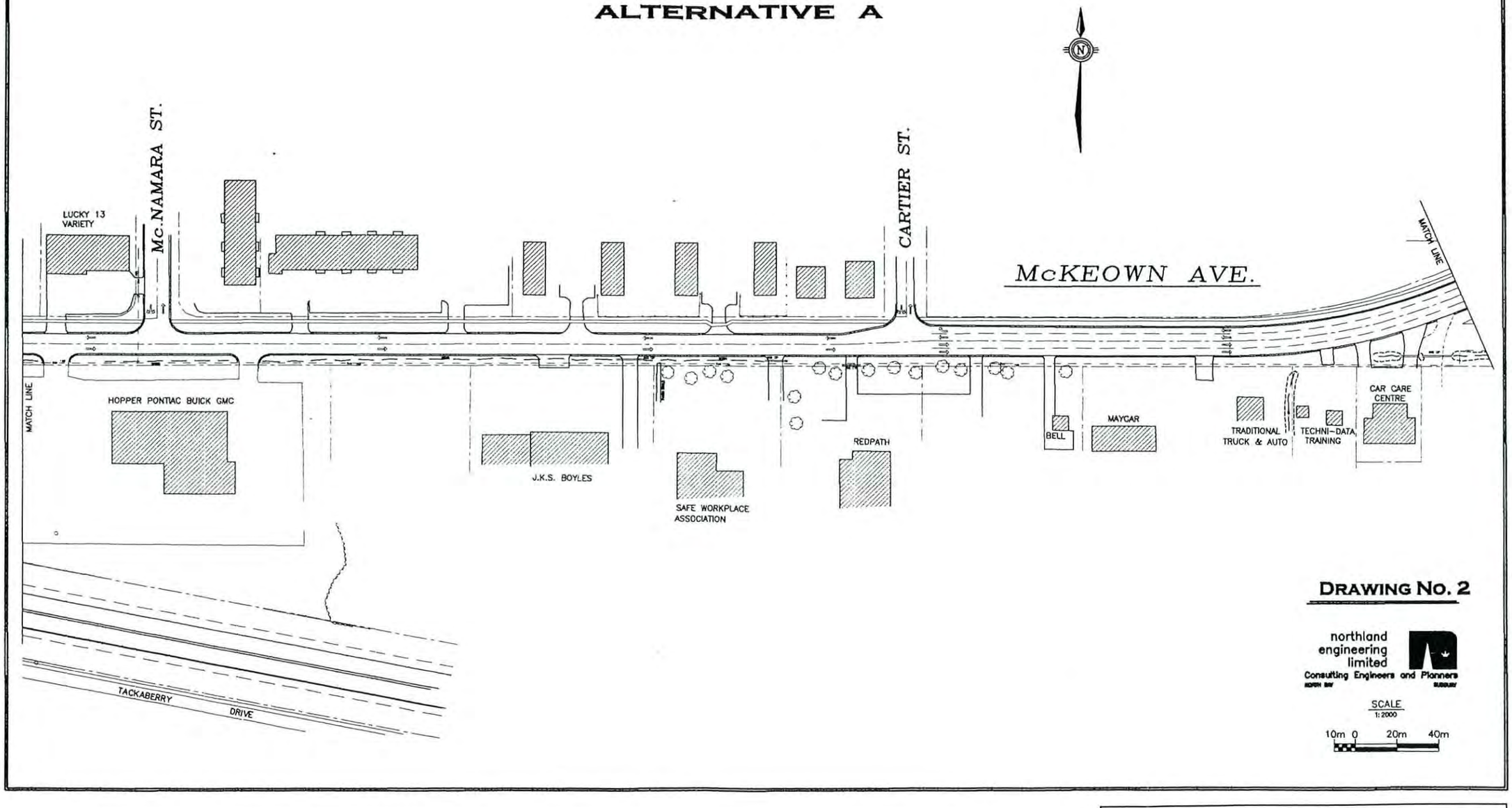


DRAWING No. 1

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NORTH BAY SUDBURY

Exhibit 8 - ALTERNATIVE "A" - page 1

ALTERNATIVE A



DRAWING No. 2

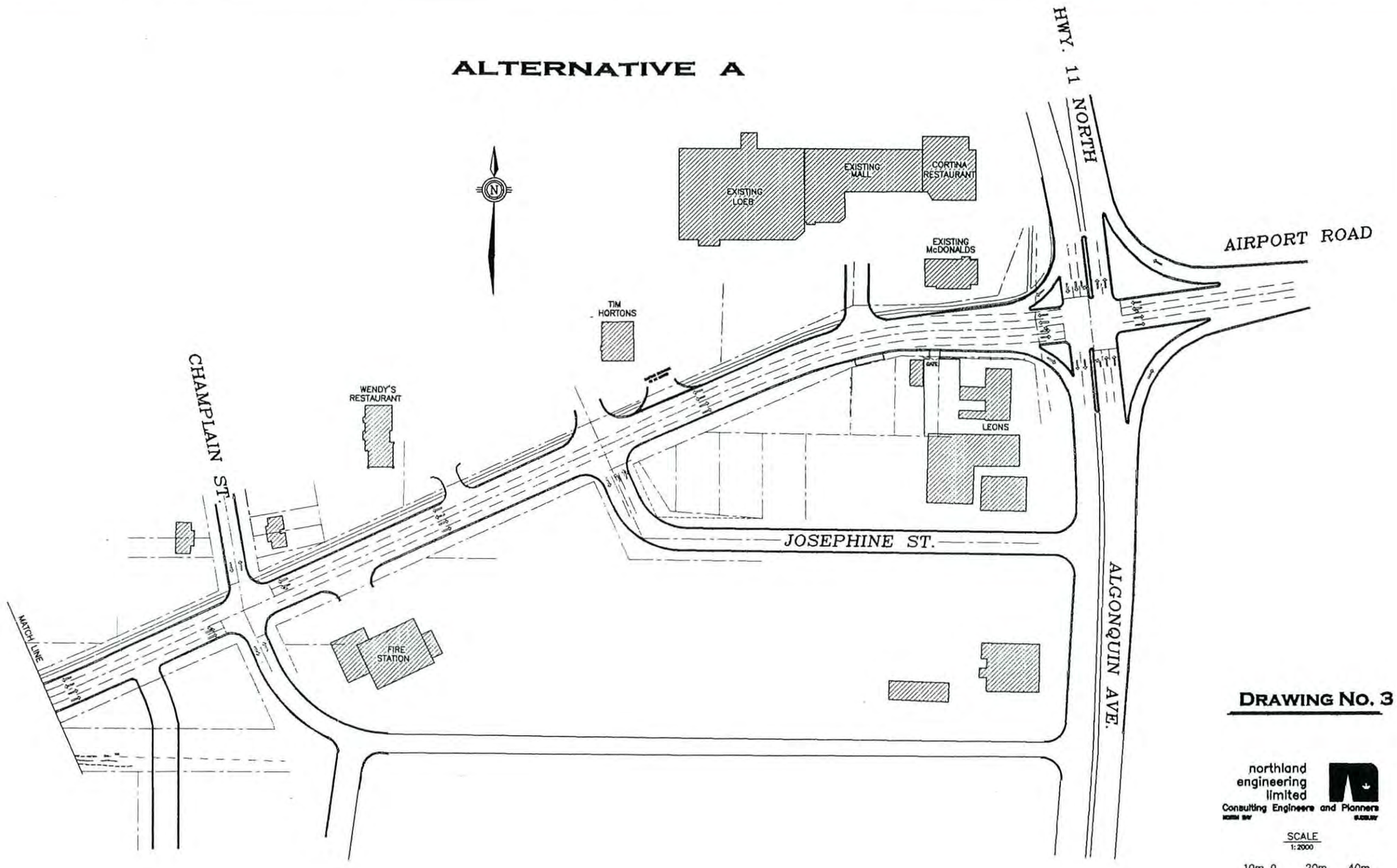
northland engineering limited
Consulting Engineers and Planners
NORTH BAY SUDBURY

SCALE
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Exhibit 8 - ALTERNATIVE "A" - page 2

ALTERNATIVE A



DRAWING No. 3

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Exhibit 8 - ALTERNATIVE "A" - page 3

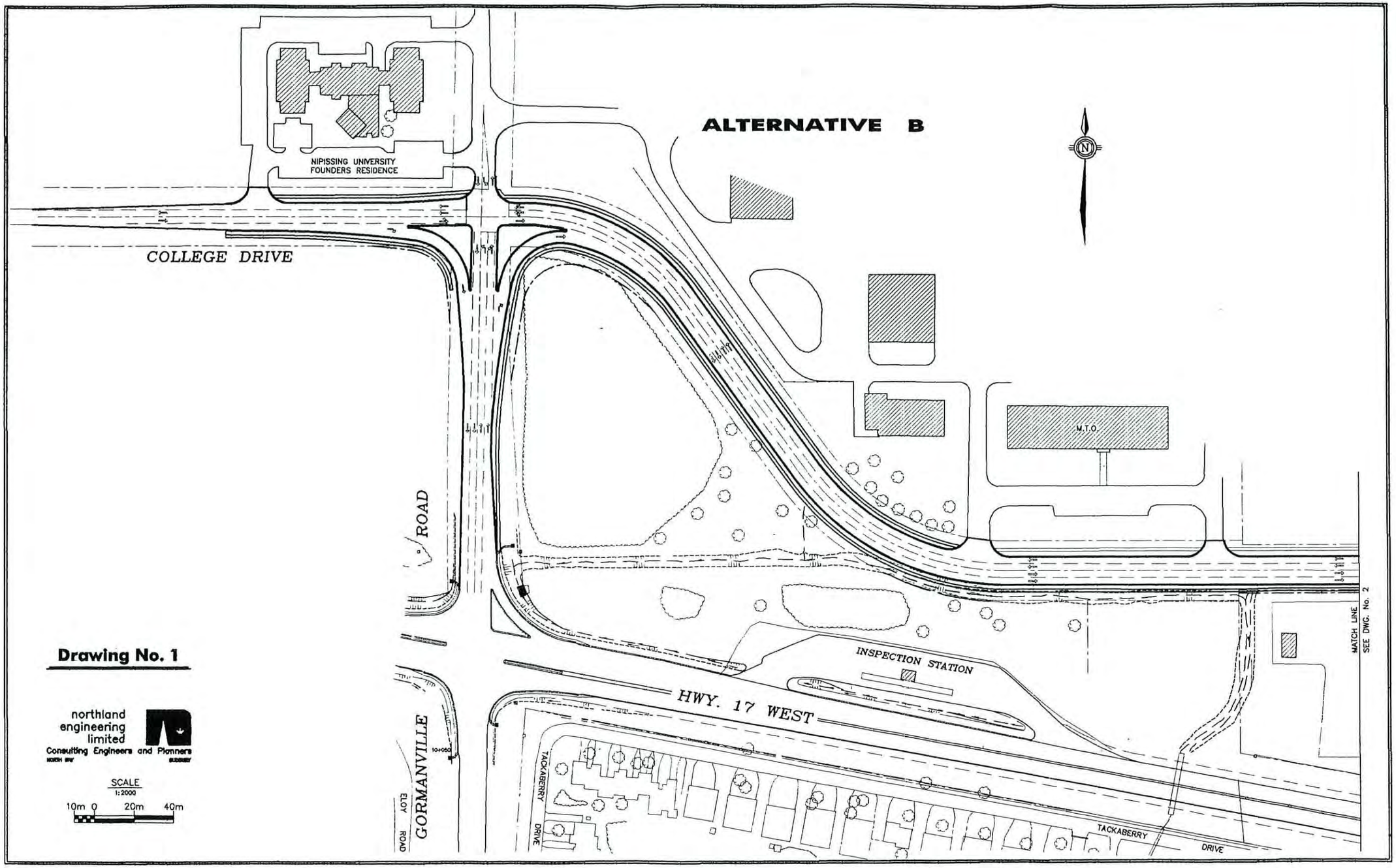
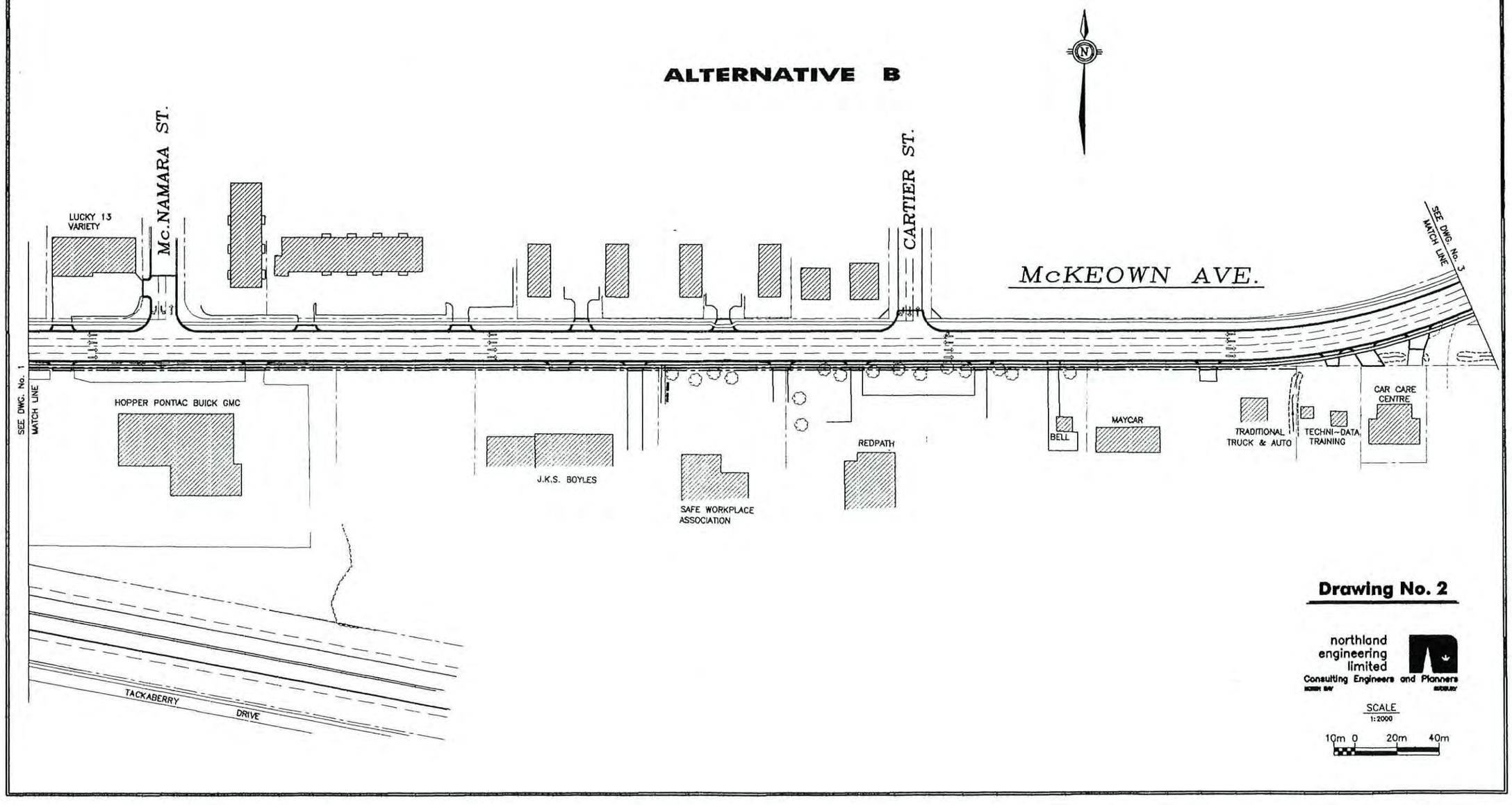


Exhibit 9 - ALTERNATIVE "B" - page 1

ALTERNATIVE B



Drawing No. 2

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Exhibit 9 - ALTERNATIVE "B" - page 2

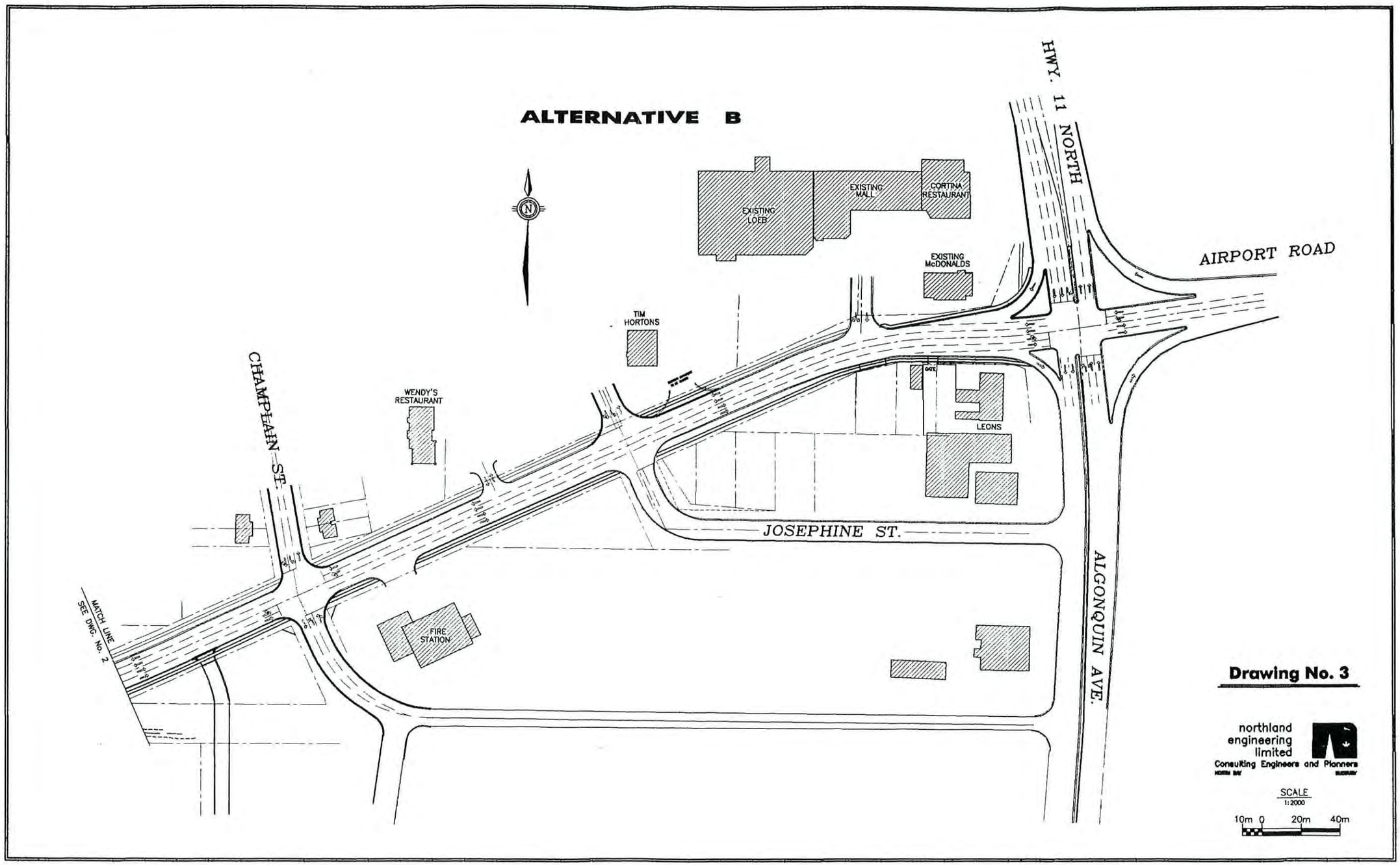
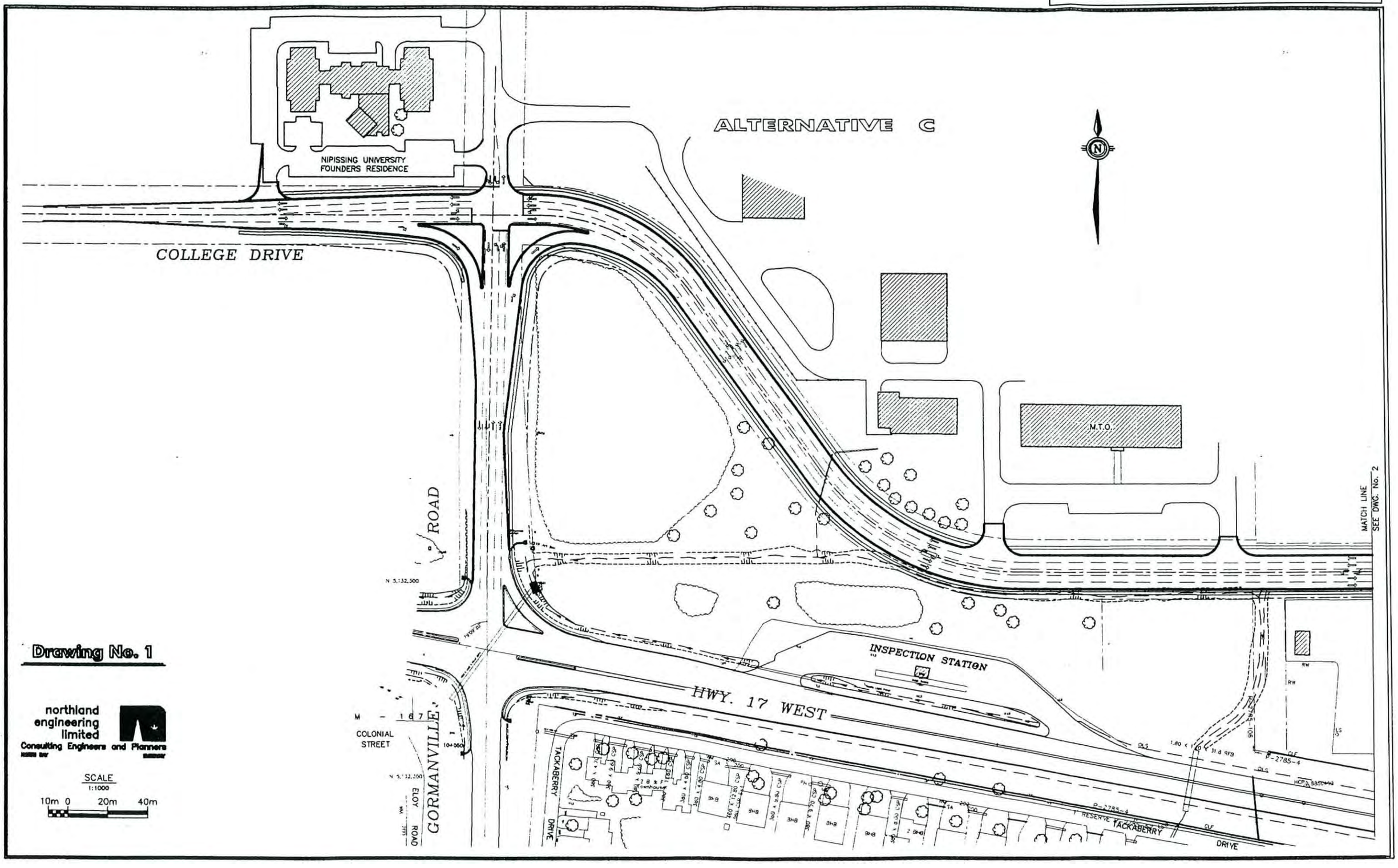


Exhibit 9 - ALTERNATIVE "B" - page 3



Drawing No. 1

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ALTERNATIVE C



Mc.NAMARA ST.

CARTIER ST.

McKEOWN AVE.

LUCKY 13 VARIETY

SEE DWG. No. 3 MATCH LINE

SEE DWG. No. 1 MATCH LINE

HOPPER PONTIAC BUICK GMC

J.K.S. BOYLES

SAFE WORKPLACE ASSOCIATION

REDPATH

BELL

MAYCAR

TRADITIONAL TRUCK & AUTO

TECHNI-DATA TRAINING

CAR CARE CENTRE

CLF

TACKABERRY DRIVE

Drawing No. 2

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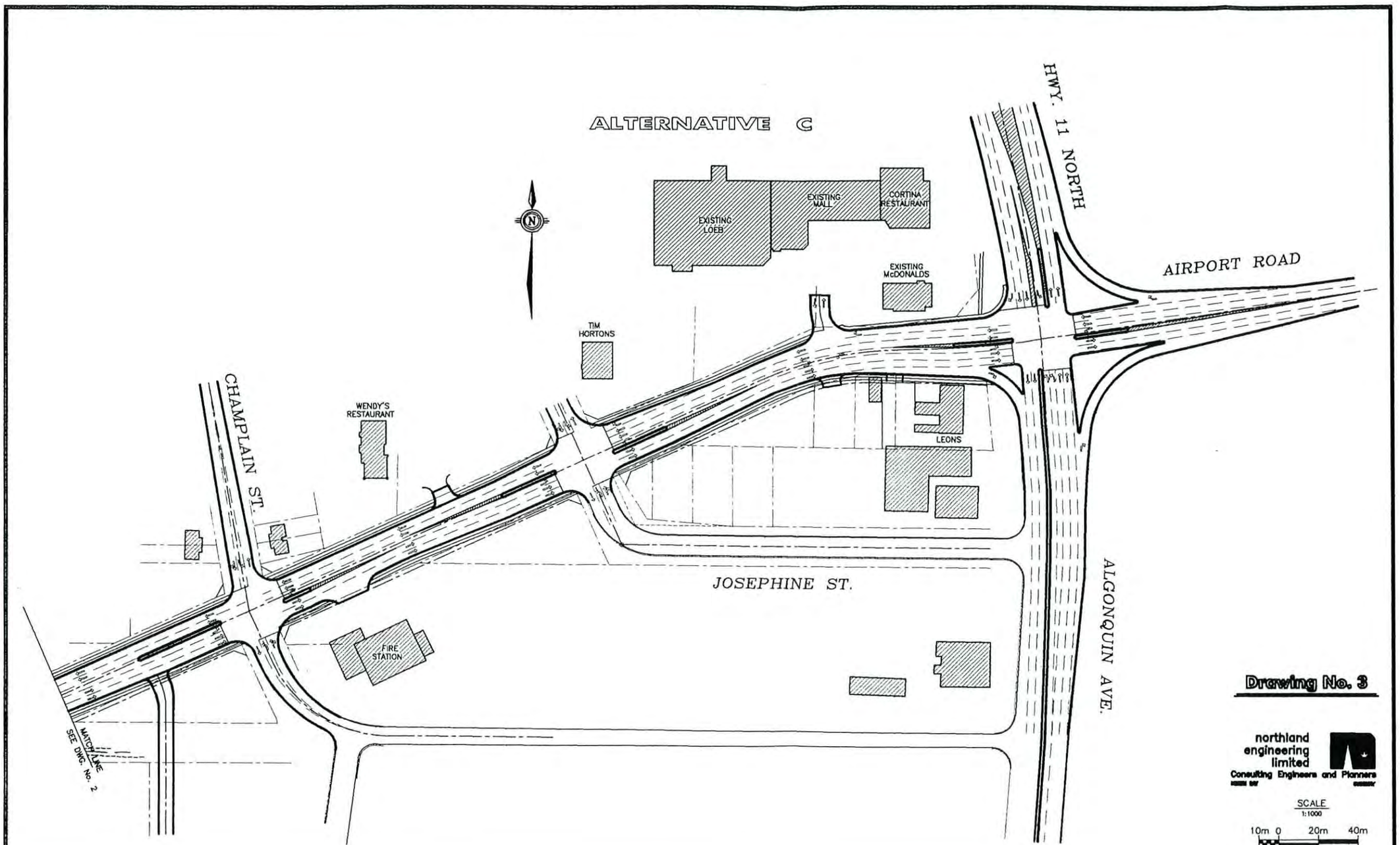

ALTERNATIVE C
HWY. 11 NORTH
AIRPORT ROAD
EXISTING LOEB
EXISTING MALL
CORTINA RESTAURANT
EXISTING McDONALDS
TIM HORTONS
WENDY'S RESTAURANT
LEONS
CHAMPLAIN ST.
JOSEPHINE ST.
ALGONQUIN AVE.
FIRE STATION
MATCH LINE SEE DWG. No. 2
Drawing No. 3
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Exhibit 11 - DETAILED EVALUATION FACTORS

Detailed Evaluation Factors		
Factor	**Sub-Factor**	**Description**
TRANSPORTATION	Capacity/Flow	Identification of whether an option improves or reduces the capacity of flow.
	Intersection Level of Service	Identification of whether an option improves or reduces the ability of an intersection to move vehicles.
SAFETY	Traffic Operations	Subjective measure of how traffic will operate and affect safety.
	Safety of Access	Subjective measure of whether access to and from McKeown Avenue will be good or poor.
	Pedestrian Safety	Indication of the safety and convenience of pedestrian movements.
LAND USE	Impact on Existing or Future Land Uses	Indication of the compatibility of an option with existing or future land uses.
SOCIAL ENVIRONMENT	Property Acquisition	Identification of the amount of property required to accommodate option.
	Noise	Quantitative measure of the predicted change in noise levels.
	Aesthetics/Visual Impacts	Subjective identification of whether aesthetics of the roadway is improved or reduced.
NATURAL ENVIRONMENT	Water Management	A statement of the proposed stormwater management system.
	Air Quality/Fuel Consumption	Subjective measure on the effects of air quality and fuel consumption.
COST	Annual Maintenance	Subjective measure of the effects on annual maintenance costs.
	Construction	Quantitative statement of construction costs.
PUBLIC PREFERENCE		Indication of general public preferences.

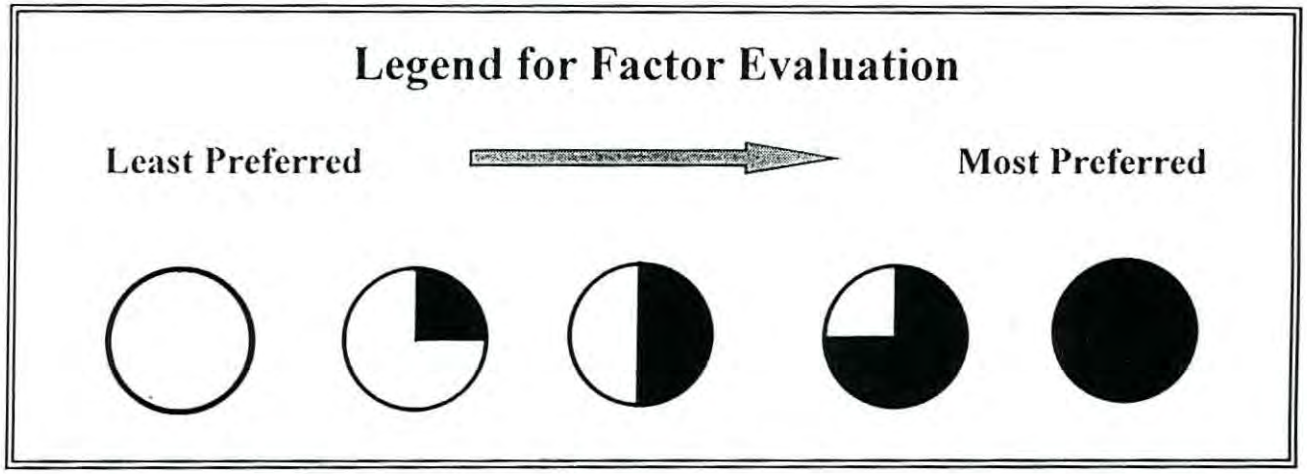


Exhibit 12 - RATING SCALE

DETAILED EVALUATION TABLE - McKeown Avenue Class Environment Assessment from Gormanville Road to Algonquin Avenue

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
TRANSPORTATION						
Capacity / Flow	• will not meet future capacity requirements • existing 2 lane/4 lane roadway will be at capacity in 5 years	○	• will meet basic capacity requirements in the study area during the initial planning period, but will not meet capacity requirements with full development	◕	• will meet future capacity requirements from Algonquin Avenue to Gormanville Road	●
Intersection Level of Service	• does not presently meet acceptable level of service at Gormanville Road (LOS F) • all other intersections presently operate at acceptable Level of Service (LOS B and C) • intersection capacity for McNamara Street and Cartier Street will diminish to unacceptable Level of Service within 5 years • intersection capacity for all intersections will diminish to unacceptable Level of Service (LOS E and F) under full development	○	• intersection Level of Service at all intersections will be unacceptable under full development without traffic signals • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	◑	• will provide acceptable Level of Service at all intersections under full development • intersection Level of Service at Gormanville Road will be acceptable with traffic signals • left turns into Cartier Street and McNamara Street will improve as a result of additional traffic lanes and left turn lanes • Level of Service for left turns out of Cartier Street and McNamara Street will be poor without traffic signals at one or both locations	●
Traffic Operations	• existing traffic experiences some stoppages and interruptions to flow especially at McNamara Street and major driveways • stoppages and interruptions will increase notably over next 5 years	○	• flow of traffic from Algonquin Avenue to Cartier Street will continue to deteriorate with increasing conflicts between through traffic and left turning vehicles • flow of traffic from Cartier Street to Gormanville Road will improve but traffic flow will be delayed at intersections and driveway entrances by left turning vehicles in the inside through lane	◑	• flow of traffic will improve as conflicts between left turning vehicles and through traffic are reduced with a fifth centre turn lane	●
Summary Evaluation		○		◑		●
SAFETY						
Accidents	• existing high accident locations will continue to worsen at Champlain Street, Tim Horton's and McNamara Street over time as traffic increases	○	• existing high accident locations will continue to worsen at Champlain Street and Tim Horton's • no improvement would occur at McNamara Street	◔	• left turn lanes at intersections and the continuous two-way left turn lane will improve safety, eliminating high accident intersections	●
Safety of Access	• ease of access to and from entrances and side streets will continue to deteriorate over time and will result in greater risk of accidents	○	• ease of access to and from entrances and side streets from Algonquin Avenue to Cartier Street will continue to deteriorate over time in terms of delays and safety	◔	• ease of access to entrances and side streets is improved over 4 lane alternative by providing safe storage for left turning vehicles • traffic signals will ensure left turn access to McKeown Avenue from side streets and driveways	●

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
Pedestrian Safety	• existing sidewalk on north side from Ontario Government Building to Algonquin Avenue accommodates existing pedestrian movements • as development proceeds pedestrian access to and from the south side will be difficult at unsignalized intersections • does not provide sidewalk access along the south side of McKeown Avenue; this will become more important as retail development occurs on south side	○	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along the street • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●	• existing sidewalk on the north side of McKeown Avenue and new sidewalk on the south side will provide safer pedestrian access between locations along McKeown Avenue • timing of sidewalk construction on the south side can be delayed until required as development proceeds as a condition of approval and as property is acquired • as development proceeds pedestrian access to and from the south side will be improved at signalized intersections	●
Summary Evaluation		○		◑		●
LAND USE						
Conformity with Existing and Future Planned Land Uses	• will maintain existing conditions which would not support higher traffic generation by new uses as approved by City	○	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • supports Official Plan direction for future development of the study area	◕	• improved capacity of street and access to adjacent properties will encourage future development to highest and best use of properties • most supportive of Official Plan direction for future development of the study area	●
Summary Evaluation		○		◕		●
SOCIO-ECONOMIC ENVIRONMENT						
Property	• no property acquisition required • no change to existing business entrances are required	●	• additional right-of-way will be required to provide for daylighting at the Gormanville Road and Champlain Street intersections • additional right-of-way width will be required along the south side of McKeown Avenue • property requirements affect 11 properties • no changes to existing business entrances are required	◕	• additional right-of-way will be required to accommodate the proposed widening and intersection improvements • property requirements range from approximately 1 m to 4.5 m in width affecting 19 properties • affects 3 existing entrances at Tim Horton's, Leon's and Canadian Tire	◑
Noise	• no sound level changes as a result of reconstructed roadway (road lane configuration remains unchanged) • predicted changes in sound levels of 4 dBA over existing ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑	• sound level changes as a result of the reconstructed roadway will be approximately 1 dBA, however, this is not perceptible to the human ear • predicted changes in sound levels of 4 dBA over ambient sound levels at residential receptors due to increases in traffic volumes under the full development scenario. This increase would be a noticeable increase.	◑
Aesthetics / Visual Impact	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑	• provides a minor improvement to the aesthetics of the streetscape	◑
Summary Evaluation		◕		◑		◑

Factor/Alternative	Reconstruct Existing 2 Lanes / 4 Lanes	A	4 Traffic Lanes	B	5 Traffic Lanes	C
NATURAL ENVIRONMENT						
Water Management	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●	• storm sewer system throughout • storm sewer system discharges to existing outlets • erosion and sedimentation control plan will be incorporated into the design and construction	●
Air Quality / Fuel Consumption	• projected increase in congestion will increase air pollution, however, not significantly	◑	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	◕	• greater roadway capacity will result in lower fuel consumption and improvement to air quality	●
Summary Evaluation		◕		◕		●
COST						
Annual Maintenance	this alternative has the lowest annual maintenance costs	●	this alternative would cost more to maintain than alternative A and would cost less than alternative C to maintain.	◔	this alternative has the highest annual maintenance costs	○
Construction	$ 1,060,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	●	$ 2,780,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	◔	$ 3,400,000.00 • does not include improvements to existing storm sewer, sewermains or watermains	○
Utility Relocation	• not required	●	• not required	◔	• minor relocation of North Bay Hydro and Ontario Hydro pole line and shared Bell and Cable TV plant on the south side of McKeown Avenue.	○
Summary Evaluation		●		◔		○
PUBLIC PREFERENCE						
Public Preference	see comments - Alternative "C"	◑	see comments - Alternative "C"	◕	Overall comments received at the two Public Information Centres indicated an understanding that the recommended improvements were needed. (Alternative C)	●
Summary Evaluation		◑		◕		●
Overall Evaluation	Least Preferred	◑		◕	Most Preferred	●

4.4.1 Transportation

Alternatives C and B provided significantly greater roadway capacity, intersection level of service and traffic operations benefits over Alternative A. The existing 4 lane roadway from Algonquin Avenue to Champlain Street is currently at capacity and the existing 2 lane roadway from Champlain to Gormanville will be at capacity in 5 years. The operation of all intersections would diminish to an unacceptable Level of Service (LOS E and F) under full development conditions. Alternative A was rated least preferred.

The projected future traffic volumes require McKeown Avenue to be a five lane roadway from Algonquin Avenue to the Ontario Government Building. From the Ontario Government Building to Gormanville Road the need for five lanes is less definite, but since the required tapers would reduce the four lane section to minimal length and provide minimal cost savings, it is proposed that the five lane section be continued through to Gormanville Road.

The added capacity of 5 lanes throughout would provide better traffic flow and result in fewer conflicts than 4 lanes. Traffic flow with Alternative B would tend to deteriorate with increasing conflicts between through traffic and left turning vehicles. Overall, Alternative C is preferred over Alternative B.

4.4.2 Safety

Alternative C provides the most preferred design in terms of transportation safety. Alternatives A and B maintain the existing high accident locations which would tend to worsen as traffic increases in the future. The added centre left turn lane in Alternative C would improve safety for left turning vehicles at intersections and at mid-block locations where conflicts between through traffic and left turning vehicles would occur without the centre left turn lane (Alternative B).

4.4.3 Land Use

Alternative C provides the most support for the desired future land use in the study corridor. The five lane roadway would be attractive for new development/redevelopment in the form of new district commercial and highway commercial along McKeown Avenue.

4.4.4 Socio-Economic Environment

Overall, Alternatives A, B and C were similar in the evaluation of socio-economic factors. Sound level changes were predicted to be similar for all alternatives and no differences in the aesthetics of the alternatives were identified. Alternative A was slightly more favoured over Alternatives B and C as the design would involve no property requirements.

Property requirements were greatest with Alternative C; however, the impact of property required for the road widening is minor overall and does not compromise the development potential of affected properties. The amount of property required generally involves narrow strips (not exceeding a width of 4.5 metres) along the south side of the street and small day lighting triangles at intersections. The inventory of property requirements for Alternatives B and C is included in Appendix 5.

4.4.5 Natural Environment

All alternatives were similar in the evaluation of the natural environment factor. Impacts that were identified for the road widening and culvert extension into Pinewood Parkway Creek associated with

Alternative C were minor and could be mitigated. Overall, Alternative C was slightly more preferred over Alternatives A and B as this alternative would reduce traffic congestion, result in lower fuel consumption and provide marginal air quality benefits.

4.4.6 Cost

Alternative A was most preferred, having the lowest construction and maintenance costs. Alternative C was the most costly option in terms of its construction and maintenance costs. However, Alternative B only ranked slightly ahead of Alternative C, with the difference being the $620,000 cost to construct the centre left turn lane.

4.4.7 Public Preference

Overall, public comments received at the two Public Information Centres indicated support for the recommended improvements (Alternative C) to McKeown Avenue in the Study Area. There were, however, insufficient comments received to indicate if one alternative was strongly preferred over the others. Alternative C was rated as only slightly more favoured than Alternatives A and B.

4.4.8 Overall Evaluation

Overall, in considering the detailed evaluation and taking into account ratings for the individual environmental factors, Alternative C was preferred over Alternatives A and B. The technical assessment and evaluation shows that the benefits of Alternative C outweigh its disadvantages to the environment which are minor and can be mitigated. Alternative C is the Study Team's recommended solution.

4.4.9 Proponent's Selection of Preferred Solution

The Study Team's recommended solution was endorsed by Council as the preferred solution by Resolution No. _____ on _____, 2001.

CHAPTER 5 - RECOMMENDED DESIGN AND CONSTRUCTION REQUIREMENTS

5.1 RECOMMENDED DESIGN

The following sections provide information on the recommended design alternative for McKeown Avenue. It provides preliminary engineering recommendations on the design plan, alignment, cross-section and intersection details.

5.1.1 Recommended - Plan

The recommended design is Alternative C. The plans for the alternative are illustrated in the three Exhibits 8, 9 and 10 (see Chapter 4) and on larger scale plans enclosed in the rear pocket of this report.

- Alternative C - Drawing No.1 - McKeown Avenue from Gormanville Road easterly to west of McNamara Street
- Alternative C - Drawing No.2 - McKeown Avenue from west of McNamara Street easterly to west of Champlain Street
- Alternative C - Drawing No.3 - McKeown Avenue from east of Cartier easterly to Algonquin Avenue

The recommended alternative provides for two lanes of travel in both directions, as well as a centre left turn lane. The design will provide an acceptable level of service for the anticipated future growth in traffic on McKeown Avenue.

McKeown Avenue from Gormanville Road easterly to west of McNamara Street (Alternative C, Exhibit 8, Drawing No. 1)

This section of roadway is presently a two lane roadway with curb and gutter. There are no additional lanes at intersections or at property entrances. The roadway drainage is by open ditches and by curb and gutter which is collected to a short section of 21 inch diameter storm sewer which discharges to an open ditch along Gormanville Road.

McKeown Avenue will be reconstructed in this section to a five lane urban cross-section. The cross-section provides two lanes in both directions of travel as well as additional turning lanes at Gormanville Road. A continuous centre fifth lane for left turns will accommodate left turning vehicles at the Ontario Government Building and will provide capacity in the roadway in the event that adjacent vacant lands are developed which would add additional traffic and new turning movements to commercial entrances on the street.

McKeown Avenue from West of McNamara Street easterly to west of Champlain Street (Alternative C, Exhibit 9, Drawing No. 2)

This section of roadway is presently a two lane roadway with an urban curb and gutter cross-section. Two side streets, McNamara Street and Cartier Street, intersect McKeown Avenue on its north side at "T" intersections. There are presently four entrances on the north side of the street serving apartment building/townhouse complexes and twelve commercial entrances on the south side which

serve a variety of industrial and commercial establishments. Drainage is by curb and gutter and storm sewer which outlet to Pinewood Parkway Creek on the west side of the Hopper Pontiac Buick GMC dealership.

McKeown Avenue in this section will be reconstructed from a two lane cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a continuous centre left turn lane to accommodate left turning vehicles at street intersections, existing apartment/townhouse complexes, commercial and industrial properties. Drainage will be by curb and gutter to storm sewers which outlet to an existing outlet at Pinewood Parkway Creek.

McKeown Avenue West of Champlain Street to Algonquin Avenue
(Alternative C, Exhibit 10, Drawing No. 3)

This section of roadway is presently a four lane roadway with an urban cross-section that was constructed in 1992. There are two side roads in this section, Champlain Street, which is a cross street, and Josephine Street, which connects to McKeown Avenue at a "T" intersection from the south. There are presently four commercial entrances on the north side serving the Wendy's Restaurant, the west and east entrances to Tim Horton's, which also serve as the Algonquin Square Mall west entrances, and the east entrance to the shopping mall and McDonald's Restaurant. Four entrances exist on the south side including the entrance west of Champlain Street to the Canadian Tire store, the McKeown Avenue entrance to the City of North Bay Fire Hall, and the entrance to the rear of Leon's Furniture Store between Josephine Street and Algonquin Avenue. Drainage is by curb and gutter and storm sewers which flow west along McKeown Avenue to Pinewood Parkway Creek at McKeown Avenue except for the area immediately adjacent to the McKeown Avenue/Algonquin intersection which flows to Chippewa Creek.

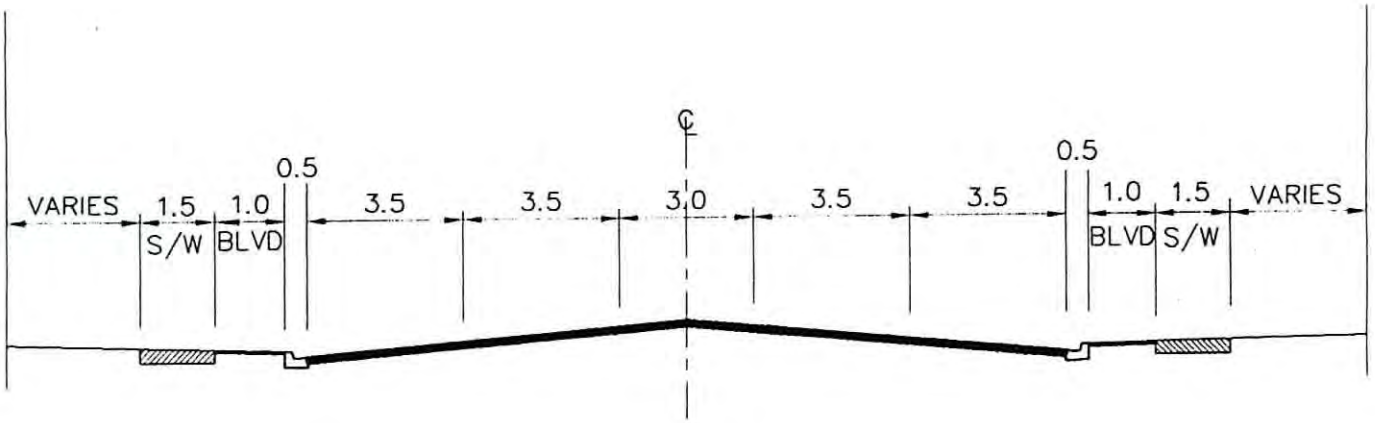
McKeown Avenue will be reconstructed in this section from a four lane urban cross-section to a five lane urban cross-section. The cross-section will provide two lanes in both directions of travel and a centre left turn lane. Additional lanes for acceleration or deceleration and turning lanes are included in the design.

5.1.2 Recommended Design - Cross-Section

The proposed cross-section includes four 3.5 metre driving lanes, a 3.0 metre centre left turn lane, curb and gutter, boulevard and sidewalk. The 3.0 metre centre left turn lane is continuous throughout McKeown Avenue from Algonquin Avenue to Gormanville Road except at signalized intersections where the lane becomes an exclusive lane for intersection left turn movements. The cross-section specifications are listed below and are shown on Exhibit 14.

Side-walk	Blvd	Curb and Gutter	Driving Lane	Driving Lane	Left Turn Lane	Driving Lane	Driving Lane	Curb and Gutter	Blvd	Side-walk
1.5 m	1.5-1.75	0.5 m	3.5 m	3.5 m	3.0 m	3.5 m	3.5 m	0.5 m	1.5-1.75	1.5 m

The cross-section provides a 1.5 m sidewalk on both the north and south sides of McKeown Avenue and a boulevard of varying width between the sidewalks and edge of curb. The area beyond the sidewalk will be suitably graded and landscaped to fit adjacent properties.



FIVE LANE ROADWAY

Exhibit 14 - CROSS-SECTION

5.1.3 Cross-Section and Property

The proposed cross-section is a minimum 25 metres wide including allowances for boulevards and right-of-way. The cross-section will require minor property acquisition from adjacent parcels throughout most of the project limits for lane widening and day lighting at intersections. An inventory of property required is included in Appendix 5.

5.1.4 Storm Drainage

Storm drainage will be provided by three existing storm sewer systems that run from Algonquin Avenue and the Ontario Government Office Building to Pinewood Parkway Creek and from the Ontario Government Building to open ditches along Gormanville Road. A third system drains the Algonquin Avenue/McKeown Avenue intersection area to Chippewa Creek.

5.1.5 Traffic Signals

New traffic signals are recommended at Josephine Street to coincide with new development in the area and at Gormanville Road. In the future, traffic signals may also be required at McNamara Street.

5.1.6 Illumination

There is existing illumination from east of McNamara Street through to Algonquin Avenue. The existing illumination from Algonquin Avenue to Cartier Street was replaced with the realignment of McKeown Avenue in 1993. The existing illumination will be upgraded where required and new illumination will be provided to Gormanville Road.

5.1.7 Utilities

Ontario Hydro, North Bay Hydro, Bell Canada and Union Gas will be contacted at the detail design stage for review and approval of the final design drawings.

5.1.8 Underground Infrastructure

5.1.8.1 Sanitary Sewer and Watermains

There have been no reported deficiencies in either of these services either due to capacity or maintenance related issues. However, due to the current age of these services we would recommend that further investigation be undertaken to confirm their adequacy in terms of structural integrity and system capacity prior to the commencement of design. No costs have been assigned in our estimate for the replacement of these services.

5.1.8.2 Stormwater

Storm Sewer - Remedial Measures

Due to the deficiencies in capacity of the existing storm sewer system and outlet, the following works should be given consideration.

(a) Perform remedial work on the downstream drainage system as recommended in the Pinewood Fingers Park study. The remedial work recommended included improvements to the Pinewood Creek System, diversion of part of the flow to the Duschenay Creek System or a combination of both. This work needs to provide a free outlet to the gravity storm sewer system to be effective.

(b) Provide relief to the existing storm sewer system on McKeown Avenue by:

(i) Regrading the existing storm sewer and or providing an additional storm sewer within the right-of-way with an interconnection between both of them when the roadway is reconstructed or widened in the future; or

(ii) Accepting the concept of overland flow down McKeown Avenue with flooding of the road and possibly adjacent currently developed properties; or

(iii) A combination of storm sewer relief via an additional piped system and overland flow.

(c) It is recommended that some type of backflow prevention system be installed on the existing properties that are connected to the existing storm sewer and are experiencing flooding as well as all future development where it is deemed necessary and it should also be ensured that all new developments in this corridor employ Stormwater Management techniques to ensure that post development flow is equal to pre-development flow.

Stormwater Management Issues

Quantity

Due to the changes in the design standards and increase in runoff coefficients for the storm sewer associated with new development within the municipality, as mentioned previously, and the current requirements with respect to water quality and quantity, it is imperative that future developers make provisions to accommodate increased stormwater by means of on-site stormwater management plans. The same scenario should be applied to municipal lands where an increase in stormwater is generated. These stormwater management plans would need to demonstrate that any increase in flow, as a result of development, would be detained and released in a controlled fashion.

For private development, the municipality currently has the controls in place (site plan and subdivision agreements) to ensure that proper stormwater management occurs. We recommend that due to current capacity problems that detention of flows occur as close as possible to the point of origin.

The municipality will be required to detain stormwater due to the increase in hard surface with the new proposed increase in road width. The options to the municipality are:

- Since there are no municipally owned lands available within the right-of-way to create a storm detention area, it will be necessary to obtain these from potential developers. These lands would best be obtained during the development stage, as part of the development agreement for each parcel, rather than purchased directly by the municipality. Should the municipality wish to purchase these lands in advance, this procedure would place the onus of maintenance on the municipality.

- An additional option would have the developer increase the amount of post-development flow that they detain on site to include a portion of the 1.0 ha of increase in hard surface. Based on approximately 13 ha of land yet to be developed, this would require each developer to accommodate an additional 0.075 ha of hard surface of land in their stormwater management plan for each hectare of land that is the subject of their development proposal. Should there

be a time lapse between the property development and the improvements to the road it may be necessary to negotiate with earlier developer's to accommodate more storage in order to ensure that the flows are not increased.

- Should the municipality decide not to provide detention for the increased flow that it generates at or near the point of origin, the potential exists to provide some storage between the outlet of the 66 inch storm sewer and the Highway 17 cross-culvert on land currently owned by the Management Board Secretariat (Part 2 of Plan 36R-8858). This property could accommodate approximately 6000 cubic metres of water which would exceed the increased flow for the 100 year storm and the increased hard surface for municipal lands. While this option provides no relief to the capacity of the existing storm sewer or the surcharging experienced at the outlet it will meet the requirements for storage of the increased flow at least for that portion of Pinewood Creek below the Highway 17 culvert.

Stormwater - Quality Issues

The existing drainage system consists of a system of pipes, culverts and rechannelled sections throughout this catchment. The entire drainage course has been altered and, therefore, the potential for fish production is low. This type of drainage course is considered to require Level 3 protection. However, we have been advised that there is strong potential for walleye spawning and fish feeding areas at the outlet of the drainage course to Lake Nipissing and; therefore, recommend that Level 2 Protection, as a minimum, be applied to any development in this area.

Cost Estimates

The costs associated with

- Improvements to the Pinewood Creek drainage system are identified in the City's Pinewood Fingers Park Study.

- Providing relief to the storm sewer system in the way of an additional parallel storm sewer ranges between $1,500,000 to $2,000,000.

- Associated with a pond on Part 2 of Plan 36R-8858 is approximately $150,000 exclusive of land purchase.

5.1.9 Construction Staging

The improvements associated with the recommended alternative will likely be staged over a number of years as all of the capacity improvements are not expected to be warranted at the same time. The recommended timing for improvements is based on traffic volumes, identified capacity deficiencies which exist now and the sequence in which capacity shortfalls are expected to occur.

McKeown Avenue from Algonquin Avenue to Champlain Street

The analysis of existing traffic volumes and accident statistics indicate **an existing need** to provide a fifth centre left turn lane within this section of roadway. The improvements can be timed to coincide with the development of vacant lands along the corridor or with the redevelopment of existing properties.

McKeown Avenue from Champlain Street to Gormanville Road
There will be **a future need** to provide a fifth centre left turn lane within this section of roadway with two through lanes in each direction to provide sufficient capacity over the planning period with full development. The timing for the recommended improvements from Cartier Street to Gormanville Road will be warranted as new development occurs in the corridor west of Champlain Street.

McKeown Avenue/Gormanville Road/College Drive Intersection
It is expected that **traffic signals will be warranted at the intersection within the next few years.** The left turns from McKeown Avenue onto Gormanville Road are facing long queues and delays at peak hours (Level of Service F). It is recommended that the intersection be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

5.2 RECOMMENDED DESIGN - POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

5.2.1 Natural Environment
Impacts to the natural environment as a result of the proposed work are minor as the reconstruction will be limited to roadway widening of approximately 5 m on the south side within a highly urbanized environment.

The road widening will require a 5 metre extension (approximate) of a 66 inch diameter storm sewer which would result in enclosing an open section of Pinewood Parkway Creek for the 5 metre length. The extension would most likely consist of adding the required length of 66 inch diameter precast reinforced concrete pipe, a new concrete headwall with end grade and stream bed armouring with rip rap for long term erosion protection. Although the creek at this location does not contain critical fish habitat (eg. spawning areas), it is an open natural channel that supports warmwater minnow species. The creek outlets at the Lake Nipissing shoreline which is known to support walleye spawning and the creek and downstream waters could be affected by sedimentation generated by upstream construction activities.

It is recommended that the construction of the storm sewer extension occur in low flow conditions. If it becomes necessary, standard construction practices to temporarily dam or dam and pump flows for dewatering of the work area could be employed and specified in contract documents. It is also recommended that a detailed erosion and sedimentation control plan be prepared for the entire project identifying controls to be employed before, during and after construction. Consideration should be given to incorporating silt fence barriers along both banks of Pinewood Parkway Creek at McKeown Avenue and straw bale flow checks in the open ditches discharging to the creek.

When detailed design drawings are available and before construction proceeds, the drawings should be submitted to the appropriate public authority to finalize mitigation plans.

5.2.2 Social Environment
The overall adverse impacts associated with the recommended improvements are minor. There will be some noise impacts with this project due to the increases in traffic. The residential areas on the north side of McKeown Avenue are recognized as sensitive noise receptors and a Noise Impact

Assessment completed in May 1999 indicated that:

> *"The existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less than the Ministry of Environment desirable Criteria of $L_{eq\ (16)}$ 55dBA. Traffic volumes in the future as a result of the expansion in traffic will increase the sound levels by about 4dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other roadway mitigation are not possible or feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.*
>
> *The conclusion of the noise study is that noise will increase as a result if expected increases in the traffic but would remain within acceptable levels. Barriers and other devices on the right-of-way are not required or feasible."*

The selected alternative has a number of features which provide social benefits to the residents of the area and to road users. There will be a decrease in driver frustration with reduced congestion of the roadway. Traffic signals at intersections will provide for safer turning and allow through vehicles to pass safely in the additional lane. Vehicles will move through the area quicker and with increased safety. It is expected that there will be a reduction in the number of accidents at the intersections and entrances as a result of this project.

The road will be illuminated and should result in safer pedestrian movements through the area with sidewalks on both sides of the street.

5.2.3 Property

The recommended design will involve land acquisition from adjacent properties. The property requirements were identified using the best information available to the Study Team including preliminary engineering design drawings of the recommended alternative, assessment base mapping and existing Plan and Profile drawings of McKeown Avenue supplied by the City of North Bay.

The property requirements should not be considered to be survey accurate. Prior to construction, and when detailed Plan and Profile drawings of the recommended design are available, a legal survey will be prepared to finalize property requirements.

Where property is acquired for public road allowance by the City of North Bay, it is the policy of the City to negotiate fair and full compensation based on current appraised value in accordance with the provisions of the Expropriations Act.

5.3 RECOMMENDED DESIGN - SPECIFIC CONSTRUCTION REQUIREMENTS

There are no site specific conditions which require special consideration over and above those that are normally prescribed for a project of this nature.

5.4 SUMMARY OF PUBLIC COMMENTS AND RESPONSES

The study process included extensive public consultation and review which was previously described in Chapter 2. The comments and concerns brought forward in the study are summarized in the following table:

Commenter / Study Participant	Comments / Concerns	Response
Willis Enterprises Ltd.	- owner of vacant parcel on south side of McKeown Avenue - concerned about future access to the property from McKeown Avenue and the amount of property required from the parcel for road widening - Q. Will the City of North Bay pay compensation for the property acquisition to accommodate the road widening? - Q. Will the widening and reduced lot area affect the development potential of the remaining parcel? - Q. Will access to the property from McKeown Avenue be approved in the future?	- study team members met with the owner at both PICs and at a follow up meeting with the City of North Bay - answers to the questions/concerns were provided at the meetings and in correspondence to the owner (Northland Engineering letter to Willis Enterprises dated July 7, 1999) - no further action required
James W. Neil Investments	- owner of developed industrial parcel on south side of McKeown Avenue (Techni Data Training) - requested information on the amount of land required with the recommended alternative	- plan of Alternative C showing the property requirements was provided
D.J. Venasse Construction Ltd.	- owner of developed parcel on south side of McKeown Avenue - expressed concerns regarding the impact of the proposed Alternative on a newly severed property - requested that any new development fees for road improvements be calculated on an area and not road frontage basis	- the owner was provided with correspondence from Northland Engineering (dated July 14, 1999) and from the City of North Bay (dated August 18, 1999) on what action was to be taken to maintain the severed parcel size with the road widening - Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA Study is completed. - no further action required

Commenter / Study Participant	Comments / Concerns	Response
Algonquin Square Mall	- owner concerned that future special area charges should not apply to new development on the Algonquin Square Mall lands as road improvement contributions were already provided to the City - identified that the consolidation of the commercial entrances to Tim Horton Donuts/Algonquin Mall would impact access to the property	- the Class EA Study will determine cost estimates for the required road improvements. The preparation of a by-law to recover costs is a separate process to occur after the Class EA is completed - the two existing entrances would be consolidated and replaced with a new signalized intersection at Josephine Street which would provide controlled access into the property - preliminary sketches identifying how the internal driveway and parking would fit with a new intersection were supplied by Tranplan Associates - no further action required at this time
J.S. Redpath Limited	- owns property on the south side of McKeown Avenue - requested to be kept informed of the study	- contact name was kept on the mailing list to receive notices
Hopper Pontiac Buick GMC	- requested to participate in study	- contact name was kept on mailing list to receive notices
McDonald's Restaurant	- requested to receive notice of meetings for the study	- contact name was kept on mailing list to receive notices
Leon's Furniture	- requested copy of the McKeown Avenue/Josephine Street Traffic Study - identified a concern that access to the property from McKeown Avenue be maintained	- copy of the study was provided as requested - recommended centre left turn lane would allow access to the existing rear entrance. Left turn arrows were added to the design drawing to indicate the turning movement
Multidev de l'Outaouais	- requested notices and copies of the recommended road improvements	- plans were provided - contact name was kept on the mailing list to receive notices
Ontario Hydro	- requested detailed design drawings of the recommended road improvements - concerned that incompatibilities between the road improvements and the Ontario Hydro transmission line be identified and addressed prior to approval of detailed engineering design	- contact at detail design stage for Ontario Hydro review and approval of design drawings
Bell Canada	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Bell Canada review and approval of design drawings

Commenter / Study Participant	Comments / Concerns	Response
Union Gas	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for Union Gas review and approval of design drawings
North Bay Hydro	- supplied drawings of existing facilities within the study area road allowances	- contact at detail design stage for North Bay Hydro review and approval of design drawings
North Bay-Mattawa Conservation Authority	- requested detailed design drawings of the recommended improvements to storm sewer outlets affecting Pinewood Parkway Creek	- contact at detail design stage for Conservation Authority review of recommended erosion and sedimentation control plan
Ministry of Citizenship, Culture and Recreation	- provided clearance that no archaeological study was required	- no further action required
Ministry of Transportation	- was consulted and provided input on what design considerations were required to integrate MTO interests into the design alternatives for the Class EA	- on-going involvement of MTO during detailed design stage

CHAPTER 6 - MONITORING

Contract supervision should be provided during construction to monitor work in progress and ensure that the recommended mitigation measures in this report and which are incorporated into the detailed design and contract package are carried out.

APPENDIX 1

PUBLIC CONSULTATION

Public Notices
PIC Attendance
Mailing List

NOTIC. OF STUDY COMMEN EMENT
CLASS ENVIRONMENTAL ASSESSMENT
McKeown Avenue from Gormanville Road to Algonquin Avenue
CITY OF NORTH BAY

The City of North Bay passed Resolution No. 20 on December 7, 1998 which gives direction to conduct an environmental assessment study and associated traffic planning and design study for McKeown Avenue from Gormanville Road to Algonquin Avenue. Accordingly, the City is commencing a study to identify any required improvements on McKeown Avenue in accordance with the Schedule 'C' planning requirements of the Class Environmental Assessment for Municipal Roads.

The study will examine the development potential of the study area and determine the impacts that this development will have on the capacity of the existing road system. Options to alleviate the problems will be investigated and recommendations made for improvements. The primary study area is indicated on the key plan attached to this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City in 1996.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct this study on behalf of the City of North Bay. The study team will present their findings to the general public at two Public Information Centres. The first Public Information Centre will be held in the spring. The date, time and location will be advertised in the local paper.

If you would like to participate in the study process or to obtain further information, please contact

Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre St. East
NORTH BAY, ON, P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P.Eng. **Or** **Mr. Dave Richards, P.Eng.**
Tranplan Associates **Northland Engineering (1987) Limited**
1850 Bond Street
NORTH BAY, ON, P1B 8G5
Telephone: 474-2720

NOTICE

Notice of Public Information Centre — Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and options to alleviate identified problems will be displayed at a Public Information Centre (PIC) at the following location:

Location: Main Foyer, City Hall, 200 McIntyre Street East
Date: Wednesday, April 14, 1999
Time: 4:30 p.m. to 8 p.m.

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

Please note that this study deals with McKeown Avenue west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

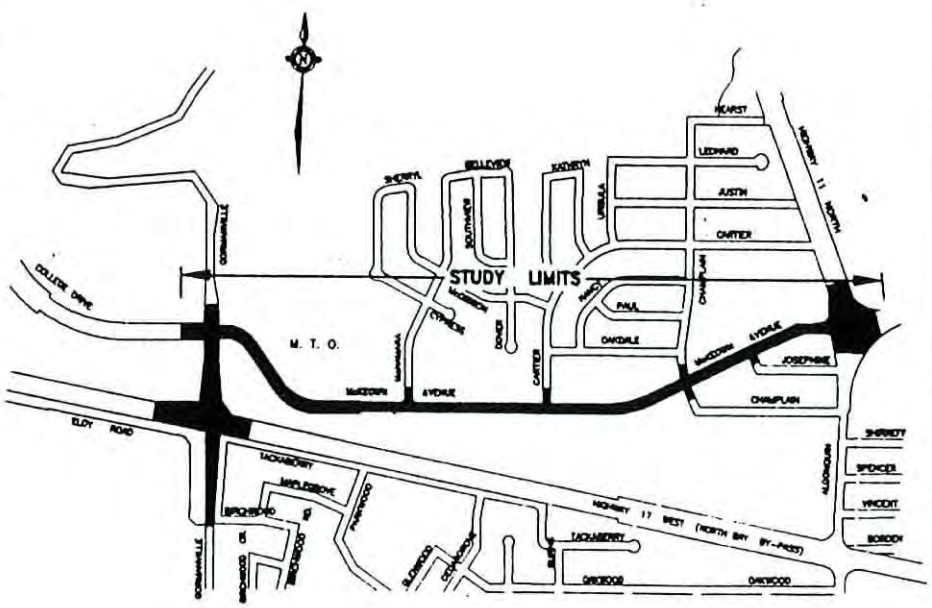
Mr. John Simmonds, P.Eng.
City Engineer
City of North Bay
200 McIntyre Street East
NORTH BAY, ON P1B 8H8
Telephone: 474-0400 Ext. 308

Mr. Toivo Rukholm, P. Eng.
Tranplan Associates
Telephone 474-2720

Or

Mr. Dave Richards
Northland Engineering
(1987) Limited

1850 Bond Street
NORTH BAY, ON P1B 8G5
Telephone: 474-2720



NOTICE

Notice Of
Second Public Information Centre
Class Environmental Assessment
McKeown Avenue From Gormanville Road to Algonquin Avenue

The City of North Bay has initiated a Class Environmental Assessment and associated Traffic Planning and Design Study for McKeown Avenue from Gormanville Road to Algonquin Avenue. The primary study area is shown on the key plan below. This study is being conducted as a Schedule C project in accordance with the requirements of the Class Environmental Assessment for Municipal Road Projects.

The purpose of the study is to examine the development potential of the study area and determine the traffic impacts that any future development will have on the capacity of the existing road system. Results of the traffic study to date indicate that the existing McKeown Avenue roadway is inadequate to accommodate future traffic. Preliminary study results and road improvement alternatives will be displayed at a second Public Information Centre (PIC) at the following location:

Location: **Main Floor, City Hall, 200 McIntyre St. East**
Date: **Wednesday, June 2, 1999**
Time: **4:30 p.m. to 8 p.m.**

The road improvement alternatives under consideration include reconstructing McKeown Avenue to its current 2 lane and 4 lane configuration (Alternative A), widening McKeown Avenue to 4 traffic lanes throughout (Alternative B) and widening McKeown Avenue to 5 traffic lanes throughout (Alternative C).

Tranplan Associates, in association with Northland Engineering (1987) Limited, have been retained to conduct the study on behalf of the City of North Bay. The Study Team will be available to discuss the study at the Public Information Centre. Interested parties may provide written comments to the Study Team at the address below within 30 calendar days from the date of this notice.

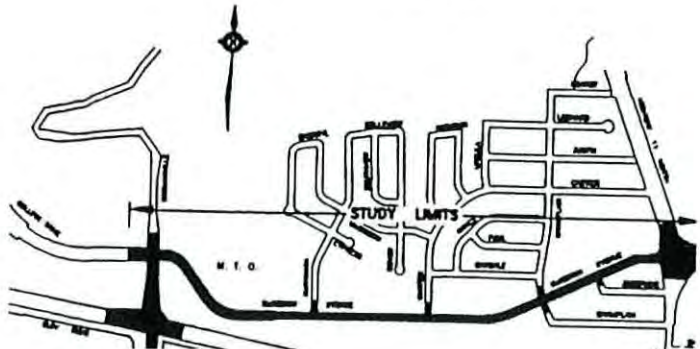
Please note that this study deals with McKeown Avenue, west of Algonquin Avenue and is not related to the Cross-Town Arterial Class Environmental Assessment which was undertaken by the City of North Bay in 1996.

If you would like to participate in this study or to obtain further information, please contact:

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Telephone: 474-2720

Mr. Dave Richards
Northland Engineering
(1987) Limited
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North Bay ON P1B 8G5
474-2720



APPENDIX 2

NOISE IMPACT ASSESSMENT

NOISE IMPACT ASSESSMENT

NEL 4351 - MCKEOWN AVENUE, NORTH BAY

FROM GORMANVILLE ROAD
EASTERLY TO ALGONQUIN AVENUE

prepared for the

CITY OF NORTH BAY



May 21, 1999

northland
engineering
limited
north bay sudbury

EXECUTIVE SUMMARY

NOISE IMPACT ASSESSMENT
CITY OF NORTH BAY - MCKEOWN AVENUE, NORTH BAY

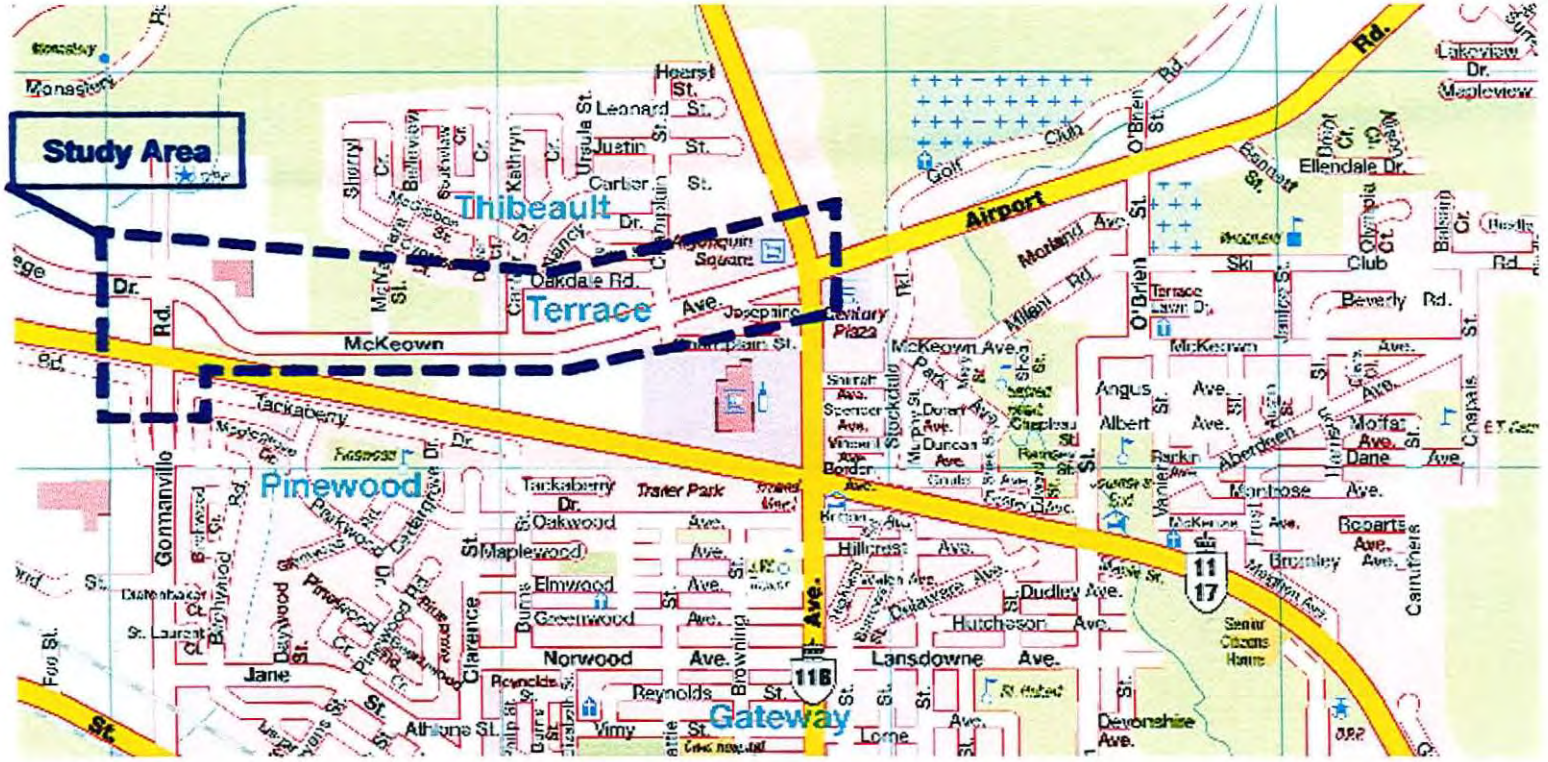
From Gormanville Road
Easterly to Algonquin Avenue

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

KEY PLAN



MCKEOWN AVENUE FROM GORMANVILLE TO ALGONQUIN AVENUE
TRAFFIC PLANNING STUDY - NOISE ASSESSMENT STUDY

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1.0 INTRODUCTION

1. This report analyzes the 1999 sound levels resulting from the 1999 traffic volumes on McKeown Avenue and the associated side streets, of McNamara Street, Cartier Street and Champlain Street. It compares these levels with the future full development scenario traffic volumes for the McKeown Avenue corridor.

2. The purposes of the study are to:

   - To determine the potential changes to the ambient environment due to the proposed widening and reconfiguring of traffic lanes on McKeown Avenue and the adjacent side streets.

   - To assess the significance of the changes, and to recommend mitigation appropriate to the increases if necessary.

3. At the present time McKeown Avenue is four lanes from Algonquin Boulevard to Cartier Street. The section from Cartier Street over to Gormanville Road is two lanes.

4. The future traffic predictions are based on the proposed five lane section - four through lanes with a continuous left turn in the middle to accommodated left turns for both directions of travel.

5. The predictions in this report are based on traffic volumes for the present traffic volumes and predictions traffic volumes prepared by Tranplan Associates.

6. The sound level predictions were made using STAMSON. This is a computer version of the road and rail noise prediction methods contained in ORNAMENT (Ontario Road and Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). This project used the road's portion of this program to make the prediction for present and future traffic in the corridor. Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

2.0 SOUND LEVELS CRITERIA

2.1 MOE/MTO Protocol

The MOE/MTO protocol is a joint effort of both the Ministry of the Environment (MOE) and the Ministry of Transportation (MTO) as outlined in the document titled "a Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of the Provincial Highways Environmental Assessments," Feb. 1986. It primarily applies to Provincial Highways undertaking such as Freeways and Kings Highways

The MOE has informally extended the use of the MOE/MTO protocol criteria to also embraced other roadways, such as the Regional and local Municipal roads subject to the provisions of the Environmental Assessment Act (EAA) administered by the MOE. Since there is no formal direction published by the MOE on the protocol application, it is recommended that the same directions with regards to mitigation applies to the MTO projects be applied also for this Municipal project. The criteria which should apply to this and other municipal projects, is a review of mitigation within the roadway road allowance. The noise impacts assessment should be reviewed for the Outdoor Living Area (OLA). The protocol does not specify whether the L_{eq} sound levels should be 24-hour based or some other time frame, the MOE extended the appropriate technical logic to municipal roads by requesting calculations be done on the basis of the daytime $L_{eq\,(16)}$ dBA[1].

To ensure that the assessment covers the most significant sound levels, predictions are made in this the assessment on the 16 hour time frame from 07:00 to 23:00 hours. This is considered the day time hours. As this an urban residential areas and commercial industrial area we have assumed 90% of the traffic is in this time frame. For purposes of determining the traffic needs for this roadway Tranplan Associates developed traffic volumes for the Design Hour Volume (DHV). These figures are 10% of the Annual Average Daily Traffic (AADT) traffic volumes.

The study also calculated the sound levels which would be experienced under the Design Hour Volume flows for comparison against the 16 hours volumes. There is a slightly higher level of 2 or 3 dBA using the DHV versus the 16 hour volumes. The increases from now to future are about the same using either method. For the purposes of the evaluation the 16 hour volumes were used, and is more representative of the sound levels experienced in this residential area, and in keeping with the latest Ministry of the Environmental Guidelines "Noise Assessment Criteria in Land Use Planning LU-131, October 1997, and its ancillary publications. The other point worth noting is that despite the presence of Provincial objective the outdoor levels of L_{eq} 55

---

[1] The sound levels in this report are all report in $L_{eq\,(16\ hour)}$ dBA. This is the 16 hour time frame from 07:00 to 23:00, reported in dBA which is the A weighted sound scale which best represent the hearing of the human ear. For purposes of simplification and convenience in the report figures will be reported as L_{eq} dBA the 16 hours will be assumed unless noted otherwise.

dBA[2], 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 levels criteria, the following statements are quoted from the protocol:

1 Section 3.1.2 of the publication LU-131 gives the equivalent sound level (L_{eq}) criterion in the selected Outdoor Living Area. The criterion applies to the entire daytime period from 07:00 to 23:00. The objective for outdoor sound levels is the higher of the L_{eq} 55 dBA or the existing ambient. The significance of the noise impact will be quantified by using this objective in addition to the change in noise levels above the ambient.

2. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as it 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 Levels above the Ambient	Mitigation Effort
0 to 5 dBA	none
greater than 5 dBA	• investigate noise control measures on ROW. • if project costs are not significantly affected introduce noise control measures within ROW • noise control measures, where introduced, should achieve the minimum of 5 dBA attenuation, over first row receivers • mitigate to ambient, as administrative, economically and technically feasible

[2] L_{eq} is an energy averaging concept adopted by the MOE to sum the time varying noise generated by vehicular traffic. The result are expressed in dBA: which is a logarithmic scale that approximates the response to the human ear.

2.2 MTO Directive A - 1

This directive is specifically written for the Provincial Highways, the MTO also applies this directive to Arterial and the Municipal roads.

The following are some of the typical applicable highlights of the MTO directive, supplemented by previous MTO work experience knowledge.

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

2. There are no subsidies for off ROW mitigation.

3 The MTO favors the institution of retrofit programs where the present or future levels exceed L_{eq} 70 dBA irrespective of how small the excess of future levels is above the present ambient, or the future Do Nothing scenarios.

3.0 ANALYSIS AND THE RESULTS

3.1 Noise Impact Methodology

1. Noise is generally defined as unwanted sound. In this case, the noise under consideration is the road traffic noise perceived along the McKeown Avenue corridor. The glossary section provides technical definitions of the road traffic noise analysis to assist in understanding the principles and terminology used in this report.

   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 preset sound level limit (criterion) such as L_{eq} 55 dBA. The degree of noise impact varies directly as the ratio between the intruding and existing noise levels; for instance, the more the intruding noise level exceeds the existing noise level, the higher the impact

   Since the proposed roadway traffic noise represents the future consideration, projections are made as to sound levels which will be generated by the project under consideration when the roadway has been in operation for at least ten years and the existing and adjacent commercial/industrial properties have come to full development and the other areas serviced by the road have been fully developed.

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

   The MTO and MOE modifications included adjustments for ground cover, terrain differences and barrier adjustments. The algorithms were also adjusted to accommodate typical Ontario traffic mixes, speeds, and situations. These modifications resulted in the ORNAMENT noise prediction methodology. The computerized version of the program is STAMSON. Version 5.1 of the prediction program was used to make sound level predictions for this project. The technical data of the ornament model used and the various adjustments implemented are summarized in appendix B.

3. There are a variety of descriptors that can be used to describe the noise levels at any location. The prediction methods all use the same descriptors are all therefore similar, in that they account for all the different parameters that modify or attenuate the noise at that location such as intervening rows of homes, townhouses, length of roadway segments, various roadway etc. Therefore, the differences in the sound levels experienced is therefore more or less based on traffic volumes.

   The sound levels for these locations selected were predicted using the L_{eq} 16 hour traffic volumes, which is approximately 90% of the daily traffic, percentages of the medium and heavy trucks, posted speed limits, road receptor distances, elevation differentials between the road and the receptor, roadway grading, pavement types and the type of ground cover between the road receptor in question. The percentage of trucks and classifications were derived from traffic counts by Tranplan and the City of North Bay.

   The sound levels which would result from the Design Hour Volumes were also calculated and compared to the 16 hour volumes. These values are higher by 2 or 3 dBA than the normal 16 hour dBA prediction. This was done to determine a peak sound level. The MOE criteria uses the 16 hour volumes to get a better representation of the sound levels. The 16 hour dBA L_{eq} is based on 90% of the traffic occurring in the 16 hour period from 7:00 a.m. to 11:00 p.m. Using this descriptor the value are approximately 2.5 dBA less than the DHV traffic volumes. The DHV then indicates the worst case scenario, and is associated with the level of traffic occurring in the highest afternoon peak hour. The levels for the remainder of the day are best represented by the dBA $L_{eq\ (16)}$ levels.

4. Ambient or existing sound levels along McKeown Avenue are largely due to the traffic on McKeown Avenue and the existing side streets. There are some sound levels in the area as a result of the nearby Highway 17 corridor to the south of this

area. The remainder of the sound in the neighbourhood is typical of urban subdivisions, children playing, traffic on local streets, lawnmowers, etc.

3.2 Study of the Alternatives.

For the purpose of the design study 6 receivers were selected which typify the various neighbourhoods adjacent to the study area. These represent more or less the areas that are impacted by sound levels from the McKeown Avenue traffic in the corridor.

There are three main alternatives,

A. The existing corridor with reconstruction to fix frost heaves and poor subbase conditions, this alternative utilizes the existing centreline.

B. Four lanes throughout, the existing Algonquin Avenue to Cartier Street section would remain the same and the section from Cartier Street to Gormanville Road would be widened to four lanes similar in cross section to the section from Cartier Street to Algonquin Avenue, this alternative utilizes the existing centreline.

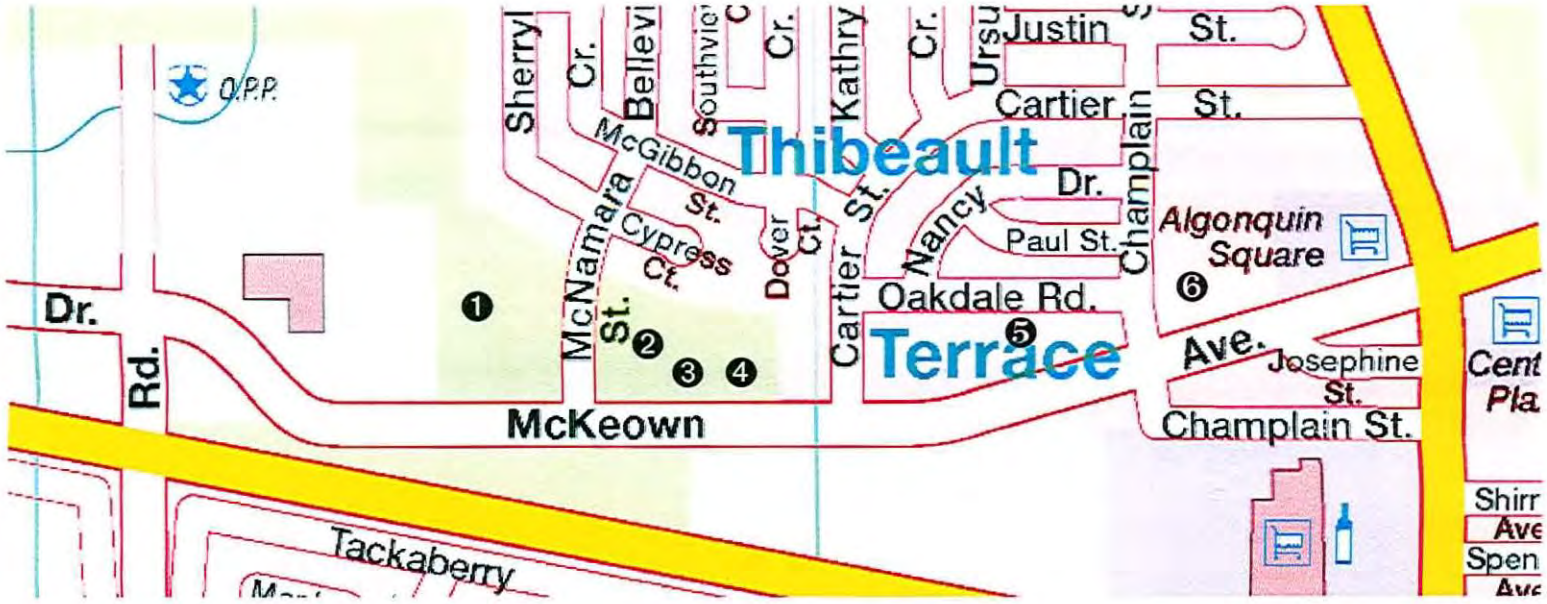
C. This alternative has a five lane section throughout from Algonquin Avenue to the Gormanville Road intersection. This centre lane will allow left turns in both directions to entrances and side streets. This alternative moves the centreline to the south about 1.5 m's in the section from Cartier Street to the Ontario Government Building west entrance.

The minor difference in source to receiver distance is so minor as to not make any significant difference in the predictions. The future traffic predictions are generally based on the commercial and industrial properties developing to their highest and best use. The larger traffic volumes as a result of this development is the most significant difference in the increase in sound levels.

3.3 Receiver Locations

There were six locations selected as representing the various neighbourhoods adjacent to McKeown Avenue. Each of these locations are typical for a particular site. They are illustrated on the McKeown Avenue Receiver Site Map. A description of each of the sites follows.

MCKEOWN AVENUE - GORMANVILLE ROAD TO ALGONQUIN AVENUE
NOISE ASSESSMENT RECEIVER LOCATIONS



3.3.1 Receiver #1 - 545 McNamara Street, Maplecrest #2



Figure 1 - Receiver #1 575 McNamara in the outside recreational area

This is a townhouse development off MacNamara Street north of Algonquin Avenue, behind the Lucky 13 Convenience Store Strip Mall. The outside recreational area to the left of the picture is used for the receiver location and represents the outdoor living area of the housing complex. The townhouse recreational and playground area are here as well. This site represents the highest sound levels in the complex. The homes elsewhere in the complex are shielded by the first row of continuous houses.

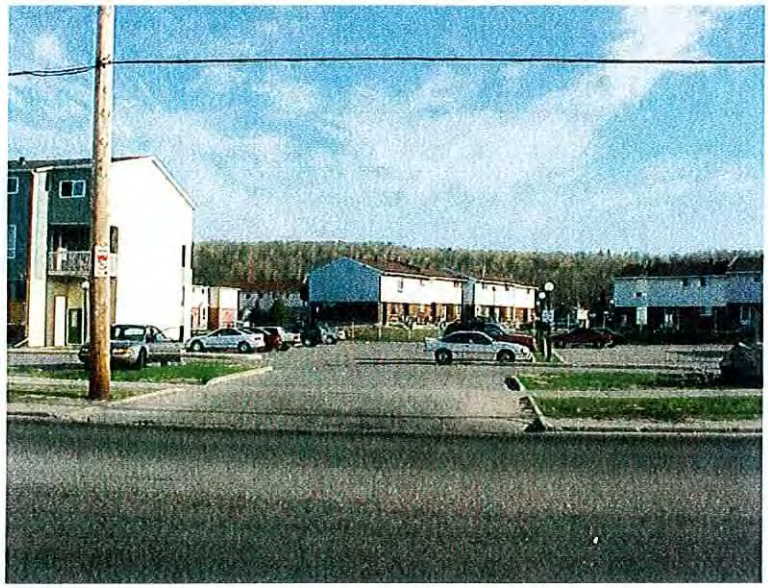
3.3.2 Receiver #2 - New Era Outdoor Recreational Area



Figure 2 - Receiver #2 outdoor recreational area of the New Era townhouse complex

This receiver location is the outdoor recreation area in the courtyard of the New Era Townhouse at the northwest corner of McKeown Avenue and McNamara Street. This also represent the common outside recreational area to the north of the townhouse complex on McNamara Street. This area is shielded by the 3 story building on two sides. The area to the right, which is the next complex on McNamara St., also receive the benefit of this shielding.

3.3.3 Receiver #3 - New Era Townhouse Outside Area east of building



This is the area is to the east of the New Era Townhouse complex. This encompasses the are between the New Era Complex and the Northern Co Operative Housing next door. This represent a nearby area with some shielding and also approximates the levels at the townhouse complex next door on McNamara Street visible in the background.

Figure 3 - Receiver #3 area east of townhouse complex

3.3.4 Receiver #4 - Northern Co Operative Housing Complex outside living area



This location is in the outdoor living area for the Northern Co Operative Housing Complex on McKeown Avenue. This location is representative of the outdoor living areas for the complex. The location is in the centre of the common area of the backyards and outside areas.

Figure 4 - Receiver 4 outdoor living area of the Northern Co Operative

3.3.5 Receiver #5 - Rear Backyards of the homes on Oakdale Avenue.



Figure 5 - Receiver #5 rear of the homes on Oakdale Avenue

Receiver #5 is the rear back yards of the residences along Oakdale Avenue. These outdoor living areas face McKeown Avenue. They are separated from McKeown Avenue by the Ontario Hydro corridor. There is some intervening shrubbery which provides some screening. This are along McKeown is likely going to develop as commercial property.

3.3.6 Receiver #6 - Rear of the Homes on Champlain Street on east side of street.



Figure 6 - Receiver #6 rear of homes on the east side of Champlain Street north.

This location is in the rear yard and outdoor living area of the homes on Champlain Street north on the east side. The actual location for evaluation was in the rear yard of the second home north of McKeown Avenue.

3.4 Description of the Ambient Noise

The existing ambient noise referred to in this study is the 1999 ambient or existing sound levels at the receptors locations based on the existing traffic volumes and lane configuration. The future full development ambient levels are based on the traffic volumes predicted by Tranplan Associates. These future ambient have been calculated in accordance with the MOE guidelines and using the Stamson computer noises prediction program based on the Ornament noise prediction methodology.

The dominant sources of noise in the project area is vehicular traffic movements along McKeown Avenue and the neighbourhood traffic in the side streets. Highway 17 is nearby and has large traffic volumes. It was included in the receiver #1 calculations because of the proximity and visibility. For the other receivers the highway is further away and there are intervening structures which means that the highway contribute little to the sum of the noise in the receiver locations. A prediction including this source resulted in a very minor increase in the sound levels of about 0.1 dB. In the still of the night the highway may be audible from some of these other locations.

3.5 Traffic Data

For the purposes of the study, AADT volumes for all the streets were used as supplied by Tranplan Associates. The AADT for the existing ambient is based on the present Design Hour Volumes which have been calculated for all roadways and intersections. The Design Hour Volume is basically 10% of the AADT. The future AADT was based on a future scenario where all of the properties along McKeown have been developed to their fullest and best use as commercial and industrial properties. The traffic generated at these location and in the study area is based on the present plans that are in place for a number of these properties. See Figure 7 McKeown Avenue Traffic Volumes Presents and Figure 8 McKeown AvenueTraffic Volumes - Future.

3.6 Impact Assessment

The process for assessing the impact of the project for the adjacent resident was to calculate the existing sound levels based on today's traffic volumes. The future traffic sound levels were predicted as well. These were based on the full development of adjacent properties. These values were compared to the established criteria as determined by MOE. Figure 11 - McKeown Avenue Noise Predictions which shows the sound levels at the various receiver locations for the existing traffic and the levels expected with the future traffic volumes. The change in dBA is also illustrated on Figure 12 McKeown Avenue Sound Levels, which shows a graphical representation of these predictions.

McKeown Avenue Traffic Planning Study - Traffic Volumes Present

May 20, 1999

1999 - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	6,750	6,480	99	171
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	8,100	7,767	126	207
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	13,050	12,528	198	324
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	9,000	8,100	405	495

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

C:\DATA\Northland\North Bay\NEL 4351 McKeown Ave\Noise Predictions\Traffic Volumes 16 hour 1999.wpd

Figure 7

McKeown Avenue Traffic Planning Study - Traffic Volumes Future

May 20, 1999

FUTURE - 16 hour volumes (07:00 to 23:00 hours)

Roadway Section	vehicles	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	11,350	18,576	290	484
McNamara Street north of McKeown Avenue	2,511	2,547	27	27
McKeown Avenue from McNamara to Champlain	21,150	20,304	317	529
Cartier Street north of McKeown Avenue	1,260	1,242	9	9
McKeown Avenue from Champlain to Algonquin	27,000	25,920	410	670
Champlain north of McKeown Avenue	3,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
Highway 17 - Gormanville to Algonquin Avenue	15,300	13,770	689	841

Information has been supplied by Tranplan Associates, volumes used for predicting traffic sound levels in STAMSON Noise Prediction Program.

C:\DATA\Northland\North Bay\NEL 4351 McKeown Ave\Noise Predictions\Traffic Volumes 16 hour future.wpd

Figure 8

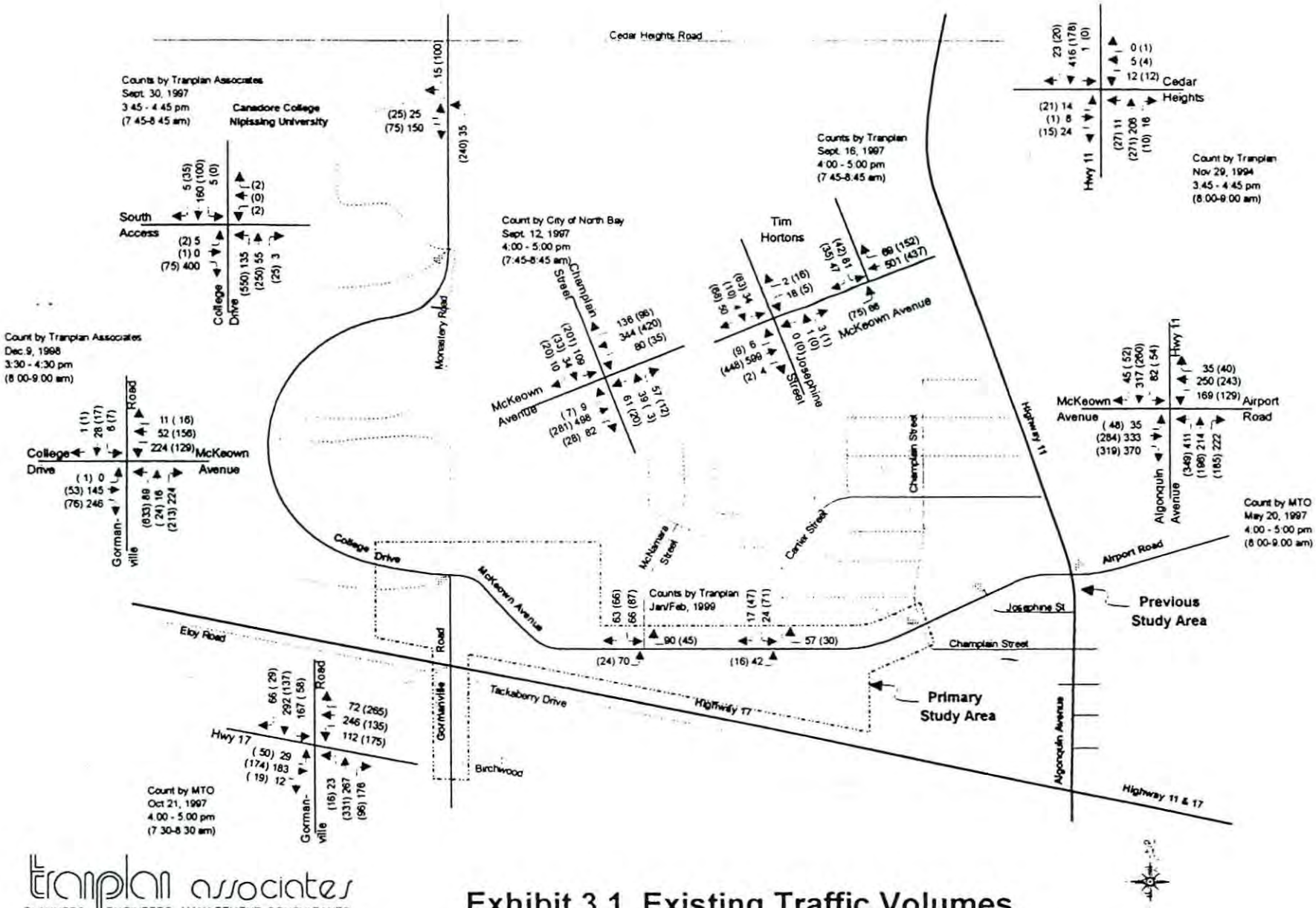
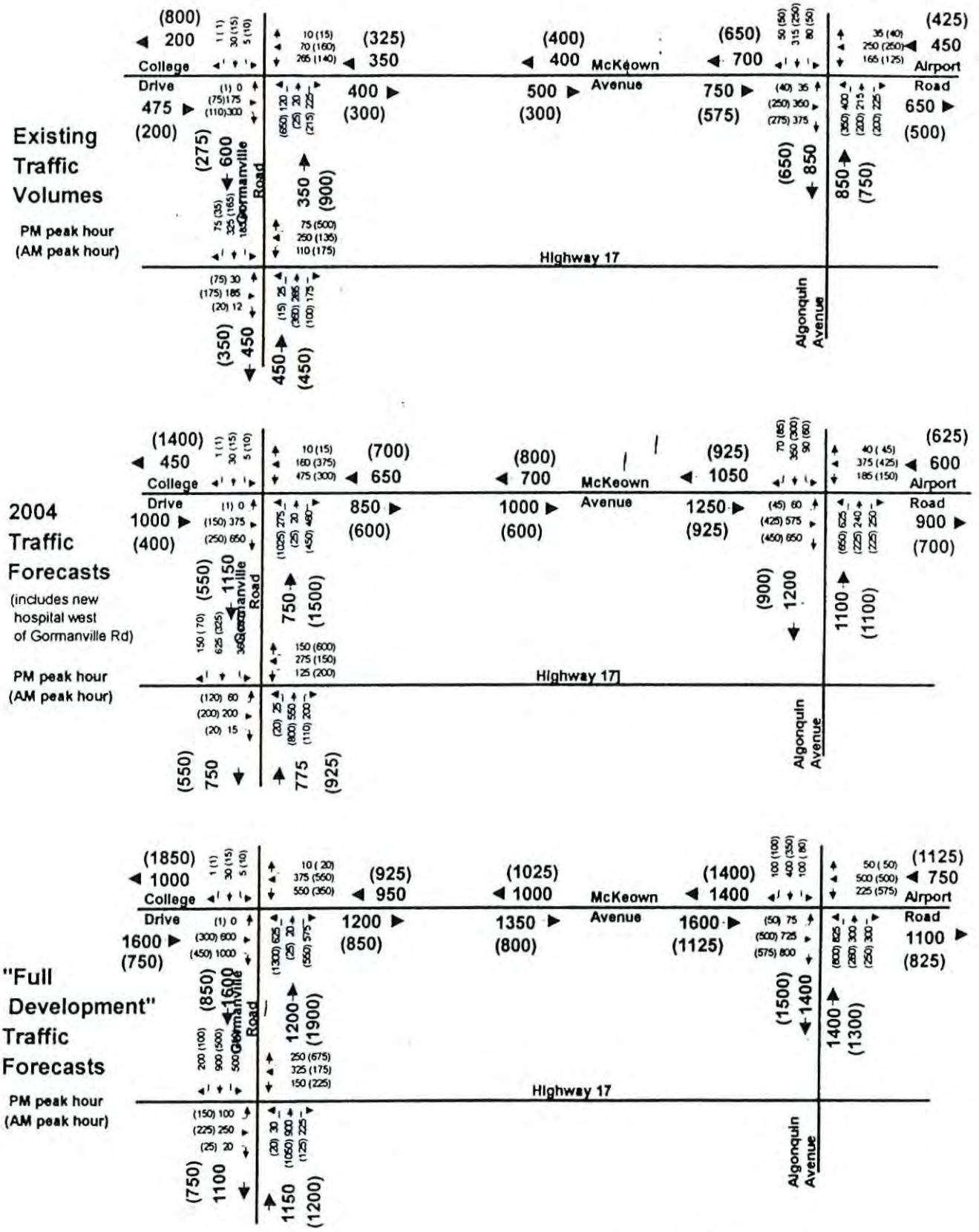


Exhibit 3.1 Existing Traffic Volumes

tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville Tel (905) 849-1500 Fax (905) 849-8164
Sudbury Tel (705) 522-0272 Fax (705) 522-1733

Figure - 10



McKeown Avenue Traffic Study

Traffic Forecasts

PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, STE 1, OAKVILLE, ONT. L6H 7R6
Oakville Tel (905) 849-1500 Fax (905) 849-8184
Sudbury Tel (705) 522-0272 Fax (705) 522-1733

NEL 4351 MCKEOWN AVENUE NOISE PREDICTIONS Leq dBA 16 hour May 17, 1999

The following Noise Predictions are based on Traffic Volumes and traffic predictions supplied by Tranplan Associates.
The predictions were made using the Ministry of Environment STAMSON* prediction program

Receiver	Location	Existing Sound Levels	Future Sound Levels	Change present to Future
1	rear of homes on south side of 545 McNamara	49.03	52.89	3.86
2	centre of courtyard on New Era townhouses	43.04	43.84	0.8
3	rear of parking lot of New Era townhouses	54.81	58.91	4.1
4	centre of play/common area in backyards of Northern Lights co-op	54.28	58.38	4.1
5	backyards of the homes on south side of Oakdale Road	48.04	52.14	4.1
6	backyards of homes on east side of Champlain	52.76	55.59	2.83

* Stamson is a computer version of the road and rail traffic noise prediction methods contained in ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) and STEAM (Sound from Trains Environmental Analysis Method). Both ORNAMENT and STEAM are publications of the Ontario Ministry of Environment.

Figure - 11

Northland Engineering Limited

The Annex to Publication LU-131 indicates that the:

> "If the daytime sound level in the Outdoor Living Area is 55 dBA or less, no further assessment is required.
>
> Where it can be clearly demonstrated that it is not technically feasible to achieves the Ministry's outdoor sound level criterion for road and rail traffic, a tolerance of no more than 5dBA above the stated criteria may be allowed.[3] "

This means that even though these receivers are above the desirable criteria, and there are no outdoor mitigation available to lessen their impacts, then this situation is acceptable.

3.7 1999 Sound Levels

Figure 11 - McKeown Avenue Noise Predictions, shows the predicted existing values. The LU 131 guidelines recommend the level of 55 dBA L_{eq} 16 hour as the desirable criteria. As can be seen from the number in this figure that all of the locations are within acceptable values. Even the closest receivers with little or no attenuation from structures are below 55. There are no receivers with existing noise problems or concerns.

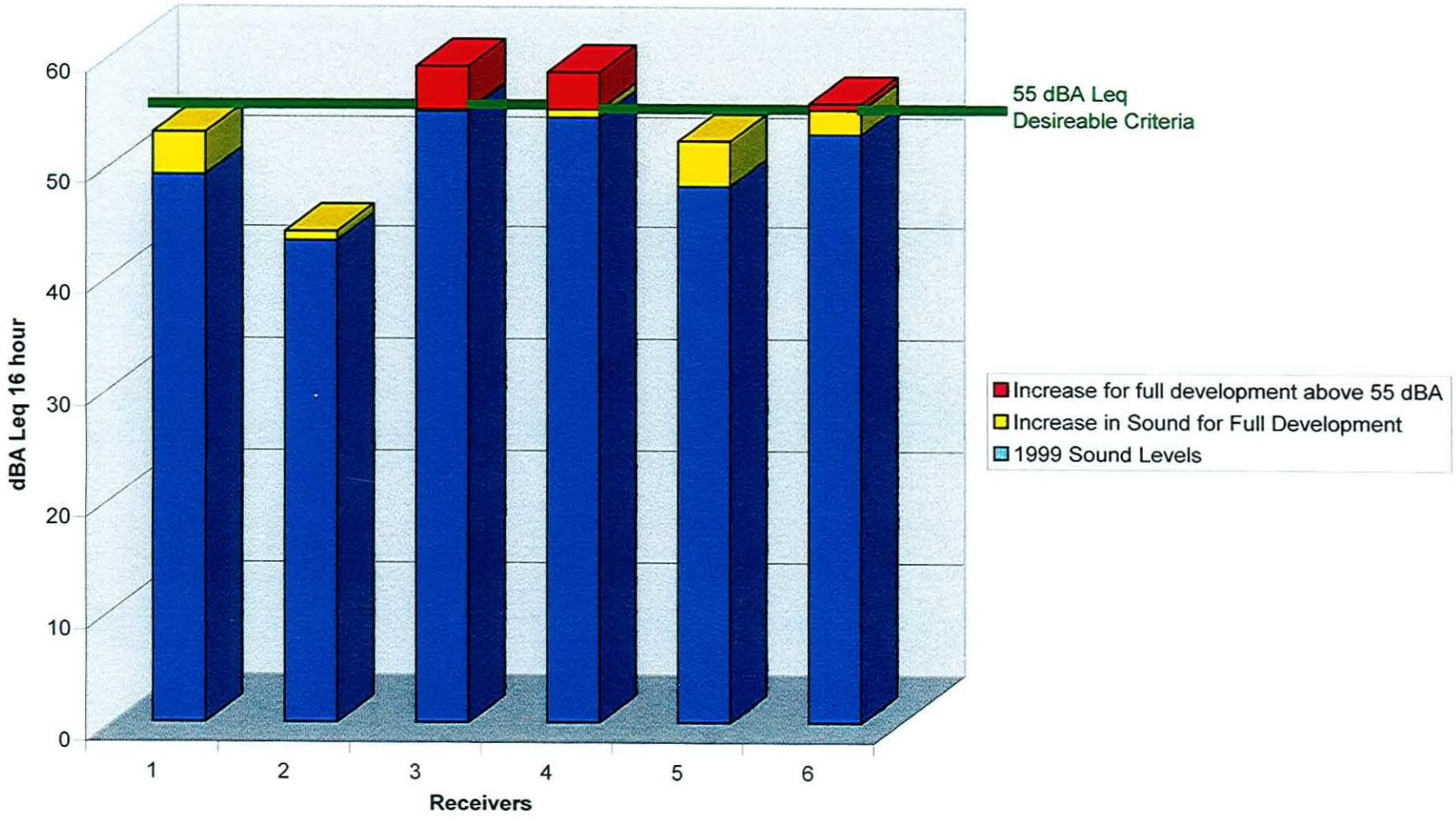
3.8 Future Full Development sound Levels.

Figure 12 - McKeown Avenue Sound Levels, shows the values of the predicted sound levels for the same receivers with the future traffic volumes. Three receivers exceed the criteria of 55 dBA L_{eq}. These are:

Receiver location	Present L_{eq} dBA	Future L_{eq} dBA	Change in L_{eq} dBA	Exceed 55 dBA
3	54.81	58.91	4.1	3.91
4	54.28	58.38	4.1	3.38
6	52.76	55.59	2.83	0.59

[3] Annex to Publication LU - 131 Noise Assessment Criteria in Land Use Planning, October 1997, Section A.3.2.1 Application of Criteria, part (a) Road and Rail

Figure 12 - McKeown Avenue Sound Levels
Leq 16 hour



These values are also illustrated in Figure 12 McKeown Avenue Sound Levels, which shows the existing levels and the increase which will result from the higher volumes in the future. It shows in yellow the receivers that exceed the desirable criteria of 55 dBA. These values are not above 60 dBA L_{eq} which is the second criteria. A number of options were reviewed in relation to reducing these values. All normal noise mitigation measures such as barriers were reviewed. Any attempt to install barriers at these locations are unfeasible. The problem being the access through the barriers for entrances and access seriously compromise the barrier, and render them unfeasible. The barriers, even if continuous would not achieve the necessary 5 dBA attenuation required for barrier. Anything less than the 5 dBA decrease is not usually considered noticeable by adjacent receivers.

The outside areas which are affected are the parking lot area beside the New Era parking lot (Receiver 3), which is not used very much as a recreational area. The outdoor areas of Kingsview Court which is adjacent to the New Era development will be at lower levels and the impact less than receiver 3 levels.

The Receiver 4 area is the outside living area at the Northern Cooperative Housing. The future levels expected are above 55 dBA but below the 60 dBA levels. The outdoor living area that are further back will have lower sound levels. The predictions did

not include the effect of the privacy fencing around all of the backyards. This would reduce the sound levels a little. They certainly cannot be considered as noise barriers.

Receive 6 is the other location that will be subjected to levels above 55 dBA. This location is in the rear backyard of the second home north of McKeown Avenue. The outdoor living area here is fenced. This will have some minor effect, but cannot be considered a noise barrier. The area to the rear of the building will eventually be part of the strip mall development, which will likely have a more significant impact on these outdoor living areas at the rear of these homes.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Summary

This study has been carried out to review the sound levels which are being experience at a number of locations that represent a variety of the typical neighbourhoods adjacent to the project. The study dealt with the documentation of the existing sound levels and the future projected sound levels for these area. There are three areas where the predicted levels exceed the desirable levels. These three areas are still within the

allowable maximum which is outlined in the appropriate MOE documentation mentioned previously. Noise barriers are unfeasible and cannot achieve an appreciatable reduction in these levels.

4.2 Noise Control During Construction

In addition to the noise emitted during the operation of vehicles on the updated roadway, another noise issue is the noise associated with the construction of the roadway.

Unlike the operational noise, construction noise is temporary in nature. It is also transient throughout the site. It is also dependent on the nature of work underway at the time. The significance of the noise impact is dependent on the number of pieces of equipment, type, hours of operation and proximity to the receptors. The following points should be reviewed during detail design stage to ensure the aspect of construction noise is addressed.

1. The City of North Bay has adopted the Model Municipal Noise Control Bylaw. The Bylaw should be reviewed during the design stage to determine contract package requirements for noise control.

2. There are no noise sensitive land uses adjacent to the project other than the residences and apartments.

3. The contract package should include "general noise control measures" referring to the maintenance levels of equipment and assurance that the equipment is being maintained in the appropriate manner to reduce noise. This would include operation methods of the equipment, and requirements like mufflers in good repair.

4. The operation and location of granular sources should also be considered and reviewed during detail design to ensure that aggregate production and extraction does not cause noise problems to residents living near the aggregate production areas.

5. In the event of a complaint about noise from the construction, the municipality or its contract administrator, should enure the general noise control measures are being abided to. If they are not, then the municipality will ensure that contractor is made aware of the problem and of the complaint, and indicate to them to adjust or modify their operation or equipment as required.

5.0 CONCLUSION

This Noise Impact Assessment was prepared for the City of North Bay as part of the Traffic Planning Study carried out by Tranplan Associates in association with Northland Engineering Limited. The study documents the assessment of the present and future sound levels associated with the existing McKeown Avenue based on existing traffic volume in the corridor and side streets. The study also investigated and makes predictions for the future traffic volumes that will occur as a result of the properties abutting McKeown Avenue coming to full development. A number of these properties are presently being developed and others are also in the process of developing plans for changes. Full development also includes such possibilities of the new hospital being located on College Drive west of Gormanville Road and expansion of the Education Centre and other developments in the area.

The results of the study indicate that the existing sound levels associated with McKeown Avenue and the neighbourhood traffic is presently less that the Ministry of Environment desirable criteria of $L_{eq\ (16)}$ 55 dBA. Traffic volumes in the future as a result of this expansion of traffic will increase the sound levels about 4 dBA. These levels are above the desirable criteria of 55 dBA but below the acceptable criteria of 60 dBA. Noise barriers and other on roadway mitigation are not possible of feasible. As well they could not achieve the 5 dBA reduction required for them to have a meaningful reduction in sound levels.

The conclusion of the noise study is that noise will increase as a result of the traffic increase but still within acceptable levels. Barriers or other devices on the right-of-way are not required or feasible.

APPENDIX

A -Definition of Terms

B - Stamson Noise Receivers Printouts

2. DEFINITIONS

"Adverse effect"

means one or more of the following effects of sound and vibration, selected from the relevant definitions in the Environmental Protection Act, Reference [6]:

- impairment of the quality of the natural environment for any use that can be made of it;
- harm or material discomfort to any person;
- an adverse effect on the health of any person, and
- loss of enjoyment of normal use of property.

"Ambient sound level"

means Background sound level;

"Background sound level"

is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by a source such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level;

"Class 1 Area"

means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the urban hum.

"Class 2 Area"

means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 19:00 and 23:00 hours;
- evening background sound level defined by natural environment and infrequent human activity;
- no clearly audible sound from stationary sources other than from those under impact assessment.

"Class 3 Area"

means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

"Construction", "Conveyance"

refer to the Annex.

"Control measure"

refers to action which can be taken to achieve compatibility for the specific land use or activity. The control measure should be permanent in nature and not be readily removable or alterable by the future occupants. Control measures may include, but are not limited to, the following:

- Acoustical Barriers - berms, walls, favourable topographical features, other intervening structures;
- Architectural Design - room and corridor arrangement, blank walls, placement of windows, balconies, and courtyards, building height;

- Building Construction - acoustical treatment of walls, ceilings, selection of acoustical materials and other control devices. Provision for air conditioning;
- Mitigation at Source - noise control applied directly to the noise source;
- Site Planning - orientation of buildings and Outdoor Living Areas with respect to noise sources, spatial separation such as the insertion of noise insensitive land uses between source and receiver, appropriate setbacks, and the use of intervening service roads;
- Windows/Doors - acoustically designed windows or doors that provide the required noise reduction. In order to allow for the windows and doors to remain closed, air conditioning, i.e. mechanical ventilation and climatic control system, is necessary.

Refer to References [1] and [2] for further description of control measures and their application.

"dBA"
means the A-weighted sound pressure level.

"dBAI"
means the A-weighted sound pressure level of an impulsive sound measured with a sound level meter set to "impulse" response.

"Indoor sound level"
is an estimated sound level in the central part of a room.

"L_{eq} (T): L_{eq} (16), L_{eq} (8), L_{eq} (1)"
means the A-weighted level of a steady sound carrying the same total energy in the time period T as the observed fluctuating sound. The time period T is given in hours.

"Ministry"
means the Ontario Ministry of the Environment.

"NEF/NEP"
means Noise Exposure Forecast/Noise Exposure Projection contours for major Ontario airports.

"Noise"
means unwanted sound.

"Noise sensitive land uses"
mean the following sensitive land uses:

- residential developments;
- seasonal residential developments;
- hospitals, nursing/retirement homes, schools, day-care centres, etc.

Sensitive land use means a land use that is sensitive in accordance with the definition of Reference [15], and that must be planned and/or designed using appropriate land use compatibility principles.

"Outdoor Living Area"
is the part of an outdoor area easily accessible from the building and designed for the quiet enjoyment of the outdoor environment. Outdoor Living Areas include, but are not limited to, the following:

- Backyards or front yards or gardens or terraces or patios;
- Balconies, provided they are the only Outdoor Living Areas for the occupant and meet the following conditions:

(a) minimum depth of 4 m;
(b) outside the exterior building facade;
(c) unenclosed;

- Common Outdoor Living Areas associated with multi-storey apartment buildings or condominiums;
- Passive recreational areas such as parks if identified by the municipality.

"Point of Reception"
means any point on the premises of a person where sound or vibration originating from other than those premises is received, see Reference [12].

"Stationary Source"
means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance, see Reference [12]. Section A.2.1.1 provides further explanation.

"Time Periods"
"Day-time"
is the 16-hour period between 07:00 and 23:00 hours.

"Evening"
is the 4-hour period between 19:00 and 23:00 hours.

"Night-time"
is the 8-hour period between 23:00 and 07:00 hours.

"Urban Hum"
means aggregate sound of many unidentifiable, mostly road traffic related sound sources.

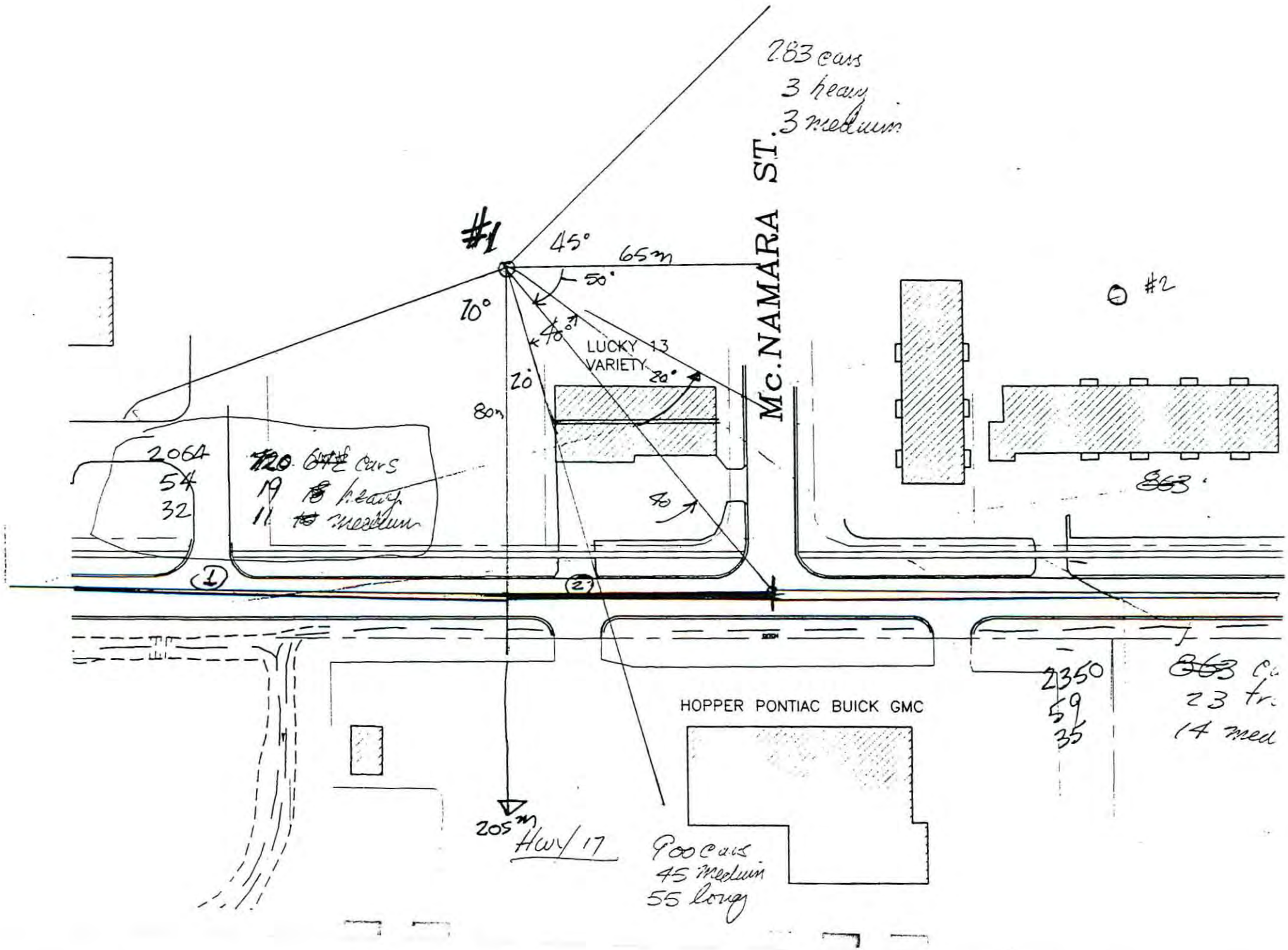
"Warning Clause" (or "Environmental Warning/Restriction")
means a notification of or obligation to notify a potential purchaser of some environmental concern; in this case the concern is potential annoyance due a source of noise.

3. NOISE IMPACT ASSESSMENT, TRANSPORTATION SOURCES

This section deals with noise impact from transportation corridors (i.e., road, rail and air traffic). In case of multiple transportation noise sources:

(a) the outdoor noise impact due to air traffic shall be established separately from the impact due to road and/or rail traffic;
(b) the outdoor noise impact due to road and rail traffic shall be combined;
(c) the indoor noise impact shall be assessed separately for road, rail and aircraft noise. The required indoor noise control measures for the multiple source impact are then defined by a combined acoustical insulation parameter (descriptor) that is evaluated by combining the acoustical insulation parameters determined for each of the sources.

In all cases, consideration should be given to future sound levels. For road and rail noise, a minimum ten year prediction should be made and for aircraft noise, the current NEF/NEP contours shall apply.


783 cars
3 heavy
3 medium
#1
45°
65m
50°
10°
40°
20°
80m
LUCKY 13
VARIETY
Mc. NAMARA ST.
#2
2064
54
32
120 642 cars
19 heavy
11 medium
40
1
2
2350
59
35
HOPPER PONTIAC BUICK GMC
205m
HWY 17
900 cars
45 medium
55 long

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:43:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1b1699.te Time Period: 16 hours
Description: 4351 Rec #1 16 hour volumes 1999 575 MacNamara Pla

Road data, segment # 1: mck west 1

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : -40.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : -20.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 50.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

oad data, segment # 3: mck east 1
---
ar traffic volume : 7767 veh/TimePeriod
edium truck volume : 126 veh/TimePeriod
eavy truck volume : 207 veh/TimePeriod
osted speed limit : 50 km/h
oad gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 3: mck east 1
---
ngle1 Angle2 : -60.00 deg 0.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
urface : 1 (Absorptive ground surface)
eceiver source distance : 150.00 m
eceiver height : 1.50 m
opography : 2 (Flat/gentle slope; with barrier)
arrier angle1 : -60.00 deg Angle2 : -40.00 deg
arrier height : 5.00 m
arrier receiver distance : 55.00 m
ource elevation : 0.00 m
eceiver elevation : 0.00 m
arrier elevation : 0.00 m
eference angle : 0.00

oad data, segment # 4: mcn north 1
---
ar traffic volume : 2547 veh/TimePeriod
edium truck volume : 27 veh/TimePeriod
eavy truck volume : 27 veh/TimePeriod
osted speed limit : 50 km/h
oad gradient : 0 %
oad pavement : 1 (Typical asphalt or concrete)

ata for Segment # 4: mcn north 1
---
ngle1 Angle2 : -45.00 deg 45.00 deg
ood depth : 0 (No woods.)
o of house rows : 0
urface : 1 (Absorptive ground surface)
eceiver source distance : 65.00 m
eceiver height : 1.50 m
opography : 2 (Flat/gentle slope; with barrier)
arrier angle1 : 30.00 deg Angle2 : 45.00 deg
arrier height : 5.00 m
arrier receiver distance : 55.00 m
ource elevation : 0.00 m
eceiver elevation : 0.00 m
arrier elevation : 0.00 m
eference angle : 0.00

esults segment # 1: mck west 1

ource height = 1.26 m

OAD (0.00 + 45.80 + 0.00) = 45.80 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	62.76	0.00	-12.07	-4.89	0.00	0.00	0.00	45.80

egment Leq : 45.80 dBA

esults segment # 2: mck west 2

ource height = 1.26 m

arrier height for grazing incidence

ource eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.98	1.98

OAD (0.00 + 30.11 + 41.09) = 41.43 dBA

ngle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	62.76	0.00	-9.50	-9.74	0.00	0.00	-13.40	30.11
-20	0	0.66	62.76	0.00	-12.07	-9.60	0.00	0.00	0.00	41.09

egment Leq : 41.43 dBA

Results segment # 3: mck east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.41	1.41

ROAD (0.00 + 30.42 + 40.22) = 40.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	-40	0.37	63.60	0.00	-13.67	-10.26	0.00	0.00	-9.24	30.42
-40	0	0.66	63.60	0.00	-16.60	-6.77	0.00	0.00	0.00	40.22

Segment Leq : 40.66 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

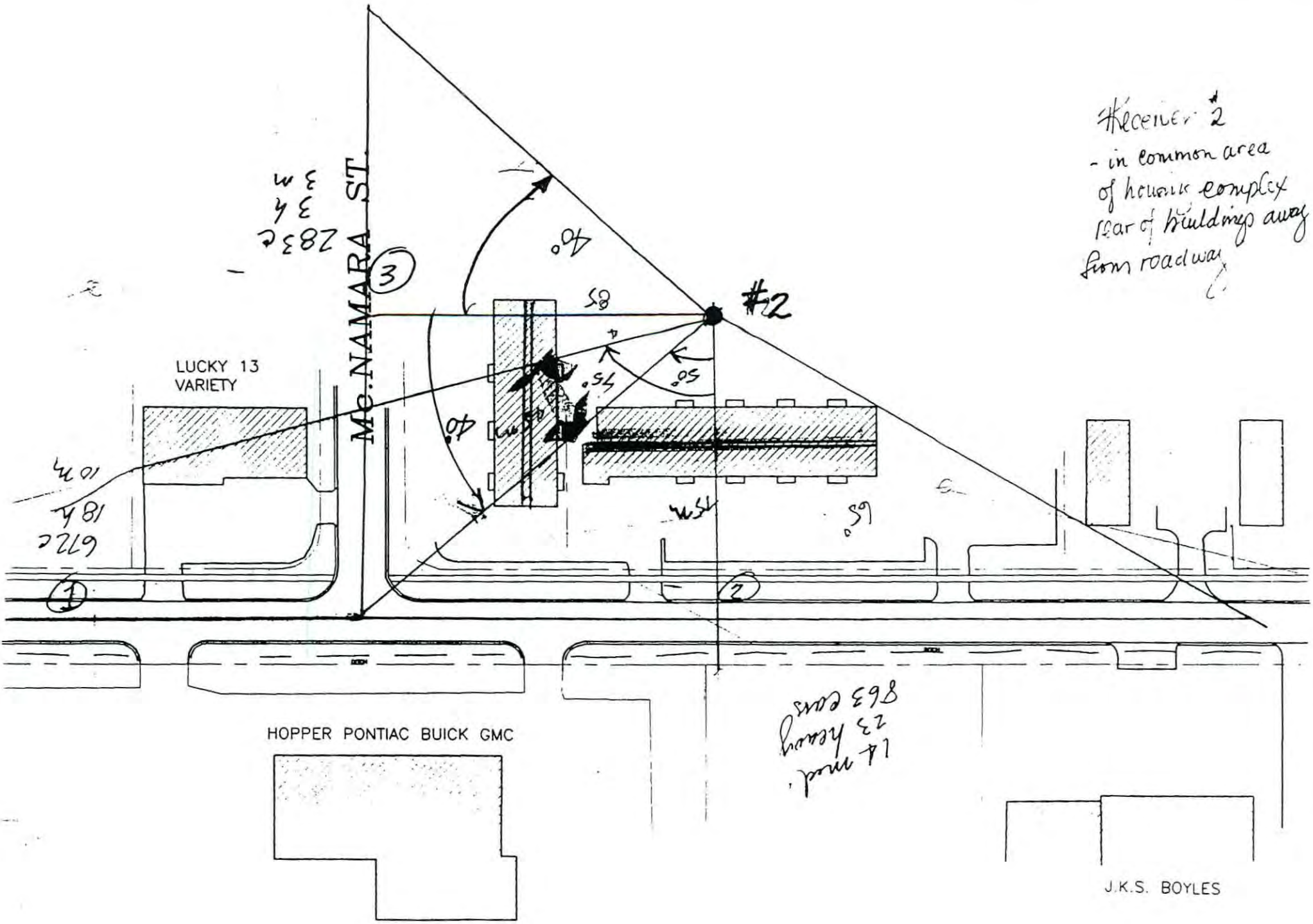
ROAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.11
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.75

Segment Leq : 42.14 dBA

Total Leq All Segments: 49.03 dBA

TOTAL Leq FROM ALL SOURCES: 49.03


Receiver #2
- in common area of housing complex rear of buildings away from roadway
Mc.NAMARA ST.
LUCKY 13
VARIETY
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
#2
40°
85
75°
50°
65°
40
1
2
3

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:45:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1b16fut.te Time Period: 16 hours
Description: 4351 Rec#1b 16 hour volumes ~~1999~~ future 575 McNamara Rec

Road data, segment # 1: mck west 1

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : -40.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 80.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : -20.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 50.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

```
.oad data, segment # 3: mck east 1
 ---------------------------------
Car traffic volume  : 21150 veh/TimePeriod
Medium truck volume :   317 veh/TimePeriod
Heavy truck volume  :   529 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1
 ---------------------------------
Angle1   Angle2           : -60.00 deg   0.00 deg
Wood depth                :       0      (No woods.)
No of house rows          :       0
Surface                   :       1      (Absorptive ground surface)
Receiver source distance  : 150.00 m
Receiver height           :   1.50 m
Topography                :       2      (Flat/gentle slope; with barrier)
Barrier angle1            : -60.00 deg   Angle2 : -40.00 deg
Barrier height            :   5.00 m
Barrier receiver distance :  55.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: mcn north 1
 ---------------------------------
Car traffic volume  :  2547 veh/TimePeriod
Medium truck volume :    27 veh/TimePeriod
Heavy truck volume  :    27 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mcn north 1
 ---------------------------------
Angle1   Angle2           : -45.00 deg   45.00 deg
Wood depth                :       0      (No woods.)
No of house rows          :       0
Surface                   :       1      (Absorptive ground surface)
Receiver source distance  :  65.00 m
Receiver height           :   1.50 m
Topography                :       2      (Flat/gentle slope; with barrier)
Barrier angle1            :  30.00 deg   Angle2 : 45.00 deg
Barrier height            :   5.00 m
Barrier receiver distance :  55.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

Results segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 50.35 + 0.00) = 50.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.31	0.00	-12.07	-4.89	0.00	0.00	0.00	50.35

Segment Leq : 50.35 dBA

Results segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.97	1.97

ROAD (0.00 + 34.66 + 45.64) = 45.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	-20	0.31	67.31	0.00	-9.50	-9.74	0.00	0.00	-13.41	34.66
-20	0	0.66	67.31	0.00	-12.07	-9.60	0.00	0.00	0.00	45.64

Segment Leq : 45.98 dBA

Results segment # 3: mck east 1

Source height = 1.25 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.25	1.50	1.41	1.41

ROAD (0.00 + 34.57 + 44.39) = 44.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLec
-60	-40	0.37	67.76	0.00	-13.68	-10.26	0.00	0.00	-9.25	34.5
-40	0	0.66	67.76	0.00	-16.60	-6.77	0.00	0.00	0.00	44.3

Segment Leq : 44.82 dBA

Results segment # 4: mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.08	1.08

ROAD (42.11 + 20.75 + 0.00) = 42.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-45	30	0.66	56.72	0.00	-10.57	-4.04	0.00	0.00	0.00	42.1
30	45	0.37	56.72	0.00	-8.75	-11.17	0.00	0.00	-16.04	20.7

Segment Leq : 42.14 dBA

Total Leq All Segments: 52.89 dBA

TOTAL Leq FROM ALL SOURCES: 52.89

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:52:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_1699.te Time Period: 16 hours
Description: 4351 Rec #2 16 hour volumes 1999 New Era Courtyard

Road data, segment # 1: McK west 1

Car traffic volume : 6480 veh/TimePeriod
Medium truck volume : 99 veh/TimePeriod
Heavy truck volume : 171 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1

Angle1 Angle2 : 50.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east 1

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1

Angle1 Angle2 : -65.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

oad data, segment # 3: Mcn north 1

ar traffic volume	:	2547	veh/TimePeriod
edium truck volume	:	27	veh/TimePeriod
eavy truck volume	:	27	veh/TimePeriod
osted speed limit	:	50	km/h
oad gradient	:	0	%
oad pavement	:	1	(Typical asphalt or concrete)

ata for Segment # 3: Mcn north 1

ngle1 Angle2	:	-40.00 deg	40.00 deg
ood depth	:	0	(No woods.)
o of house rows	:	0	
urface	:	1	(Absorptive ground surface)
eceiver source distance	:	85.00 m	
eceiver height	:	1.50 m	
opography	:	2	(Flat/gentle slope; with barrier)
arrier angle1	:	-40.00 deg	Angle2 : 5.00 deg
arrier height	:	8.00 m	
arrier receiver distance	:	45.00 m	
ource elevation	:	1.00 m	
eceiver elevation	:	0.00 m	
arrier elevation	:	0.00 m	
eference angle	:	0.00	

esults segment # 1: McK west 1

ource height = 1.26 m

OAD (0.00 + 40.32 + 0.00) = 40.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	75	0.66	62.76	0.00	-11.60	-10.84	0.00	0.00	0.00	40.32

egment Leq : 40.32 dBA

esults segment # 2: McK east 1

ource height = 1.26 m

arrier height for grazing incidence

ource .eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.81	1.81

ROAD (0.00 + 36.30 + 0.00) = 36.30 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	63.60	0.00	-8.30	-2.11	0.00	0.00	-16.89	36.3(

egment Leq : 36.30 dBA

esults segment # 3: Mcn north 1

ource height = 1.01 m

arrier height for grazing incidence

ource eight (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.7
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.8

egment Leq : 37.09 dBA

otal Leq All Segments: 43.04 dBA

OTAL Leq FROM ALL SOURCES: 43.04

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 09:50:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_16fut.te Time Period: 16 hours
Description: 4351 Rec#2 16 hour volumes future 575 McNamara

Road data, segment # 1: McK west 1

Car traffic volume : 18576 veh/TimePeriod
Medium truck volume : 290 veh/TimePeriod
Heavy truck volume : 484 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west 1

Angle1 Angle2 : 50.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 50.00 deg Angle2 : 75.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK east 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east 1

Angle1 Angle2 : -65.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 50.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: Mcn north 1

Car traffic volume : 2547 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Mcn north 1

Angle1 Angle2 : -40.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 85.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : 5.00 deg
Barrier height : 8.00 m
Barrier receiver distance : 45.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: McK west 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.47	1.47

ROAD (0.00 + 39.10 + 0.00) = 39.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
50	75	0.49	67.31	0.00	-10.40	-10.26	0.00	0.00	-7.56	39.1

Segment Leq : 39.10 dBA

Results segment # 2: McK east 1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.80	1.80

ROAD (0.00 + 40.40 + 0.00) = 40.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	50	0.19	67.70	0.00	-8.30	-2.11	0.00	0.00	-16.90	40.40

Segment Leq : 40.40 dBA

Results segment # 3: Mcn north 1

Source height = 1.01 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.77	1.77

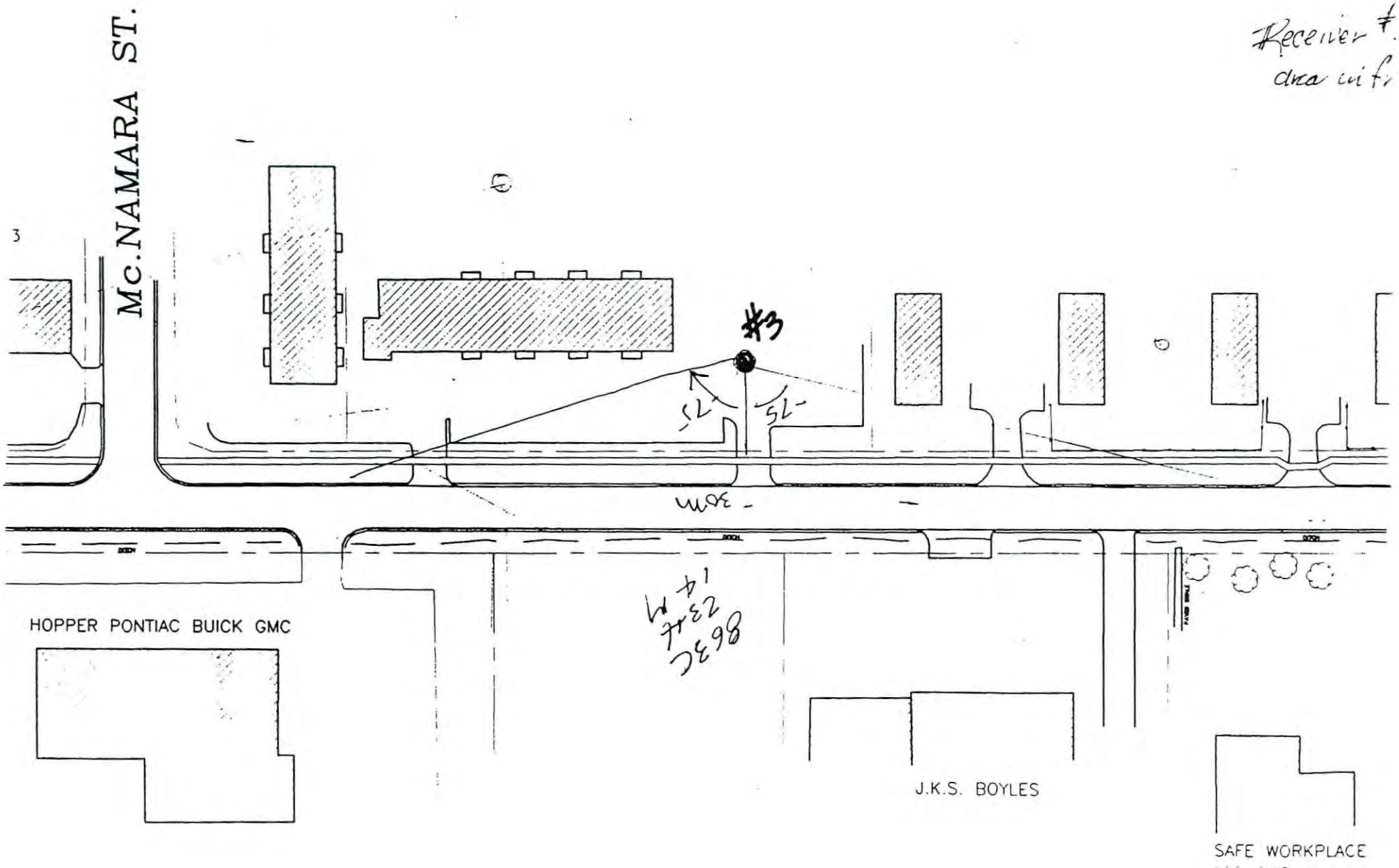
ROAD (0.00 + 24.75 + 36.83) = 37.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-40	5	0.19	56.72	0.00	-9.00	-6.08	0.00	0.00	-16.89	24.7
5	40	0.66	56.72	0.00	-12.51	-7.39	0.00	0.00	0.00	36.8

Segment Leq : 37.09 dBA

Total Leq All Segments: 43.84 dBA

TOTAL Leq FROM ALL SOURCES: 43.84


Mc. NAMARA ST.
#3
75'
75'
HOPPER PONTIAC BUICK GMC
J.K.S. BOYLES
SAFE WORKPLACE

STAMSON 5.0 NORMAL REPORT Date: 14-05-1999 11:55:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_1699.te Time Period: 16 hours
Description: 4351 Rec #3 16 hour volumes 1999 New Era Parking

Road data, segment # 1: McKeown

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2 : -75.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: McKeown

Source height = 1.26 m

ROAD (0.00 + 54.81 + 0.00) = 54.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	75	0.66	63.60	0.00	-7.07	-1.72	0.00	0.00	0.00	54.81

Segment Leq : 54.81 dBA

Total Leq All Segments: 54.81 dBA

TOTAL Leq FROM ALL SOURCES: 54.81

STAMSON 5.0 NORMAL REPORT Date: 17-05-1999 10:35:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_16fut.te Time Period: 16 hours
Description: 4351 Rec#3 16 hour volumes future New Era Parking

Road data, segment # 1: McKeown

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McKeown

Angle1 Angle2 : -75.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 40.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: McKeown

Source height = 1.26 m

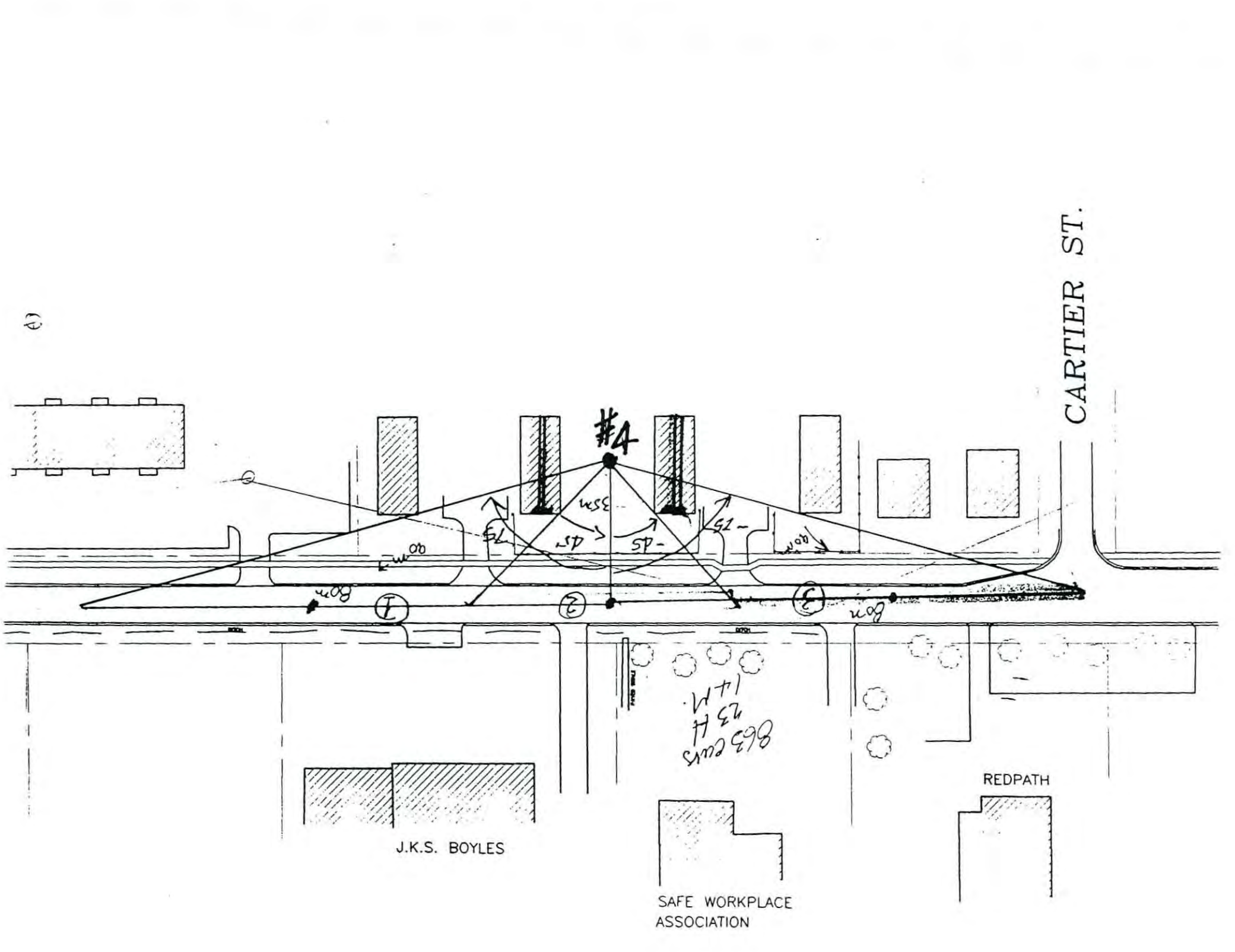
ROAD (0.00 + 58.91 + 0.00) = 58.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-75	75	0.66	67.70	0.00	-7.07	-1.72	0.00	0.00	0.00	58.9

Segment Leq : 58.91 dBA

Total Leq All Segments: 58.91 dBA

TOTAL Leq FROM ALL SOURCES: 58.91


CARTIER ST.
#4
J.K.S. BOYLES
SAFE WORKPLACE ASSOCIATION
REDPATH

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 10:49:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_1699.te Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes 1999 Northern Co-Op

Road data, segment # 1: McK west

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: McK west

Angle1 Angle2 : 45.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 45.00 deg Angle2 : 75.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 20.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: McK centre

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK centre

Angle1 Angle2 : -45.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: McK east

Car traffic volume	: 7767	veh/TimePeriod
Medium truck volume	: 126	veh/TimePeriod
Heavy truck volume	: 207	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 3: McK east

Angle1 Angle2	: -75.00 deg	-45.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 35.00 m	
Receiver height	: 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -75.00 deg	Angle2 : -45.00 deg
Barrier height	: 7.00 m	
Barrier receiver distance	: 20.00 m	
Source elevation	: 1.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 0.00 m	
Reference angle	: 0.00	

Segment # 1: McK west

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

ROAD (0.00 + 35.94 + 0.00) = 35.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
45	75	0.31	63.60	0.00	-4.81	-8.76	0.00	0.00	-14.09	35.9

Segment Leq : 35.94 dBA

Segment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 54.17 + 0.00) = 54.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	63.60	0.00	-6.11	-3.32	0.00	0.00	0.00	54.17

Segment Leq : 54.17 dBA

Segment # 3: McK east

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.94	1.94

ROAD (0.00 + 34.53 + 0.00) = 34.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-75	-45	0.25	63.60	0.00	-4.59	-8.57	0.00	0.00	-15.91	34.53

Segment Leq : 34.53 dBA

Total Leq All Segments: 54.28 dBA

TOTAL Leq FROM ALL SOURCES: 54.28

```
STAMSON 5.0          NORMAL REPORT          Date: 17-05-1999 10:41:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_16fut.te              Time Period: 16 hours
Description: 4351 Rec#4 16 hour volumes future Northern Co-Op


Road data, segment # 1: McK west
----------------------------------
Car traffic volume   : 20304 veh/TimePeriod
Medium truck volume  :   317 veh/TimePeriod
Heavy truck volume   :   529 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 1: McK west
----------------------------------
Angle1   Angle2               :  45.00 deg   75.00 deg
Wood depth                    :       0      (No woods.)
No of house rows              :       0
Surface                       :       1      (Absorptive ground surface)
Receiver source distance      :  35.00 m
Receiver height               :   1.50 m
Topography                    :       2      (Flat/gentle slope; with barrier)
Barrier angle1                :  45.00 deg   Angle2 : 75.00 deg
Barrier height                :   6.00 m
Barrier receiver distance     :  20.00 m
Source elevation              :   1.00 m
Receiver elevation            :   0.00 m
Barrier elevation             :   0.00 m
Reference angle               :   0.00

Road data, segment # 2: McK centre
----------------------------------
Car traffic volume   : 20304 veh/TimePeriod
Medium truck volume  :   317 veh/TimePeriod
Heavy truck volume   :   529 veh/TimePeriod
Posted speed limit   :    50 km/h
Road gradient        :     0 %
Road pavement        :     1 (Typical asphalt or concrete)

Data for Segment # 2: McK centre
----------------------------------
Angle1   Angle2               : -45.00 deg   45.00 deg
Wood depth                    :       0      (No woods.)
No of house rows              :       0
Surface                       :       1      (Absorptive ground surface)
Receiver source distance      :  35.00 m
Receiver height               :   1.50 m
Topography                    :       1      (Flat/gentle slope; no barrier)
Reference angle               :   0.00
```

.oad data, segment # 3: McK east

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: McK east

Angle1 Angle2 : -75.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -75.00 deg Angle2 : -45.00 deg
Barrier height : 7.00 m
Barrier receiver distance : 20.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: McK west

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

ROAD (0.00 + 40.03 + 0.00) = 40.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	75	0.31	67.70	0.00	-4.81	-8.76	0.00	0.00	-14.10	40.03

Segment Leq : 40.03 dBA

Results segment # 2: McK centre

Source height = 1.26 m

ROAD (0.00 + 58.27 + 0.00) = 58.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	45	0.66	67.70	0.00	-6.11	-3.32	0.00	0.00	0.00	58.2

Segment Leq : 58.27 dBA

Results segment # 3: McK east

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.93	1.93

ROAD (0.00 + 38.63 + 0.00) = 38.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-75	-45	0.25	67.70	0.00	-4.59	-8.57	0.00	0.00	-15.91	38.6

Segment Leq : 38.63 dBA

Total Leq All Segments: 58.38 dBA

TOTAL Leq FROM ALL SOURCES: 58.38

CARTIER ST.
McKEOWN AVE.
CAR CARE CENTRE
CHAMPLAIN ST.
120m
180m
70°
70
130m
Reserve #5
1392 cars
22 mc
36 h

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:04:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_1699.te Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes 1999 Oakdale Rear Yards

Road data, segment # 1: Mck west

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Mck west

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east

Angle1 Angle2 : -70.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: Mck west

Source height = 1.26 m

ROAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

Segment Leq : 45.03 dBA

Segment # 2: McK east

Source height = 1.26 m

ROAD (0.00 + 45.03 + 0.00) = 45.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	63.60	0.00	-13.68	-4.89	0.00	0.00	0.00	45.03

Segment Leq : 45.03 dBA

Total Leq All Segments: 48.04 dBA

TOTAL Leq FROM ALL SOURCES: 48.04

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:07:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_16fut.te Time Period: 16 hours
Description: 4351 Rec#5 16 hour volumes future Oakdale Rear Yd

Road data, segment # 1: Mck west

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Mck west

Angle1 Angle2 : 0.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: McK east

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: McK east

Angle1 Angle2 : -70.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 100.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: Mck west

Source height = 1.26 m

ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	70	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

Segment Leq : 49.13 dBA

Segment # 2: McK east

Source height = 1.26 m

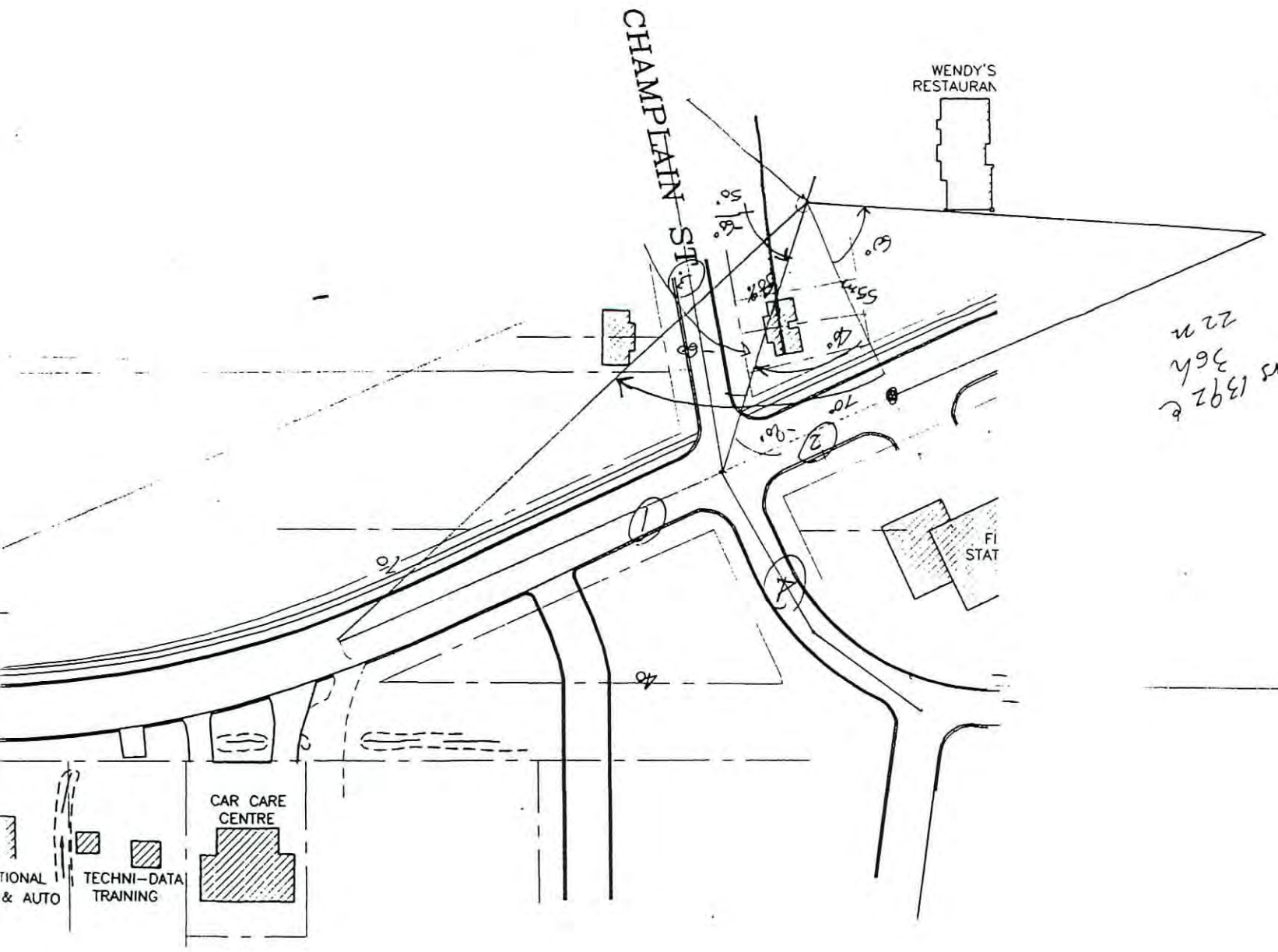
ROAD (0.00 + 49.13 + 0.00) = 49.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	67.70	0.00	-13.68	-4.89	0.00	0.00	0.00	49.13

Segment Leq : 49.13 dBA

Total Leq All Segments: 52.14 dBA

TOTAL Leq FROM ALL SOURCES: 52.14



#6
Leaving from Champlain.

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:12:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16fut.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes future Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume : 20304 veh/TimePeriod
Medium truck volume : 317 veh/TimePeriod
Heavy truck volume : 529 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 40.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 80 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
Heavy truck volume : 670 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : 0.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 30.00 deg Angle2 : 40.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: mck east 1

Car traffic volume : 25920 veh/TimePeriod
Medium truck volume : 410 veh/TimePeriod
Heavy truck volume : 670 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1

Angle1 Angle2 : -60.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: Champ north

Car traffic volume : 2970 veh/TimePeriod
Medium truck volume : 36 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Champ north

Angle1 Angle2 : -60.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 60.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

.oad data, segment # 5: Champ south

Car traffic volume : 3123 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 36 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: Champ south

Angle1 Angle2 : -70.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 42.95 + 0.00) = 42.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.66	67.70	0.00	-9.37	-9.43	0.00	-5.95	0.00	42.9

Segment Leq : 42.95 dBA

Segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

ROAD (51.46 + 33.91 + 0.00) = 51.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
0	30	0.66	68.74	0.00	-9.37	-7.91	0.00	0.00	0.00	51.4
30	40	0.31	68.74	0.00	-7.38	-12.82	0.00	0.00	-14.64	33.9

Segment Leq : 51.54 dBA

Segment # 3: mck east 1

Source height = 1.26 m

ROAD (0.00 + 52.84 + 0.00) = 52.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-60	0	0.66	68.74	0.00	-10.57	-5.33	0.00	0.00	0.00	52.

Segment Leq : 52.84 dBA

Segment # 4: Champ north

Source height = 0.97 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.97	1.50	1.63	1.63

ROAD (0.00 + 34.51 + 0.00) = 34.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-60	60	0.38	57.21	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.

Segment Leq : 34.51 dBA

Segment # 5: Champ south

Source height = 1.03 m

ROAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubL
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36

Segment Leq : 36.53 dBA

Total Leq All Segments: 55.59 dBA

TOTAL Leq FROM ALL SOURCES: 55.59

STAMSON 5.0 COMPREHENSIVE REPORT Date: 17-05-1999 11:44:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6b16_99.te Time Period: 16 hours
Description: 4351 Rec#6 16 hour volumes 1999 Rear Champlain

Road data, segment # 1: mck west 1

Car traffic volume : 7767 veh/TimePeriod
Medium truck volume : 126 veh/TimePeriod
Heavy truck volume : 207 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: mck west 1

Angle1 Angle2 : 40.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1
House density : 80 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: mck west 2

Car traffic volume : 12528 veh/TimePeriod
Medium truck volume : 198 veh/TimePeriod
Heavy truck volume : 324 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: mck west 2

Angle1 Angle2 : 0.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier
Barrier angle1 : 30.00 deg Angle2 : 40.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 30.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: mck east 1

Car traffic volume : 12528 veh/TimePeriod
Medium truck volume : 198 veh/TimePeriod
Heavy truck volume : 324 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: mck east 1

Angle1 Angle2 : -60.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: Champ north

Car traffic volume : 2920 veh/TimePeriod
Medium truck volume : 36 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Champ north

Angle1 Angle2 : -60.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -60.00 deg Angle2 : 60.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 m
Source elevation : 1.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 5: Champ south

Car traffic volume	: 3123	veh/TimePeriod
Medium truck volume	: 27	veh/TimePeriod
Heavy truck volume	: 36	veh/TimePeriod
Posted speed limit	: 50	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

Data for Segment # 5: Champ south

Angle1 Angle2	: -70.00	deg	-60.00 deg
Wood depth	: 0		(No woods.)
No of house rows	: 0		
Surface	: 1		(Absorptive ground surface)
Receiver source distance	: 35.00	m	
Receiver height	: 1.50	m	
Topography	: 1		(Flat/gentle slope; no barrier)
Reference angle	: 0.00		

Segment # 1: mck west 1

Source height = 1.26 m

ROAD (0.00 + 42.97 + 0.00) = 42.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
40	70	0.66	63.60	0.00	-5.00	-9.43	0.00	-6.20	0.00	42.9

Segment Leq : 42.97 dBA

Segment # 2: mck west 2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.91	1.91

ROAD (48.31 + 30.75 + 0.00) = 48.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
0	30	0.66	65.59	0.00	-9.37	-7.91	0.00	0.00	0.00	48.3
30	40	0.31	65.59	0.00	-7.38	-12.82	0.00	0.00	-14.64	30.7

Segment Leq : 48.38 dBA

Segment # 3: mck east 1

Source height = 1.26 m

ROAD (0.00 + 49.68 + 0.00) = 49.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-60	0	0.66	65.59	0.00	-10.57	-5.33	0.00	0.00	0.00	49.6

Segment Leq : 49.68 dBA

Segment # 4: Champ north

Source height = 0.98 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.98	1.50	1.64	1.64

ROAD (0.00 + 34.47 + 0.00) = 34.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-60	60	0.38	57.17	0.00	-5.06	-2.09	0.00	0.00	-15.55	34.4

Segment Leq : 34.47 dBA

Segment # 5: Champ south

Source height = 1.03 m

ROAD (0.00 + 36.53 + 0.00) = 36.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLe
-70	-60	0.66	57.67	0.00	-6.11	-15.03	0.00	0.00	0.00	36..

Segment Leq : 36.53 dBA

Total Leq All Segments: 52.76 dBA

TOTAL Leq FROM ALL SOURCES: 52.76

APPENDIX 3

VISUAL PAVEMENT INSPECTION AND GEOTECHNICAL REVIEW

Merlex Engineering Ltd.

4351

MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

RECEIVED
FEB 18 1999

Reference No. 99/02/99009

February 12, 1999

Northland Engineering Ltd.
1850 Bond Street
North Bay, Ontario
P1B 8G5

Attention: Mr. Dave Richards, P. Eng.

Re: Preliminary Visual Assessment
McKeown Avenue

Dear Sir:

As per your letter of authorization dated February 9, 1999, we have carried out the preliminary visual field review of pavement condition on McKeown Avenue from Algonquin Avenue to Gormanville Road and present our findings and comments in this brief letter report.

VISUAL PAVEMENT REVIEW

On February 10, 1999, a visual pavement review was carried out by our Pavement Designer, Mr. Howie Pattenden, and his comments and observations are contained on Enclosure No. 1.

For this commentary, McKeown Avenue has been broken down into four sections.

Section 1 - Hwy 11 (Algonquin Ave.) to Cartier Street (4 lane section)

Section 2 - Cartier Street to McNamara Avenue (2 lane section)

Section 3 - McNamara Avenue to 50 m past west entrance to MTO

Section 4 - 50 m west of west entrance to MTO to Gormanville Road

We have carried out a review of past geotechnical investigations, undertaken by our firm, for various developments to the north and south of the McKeown Avenue right of way, between Algonquin and Gormanville Road. The subgrade conditions, based on this desk review, vary from silt and clay deposits underlying surficial organic layers to fine sands with varying silt content to silty fine sands. The groundwater table was generally recorded at a shallow depth below existing grade on the previous investigation.

COMMENTS

Based on the available historical information (old design pavement structure cross section) and our visual assessment of the existing pavement surface conditions, we have the following comments dealing with reconstruction for the above noted road.

Section 1 - Algonquin Ave. to Cartier Street

The road section between Highway 11 (Algonquin) to Cartier Street is curb and gutter with four lanes. It is understood that this section was reconstructed around 1992 with 140 mm of asphalt overlying 150 mm of Granular A followed by 600 mm of Granular B Type I. Perforated drains (150 mmø) were installed below both the north and south curbs.

This section of road has responded relatively well over the last 7 years. One minor dip was observed at a catch basin lead on the outside eastbound lane. This is probably due to the presence of granular trench backfill within the depth of frost penetration (i.e. non-uniform subgrade cross section). To rehabilitate this section of road, a dig out may be considered at the location of this storm sewer lateral. The remainder of road

rehabilitation could consist of milling off 50 mm of existing asphalt and repaving with 50 mm HL4 modified.

Section 2 - Cartier Street to McNamara

This section of road is predominantly two lanes with curb and gutter. It is understood that it was constructed around 1979 and that the pavement structure consisted of 80 mm of HL4 asphalt underlain by 150 mm of Granular A and 375 mm of Granular B Type I with trenched in 150 mmø perforated subdrains below the curb.

A visual review indicated moderate to transverse cracking of an intermittent nature with few slight alligator cracks. Slight wheel track rutting was also observed.

This section of road has stood up relatively well for the last 20 years with selective resurfacing. We therefore suggest that reconstruction could consist of in-place full depth processing, a granular lift of some 200 mm to 300 mm of Granular A followed by 130 mm of asphalt pavement consisting of 40 mm HL4 modified, 50 mm of heavy duty upper binder and 50 mm heavy duty lower binder be considered for this section of road. It is likely that the subdrain system will also have to be replaced. If profile grade cannot be increased by this amount, it will then be necessary to carry out an excavation to reconstruct the pavement structure to a section of 130 mm asphalt, 150 Granular A and 600 mm Granular B Type I with subdrains both sides.

Section 3 - McNamara to 50 m west of west entrance to MTO

It is understood that a typical section of McKeown Avenue between Gormanville and McNamara dated 1978 consisted of 125 mm of asphalt underlain by 150 mm of Granular A and 300 mm of Granular B Type I. The section between McNamara and west of MTO

exhibits moderate wheel track rutting in front of Lucky 13 with moderate distortions and poor drainage between Lucky 13 and the west entrance to the MTO building. There is no ditch to the north side of McKeown Avenue between Lucky 13 and the MTO. Some selective resurfacing has been carried out over this area in the past years.

A geotechnical investigation carried out for the Lucky 13 indicated that the subgrade conditions probably consist of silt and clays. It is probable that the impermeable nature of the subgrade conditions, poor drainage along the north side and thin existing pavement structure combine to produce a pavement surface which has responded poorly to higher traffic load during the latter part of its life.

To correct this section it will probably be necessary to excavate to allow reconstruction of a pavement structure consisting of 130 mm of asphalt, 150 mm of Granular A and 600 mm of Granular B Type I with 150 mmø perforated drain both north and south to ensure proper drainage of subgrade.

Section 4 - 50 m west of MTO west Entrance to Gormanville Road

There are two areas where slight to moderate wheel track rutting combined with moderate to intermittent transverse cracking have been observed and must be investigated. The remaining portion of this section of McKeown Avenue can probably be rehabilitated with a milling off of 50 mm and repaving with 50 mm HL4 modified.

General

If widening is required, the above pavement sections must be carried across for the new lanes.

CLOSURE

Merlex Engineering Ltd. has carried out a visual pavement condition survey combined with a desktop review of geotechnical conditions in the McKeown Avenue area. The comments contained in this report are intended to be used only for preliminary estimating purposes. A detailed field investigation involving sampled boreholes and laboratory testing, etc., must be carried out to further delineate the cause of distresses as identified in this report. Following a detailed investigation and laboratory test program, a more specific pavement design can be compiled.

We trust the enclosed comments are sufficient for your initial preliminary purposes. Should you have any queries or if we could be of further assistance, please do not hesitate to contact the undersigned.

Yours very truly,

MERLEX ENGINEERING LTD.

M.A. Merleau, P. Eng.

MAM/cl

Encl.

99009 - Visual and Historical Assessment Report

VISUAL PAVEMENT REVIEW

McKeown Avenue (from Algonquin Avenue to Gormanville Road)
carried out on February 10, 1999

Area A - Algonquin Ave. to Cartier Street (4 Lane Section)

- Longitudinal cracks in each inside lane from improper paving.
- Moderate intermittent cracks.
- Moderate frost heave in eastbound lane over sewer lateral, east of Champlain St.
- Slight few longitudinal meander and midlane cracking.

Area B - Cartier Street to McNamara (2 lane section)

- Moderate transverse cracking intermittent.
- Slight few alligator cracking.
- Slight wheel track rutting.
- Few sections with poor surface drainage.
- Slight to moderate longitudinal meander and midlane cracking.
- Moderate wheel track rutting (front of Lucky 13).
- Moderate distortion and poor drainage between Lucky 13 and MTO Building.
- Some selective resurfacing has been carried out.

Area C - McNamara to Gormanville Road

- Moderate distortion and alligator cracking (MTO west entrance W'ly 50 m).
- Moderate intermittent transverse cracking.
- Slight few alligator cracking.
- Slight to moderate wheel track rutting between two curves.
- Moderate intermittent C/L cracking.
- Moderate distortion between two curves.
- Slight few longitudinal meander midlane cracking.

APPENDIX 4

MCKEOWN AVENUE TRAFFIC STUDY

AND ADDENDUM

Algonquin Avenue to Gormanville Road

McKeown Avenue Traffic Study

Algonquin Avenue to Gormanville Road

prepared for

the City of North Bay



by

Tranplan Associates

October 1999



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1. INTRODUCTION

In 1997-98 the City of North Bay conducted a traffic study of the McKeown Avenue/Josephine Street area. The final report, entitled "McKeown Avenue / Josephine Street Traffic Study, June 1998" presented the findings of the study together with detailed recommendations for improvements to McKeown Avenue between Algonquin Avenue and Champlain Street. In summary, the report recommended that, within the study area, McKeown Avenue be widened from four lanes to five lanes, providing a centre fifth lane for two-way left turns, along with right turn tapers at selected locations, improvements to the Algonquin Avenue intersection and new traffic signals at Josephine Street.

Subsequently the City decided to conduct a similar traffic study for the section of McKeown Avenue from Champlain Street west to Gormanville Road. Due to the size of the study area and the extent of its impact, the project was undertaken as a Schedule C Municipal Environmental Assessment, with the associated traffic study undertaken as one of the technical background reports in support of the EA process. This report documents the traffic study which has been carried out for McKeown Avenue between Champlain Street and Gormanville Road. Together with the previous report for the section between Algonquin Avenue and Champlain Street, these two reports form the supporting technical traffic reports for the Class Environmental Assessment for McKeown Avenue between Algonquin Avenue and Gormanville Road.

The study conclusions and recommendations are presented in the next section (Chapter 2). Chapter 3 describes the existing conditions in the study area; Chapter 4 describes the projected future traffic volumes in the corridor; Chapter 5 evaluates the impact of the projected traffic on the existing road network and identifies the necessary improvements.

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

2.1 Findings from 1998 Traffic Study McKeown Avenue/Josephine Street

In response to expected development in the Josephine Street area, the City carried out an earlier study, "McKeown Avenue/Josephine Street Traffic Study - June 1998", which dealt with McKeown Avenue from Algonquin Avenue to Champlain Street. Along with improvements at the McKeown Avenue/Algonquin Avenue intersection (northbound double left turn and the addition of one lane on the McKeown Avenue and Airport Road approaches), the study recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). These improvements were to coincide with development of the vacant lands along Josephine Street and the nearby McKeown Avenue.

The current study supports the 1998 Study recommendations.

2.2 Champlain Street to Gormanville Road Existing Level of Service

From Champlain Street to Gormanville Road, McKeown Avenue is currently operating at an acceptable Level of Service, with the exception of the McKeown Avenue/Gormanville Road intersection where one movement, the left turn from McKeown to go south on Gormanville, is experiencing long delays at peak hours (see Exhibit 3.2). The McKeown Avenue /Gormanville Road intersection is close to the point of warranting traffic signals; with traffic signals, the intersection would operate at a very good Level of Service.

It is recommended that the intersection of McKeown Avenue and Gormanville Road be monitored on a regular basis (annually during the school year) to determine when traffic volumes reach the level warranting traffic signals.

An analysis of Police accident reports confirms earlier findings from the 1998 study that the McKeown Avenue/Champlain Street intersection and McKeown Avenue at the Tim Hortons entrance are high accident locations (see Exhibits 3.2 and 3.3, and Table 3.1). The accident

frequency indicates problems at these locations in the existing road network even though the traffic capacity (Level of Service) is satisfactory.

It is recommended that the 1998 study recommendations be implemented at the McKeown Avenue/Champlain Street intersection (left turn lanes and left turn signal phasing) and on McKeown Avenue at the Tim Hortons entrance (consolidation of entrances and left turn storage lane, with traffic signals as new development occurs).

2.3 Future Development in the McKeown Avenue Corridor 2004 and Longer Term Future

McKeown Avenue between Algonquin Avenue and Gormanville Road is expected to see major development pressure over the next 15-20 years (see Table 4.1). For planning purposes it has been assumed that by 2004 the corridor will have approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, several new restaurant developments, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building, and development of a new hospital complex on 30-40 acres of land west of Gormanville Road.

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (mostly on Education Centre Lowlands), 500 new residential units, more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

2.4 Projected Growth in Traffic 2004 and Longer Term Future

Based on the projected development scenarios, future levels of traffic have been estimated for 2004 and a longer term planning horizon. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour. An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed. This new

traffic has been assigned to the existing road network based on the observed directional orientation of today's traffic (see Exhibit 4.2) and the results in 2004 are 65% and 100% increases in traffic at the east and west ends of McKeown Avenue respectively (see Exhibits 5.1 and 5.2). The ultimate (full development) traffic volumes are estimated to be 100% and 200% higher than today's traffic at the east and west ends respectively.

The impact of the added traffic in 2004 will be reduced Levels of Service ("D" and "E" at the key entry points and "E" and "F" at most internal locations - see Exhibit 5.3) if no improvements are made to the roads. With no road improvements and full development, the Levels of Service are almost all reduced to "F" (see Exhibit 5.4).

2.5 McKeown Avenue from Champlain Street to Gormanville Road Required Number of Through Lanes

Based on the projected traffic volumes along McKeown Avenue between Champlain Street and Gormanville Road, two through lanes in each direction will provide sufficient capacity over the planning period to full development. The section between Cartier Street and McNamara Street will require widening by 2004; between McNamara Street and Gormanville Road, one through lane in each direction may continue to be satisfactory through 2004, but will need widening within five years after 2004, with the section from McNamara Street to the Provincial Government Building being more critical.

It is recommended that two through lanes in each direction be adopted as the design standard for McKeown Avenue.

2.6 McKeown Avenue from Champlain Street to Gormanville Road Turning Lanes

Left turn storage lanes are currently required at Champlain Street, Cartier Street, McNamara Street and at the Ontario Government Building entrances. With the expected new development by 2004, left turn storage lanes will also be required at driveways between Champlain Street and Cartier Street and between Cartier Street and McNamara Street. Since

the tapers of these left turn storage lanes will overlap, a continuous centre two-way left turn lane should be provided from Champlain Street to the west side of the Ontario Government Building driveways. Between the Ontario Government Building and Gormanville Road, it would be possible to taper from five lanes to four lanes, but since the four lane section would only be approximately 100 metres long between tapers, it is proposed that the five lane section be carried through to Gormanville Road.

Right turn tapers or right turn channelizations would be desirable on McKeown Avenue at both approaches to Champlain Street, at Cartier Street, at McNamara Street and at the east entrance to the Ontario Government Building. These should only be provided if it can be done without adverse impact on pedestrians and adjacent properties.

It is recommended that the centre two-way left turn lane, which was previously recommended between Algonquin Avenue and Champlain Street, be continued through to Gormanville Road, and that consideration be given to providing right turn tapers or channelizations at Champlain Street (both approaches), at Cartier Street, at McNamara Street, and at the east entrance to the Ontario Government Building.

2.7 McKeown Avenue/Gormanville Road /College Drive Intersection

It is expected that the McKeown Avenue/Gormanville Road intersection will warrant traffic signals within the next few years. If the McKeown Avenue approach to the intersection is widened at the same time as the signals are installed, the intersection should operate at a very good Level of Service for a number of years. As the area approaches full development, the approaches to the intersection would require further improvements; however, full development may coincide with the construction of the new North Bay Bypass, which includes a new grade separated alignment for Gormanville Road with significant imrovements in traffic capacity.

It is recommended that traffic signals be installed at the McKeown Avenue/Gormanville Road intersection when the volumes reach the minimum warrant level, and that the McKeown Avenue approach to the intersection be widened before the signals are installed.

2.9 Gormanville Road /Highway 17 Intersection

The Gormanville Road/Highway 17 intersection is currently operating at a satisfactory Level of Service ("C"). By 2004 this will drop to "D", but widening both Gormanville Road approaches by one lane would maintain the Level of Service at "C". By full development, the Level of Service would again drop to "D", but full development is expected to coincide with the realignment of the Bypass and the grade separation of its new intersection with Gormanville Road, which would produce significant improvements in capacity.

2.10 Sidewalks

The expected traffic volumes and intensity of development along McKeown Avenue will justify a sidewalk along both sides of the road.

It is recommended that as development /redevelopment takes place, provision should be made for a sidewalk along the south side of McKeown Avenue.

3. EXISTING CONDITIONS

3.1 McKeown Avenue

Between Algonquin Avenue and Cartier Street, McKeown Avenue is a four lane undivided roadway with an urban cross-section (curb and gutter and storm sewers); west of Cartier Street, McKeown Avenue becomes a two lane roadway with curb and gutter. The speed limit is 50 km/h. There is a sidewalk along the north side between Algonquin Avenue and the west entrance to the Provincial Government Building west of McNamara Street.

Traffic signals are located at the Algonquin Avenue (Highway 11) intersection and at the Champlain Street intersection; a STOP sign faces McKeown Avenue traffic at Gormanville Road. The Algonquin Avenue intersection has channelized right turn lanes (and left turn storage lanes on Algonquin Avenue); there are no turning lanes or channelizations along McKeown Avenue between Algonquin Avenue and Gormanville Road.

3.2 Gormanville Road

Gormanville Road is an important north-south through road linking Main Street to McKeown Avenue/College Drive with a signalized intersection at Highway 17. North of McKeown Avenue, Gormanville Road is a cul-de-sac providing access to local properties (primarily OPP Buildings, MTO maintenance facilities and Nipissing University Residence). On both sides of Highway 17 (Eloy Road to McKeown Avenue), Gormanville Road is a four-lane roadway; north of McKeown Avenue and south of Eloy Road, it tapers to a two-lane roadway. The speed limit is 50 km/h.

3.3 College Drive

College Drive is a two-lane roadway which links McKeown Avenue and Gormanville Road up the escarpment to Nipissing University/Canadore College and the residential area north of the Education Centre. The posted speed limit on the escarpment is 70 km/h. Its intersection with Gormanville Road includes a channelized free flow right turn movement.

3.4 Existing Traffic Volumes

Exhibit 3.1 shows recent traffic count data for the study area for a morning and afternoon peak hour. The date and time of each count is indicated; some of the counts were recorded by City staff, while others were recorded byTranplan personnel. The detailed count sheets are included in Appendix A.

3.5 Accident Records

Detailed accident reports were made available by North Bay City Police for those accidents falling under their jurisdiction during 1996, 1997 and 1998. The Ministry of Transportation provided a computerized listing summarizing key elements of accident reports from the O.P.P. at the Algonquin Avenue (Highway 11)/McKeown Avenue (Airport Road) intersection and at the Highway 17/Gormanville Road intersection for the years 1995, 1996 and 1997. Table 3.1 summarizes the number of accidents at selected intersections and indicates the accident rate at the intersection for all accidents and for personal injury accidents. Exhibits 3.2, 3.3 and 3.4 show collision diagrams for the City data; Exhibits 3.5 and 3.6 shows collision diagrams reconstructed from the MTO data.

Table 3.1 summarizes the number of accidents and the accident rate at selected intersections; all data is over a three year period, except for the Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection, where four years of data was reviewed (21 months before reconstruction was completed in the Fall of 1996 and 27 months after reconstruction).

The highest number of accidents and the highest accident rates are at the Highway 17 /Gormanville Road intersection (22 collisions in total, or 1.3 collisions per million vehicles entering the intersection, with 10 personal injury accidents, or 0.6 personal injury accidents per million vehicles entering the intersection). Exhibit 3.6 shows a collision diagram for the 22 accidents reported at the Highway 17/Gormanville intersection from 1995 through 1997 prior to its reconstruction; fourteen of the 22 involved left turns, which should be reduced by the recent improvements to the intersection (the intersection was rebuilt with significant changes in the signal phasing during 1998 and 1999.

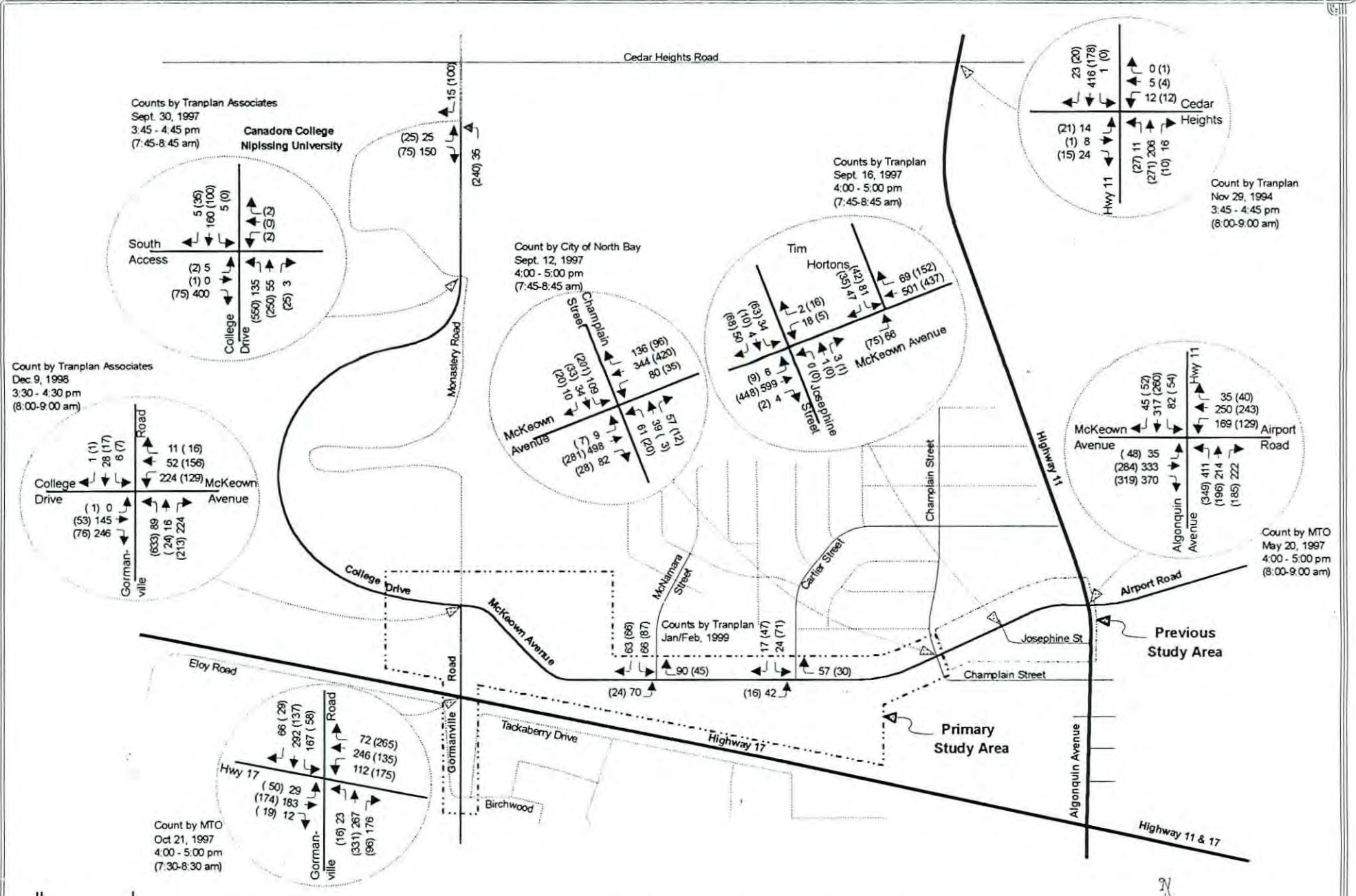


Exhibit 3.1 Existing Traffic Volumes

tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Table 3.1 Accident Rates at Selected Intersections

Intersection	Total No. of Accidents (3 yrs)	Accident Rate[1] (all accidents per million vehicles)	Personal Injury Accidents (3 yrs)	Accident Rate[2] (injury accidents per million vehicles)
McKeown Avenue /Champlain Street	16	1.2	5	0.4
McKeown Avenue /McNamara Street	5	0.5	0	0.0
McKeown Avenue /Gormanville Road	5	0.4	3	0.2
McKeown Avenue /Tim Horton's Entrance	12	0.9	1	0.1
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) Before Reconstruction 1995-1996 (21 months)	19	1.3	4	0.3
Highway 11 (Algonquin) /McKeown Ave (Airport Rd) After Reconstruction 1996-1998 (27 months)	12	0.7	6	0.3
Highway 17 /Gormanville Road	22	1.3	10	0.6

1 No. of accidents (all reported accidents) per million vehicles entering the intersection.

2 No. of personal injury accidents per million vehicles entering the intersection.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection experienced a similar high accident rate before it was reconstructed in 1996; after reconstruction, total collisions dropped from 1.3 to 0.7 collisions per million vehicles entering the intersection, but the personal injury accident rate did not show any improvement. Exhibit 3.5 shows the collision diagrams for the intersection before and after its reconstruction. During the 21 month period before reconstruction was completed, 19 collisions were reported (four involved personal injury); during the 27 months after reconstruction, 12 collisions were reported (six involved personal injury). It would appear that the reconstruction (including changes to the traffic signals) has been responsible for a 50% drop in the total number of collisions at this intersection, although the number of personal injury accidents has not dropped.

The McKeown Avenue/Champlain Street intersection has a high accident rate similar to the two MTO intersections before they were reconstructed (1.2 total collisions and 0.4 personal injury collisions per million vehicles entering the intersection). Exhibit 3.3 shows a collision diagram for the accidents at Champlain Street. Sixteen accidents occurred at the signalized Champlain Street intersection over the three year period, with the majority involving left turns from McKeown Avenue into Champlain Street (six westbound and three eastbound). Two accidents involved left turns from Champlain Street out onto McKeown Avenue, and three involved right angle collisions between McKeown Avenue and Champlain Street traffic. The high incidence of accidents at Champlain Street appears to be related to the absence of left turn storage lanes on McKeown Avenue and the lack of left turn phases in the signal timing.

The Tim Horton's driveway is the only other City intersection with a high accident rate (0.9 accidents per million vehicles entering the intersection). Exhibit 3.2 shows these accidents in collision diagram form. Twelve accidents occurred at the Tim Horton's driveway, with eleven of these being almost identical, involving a westbound vehicle along McKeown Avenue colliding with a vehicle making a left turn out from the Tim Horton's driveway. In comparison, only three similar collisions have been reported at the driveway adjacent to the McDonald's Restaurant. The significant incidence of accidents at the Tim Horton's driveway, appears to be the result of several factors, including the high volume of left turns and conflicting movements at this unsignalized location along McKeown Avenue, sight restrictions created by high volumes of

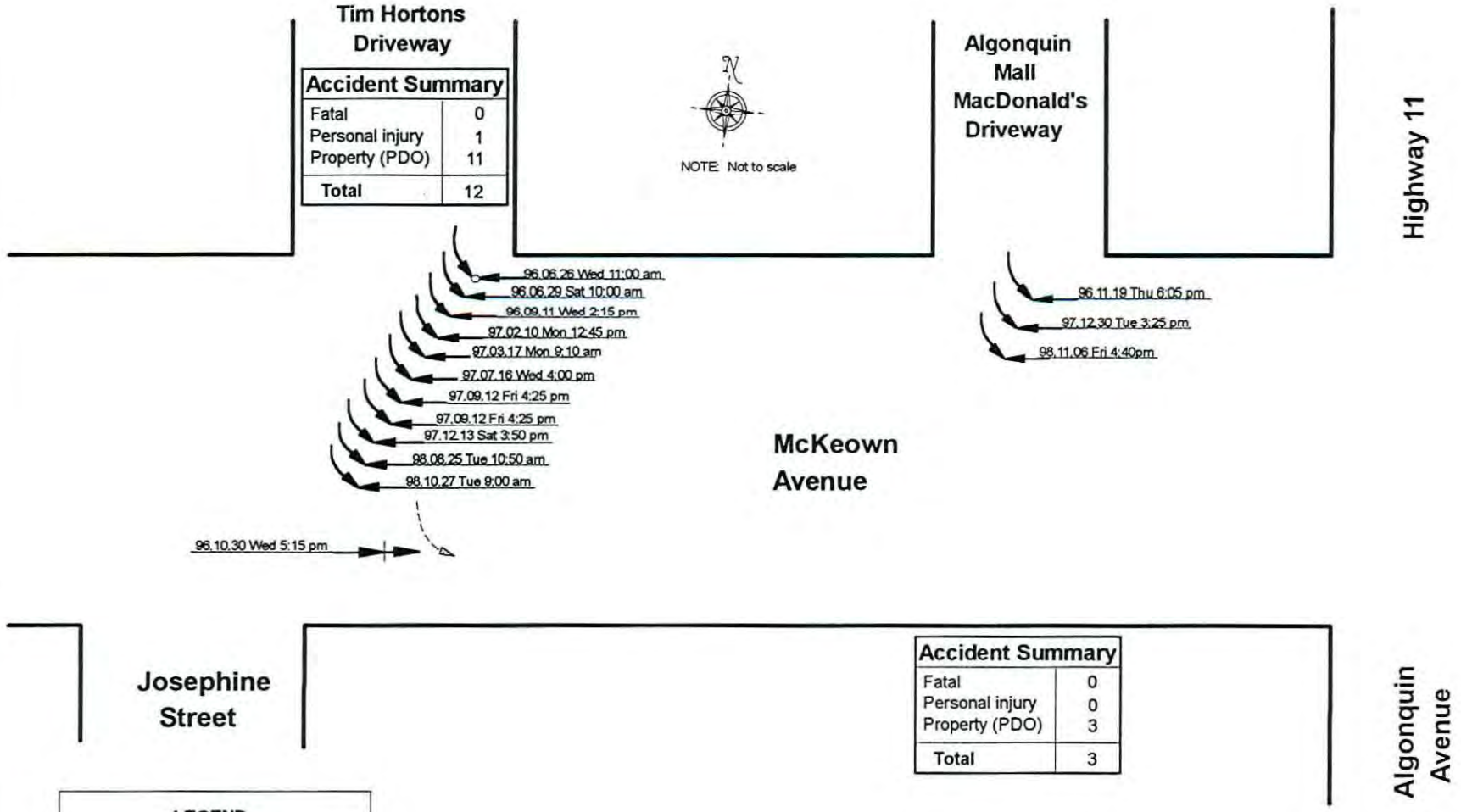


EXHIBIT 3.2
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Josephine St to Algonquin Ave

Tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel (705) 522-0272 Fax (705) 522-1733

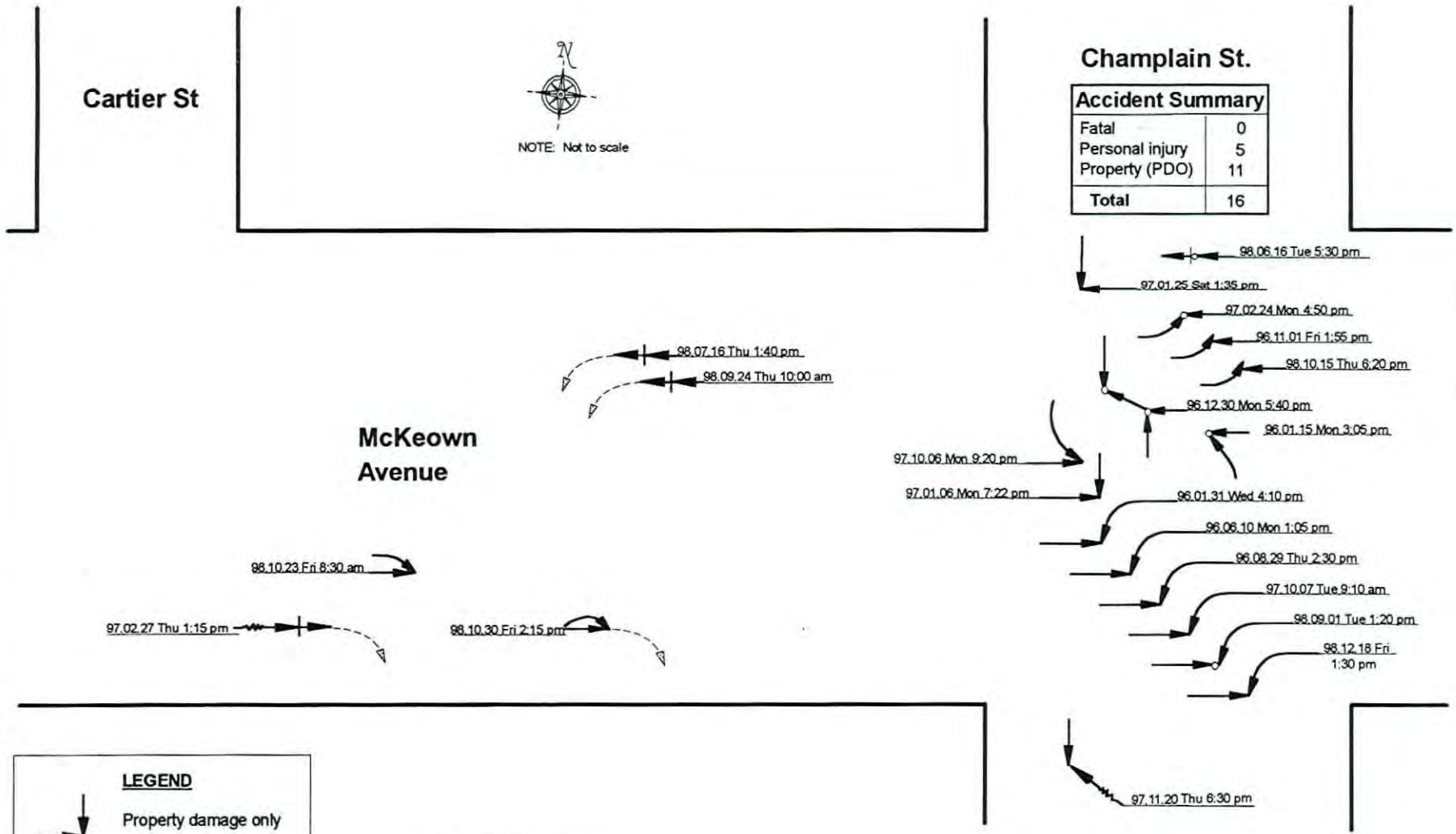


EXHIBIT 3.3
COLLISION DIAGRAM (1996-1998)
McKEOWN AVENUE
Cartier St to Champlain St

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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
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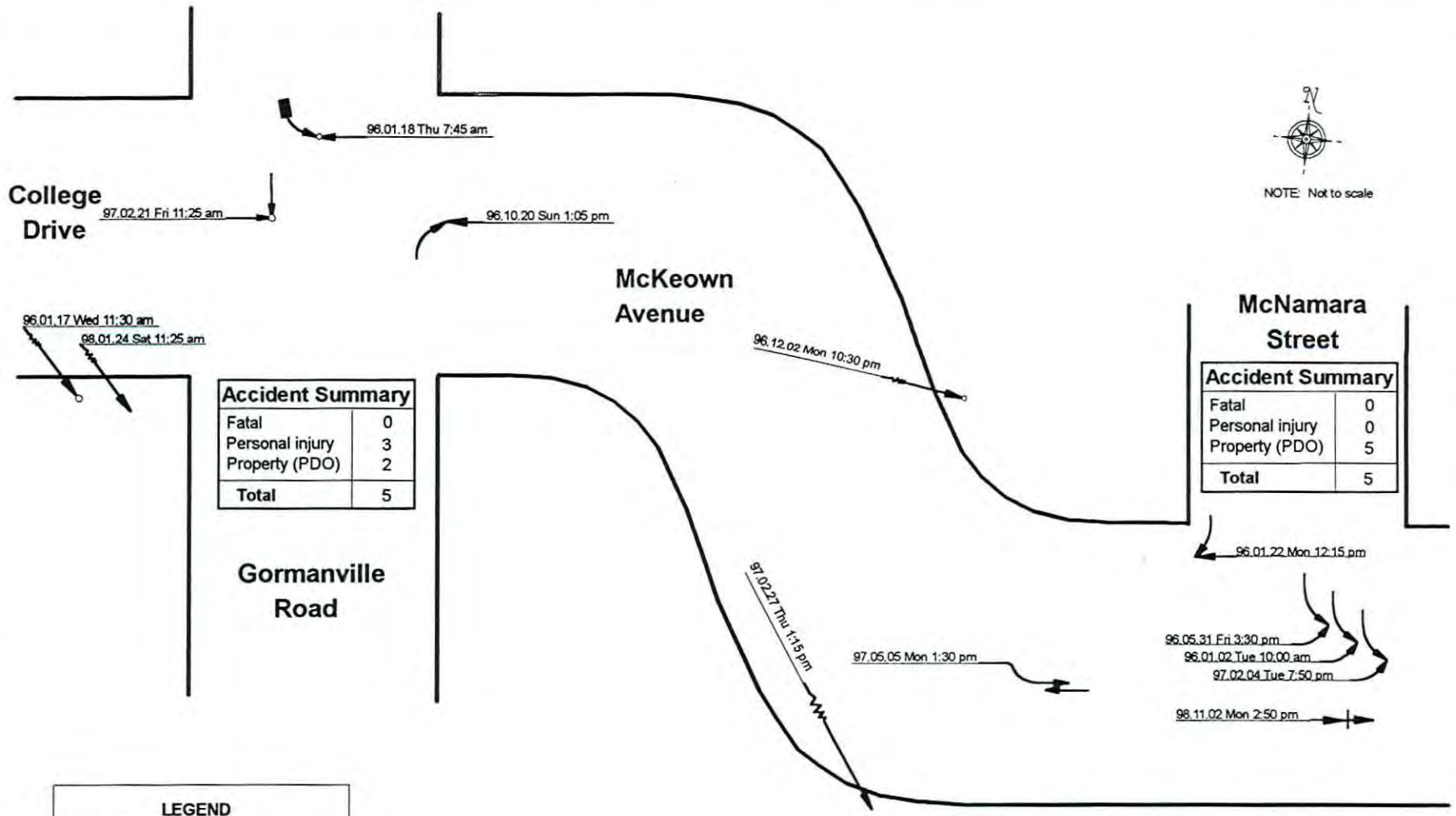
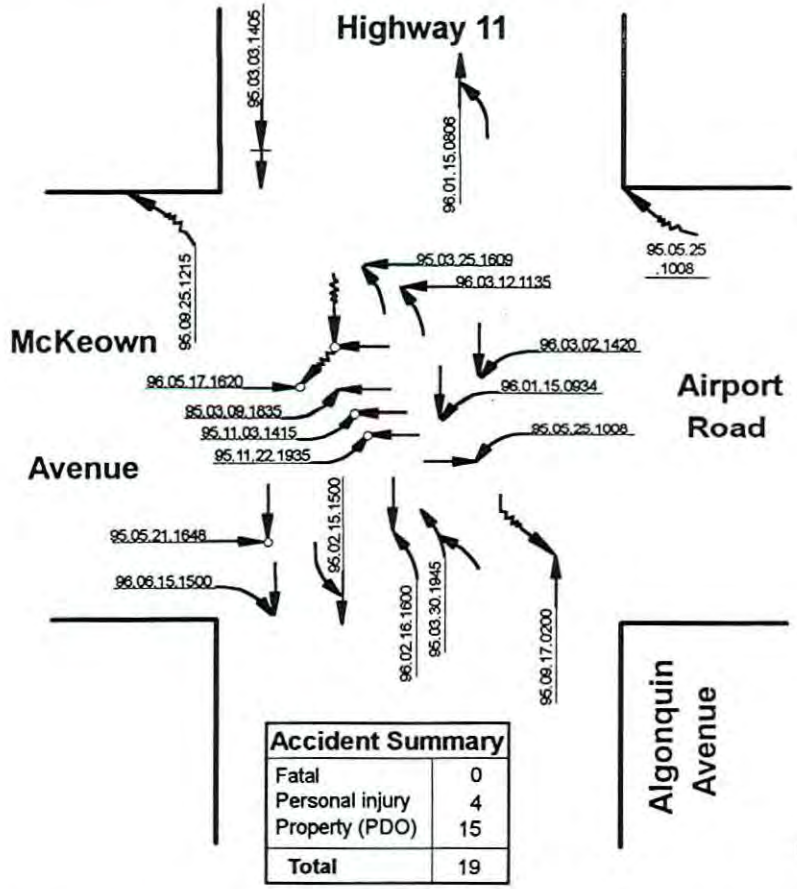


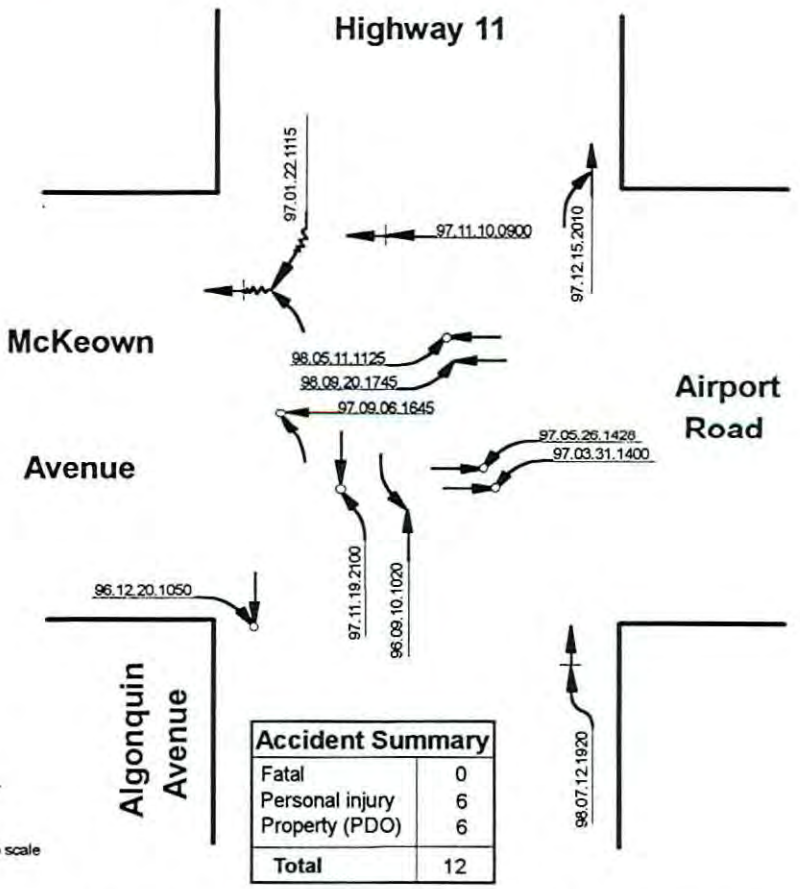
EXHIBIT 3.4
COLLISION DIAGRAM (1996-1998)
McKEOWN AVE
Gormanville Rd to McNamara St

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Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733



Accident Summary	
Fatal	0
Personal injury	4
Property (PDO)	15
Total	19

NOTE: Not to scale



Accident Summary	
Fatal	0
Personal injury	6
Property (PDO)	6
Total	12

(a) Before Reconstruction 1995-96 (21 months)

NOTE: Collisions reconstructed from MTO computerized listings of coded data. Not based directly on OPP reports.

(a) After Reconstruction 1996-98 (27 months)

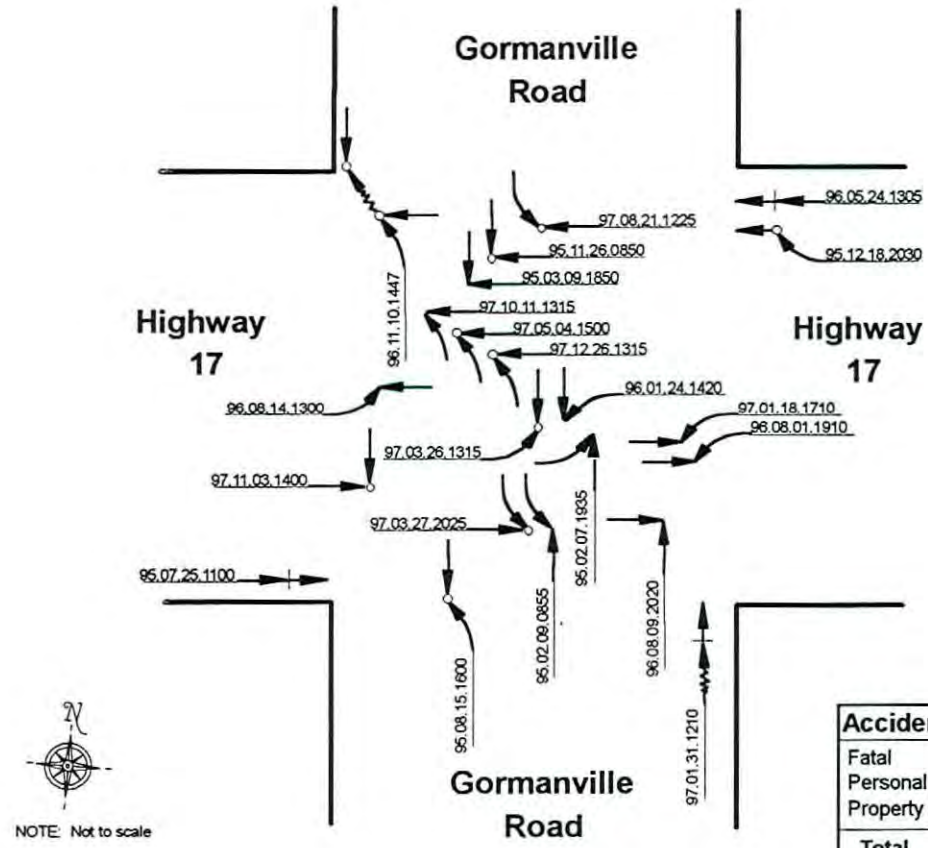
NOTE: Collisions reported in 1996 and 1997 reconstructed from MTO computerized listings of coded data. 1998 collisions based on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.5
COLLISION DIAGRAMS
McKeown Avenue at Highway 11

Trianon associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733



Accident Summary	
Fatal	0
Personal injury	10
Property (PDO)	12
Total	22

NOTE: Collisions reconstructed from MTO computerized listings of coded data.
Not based directly on OPP reports.

LEGEND

- Property damage only
- Personal injury
- Fatality

EXHIBIT 3.6
COLLISION DIAGRAM 1995-1997
Gormanville Road at Highway 17

Trans plan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1228 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

westbound vehicles in the curb lane along McKeown Avenue turning right into the Tim Hortons driveway, and the congestion/confusion created by the proximity of the two driveways on either side of Tim Hortons.

Exhibit 3.4 shows the accidents reported at the McNamara Street and at the Gormanville Road intersections. Only five collisions occurred at the Gormanville Road intersection over the three year period, with the same number at the McNamara Street intersection. There is not a significant accident problem in this section of McKeown Avenue.

3.6 Existing Level of Service

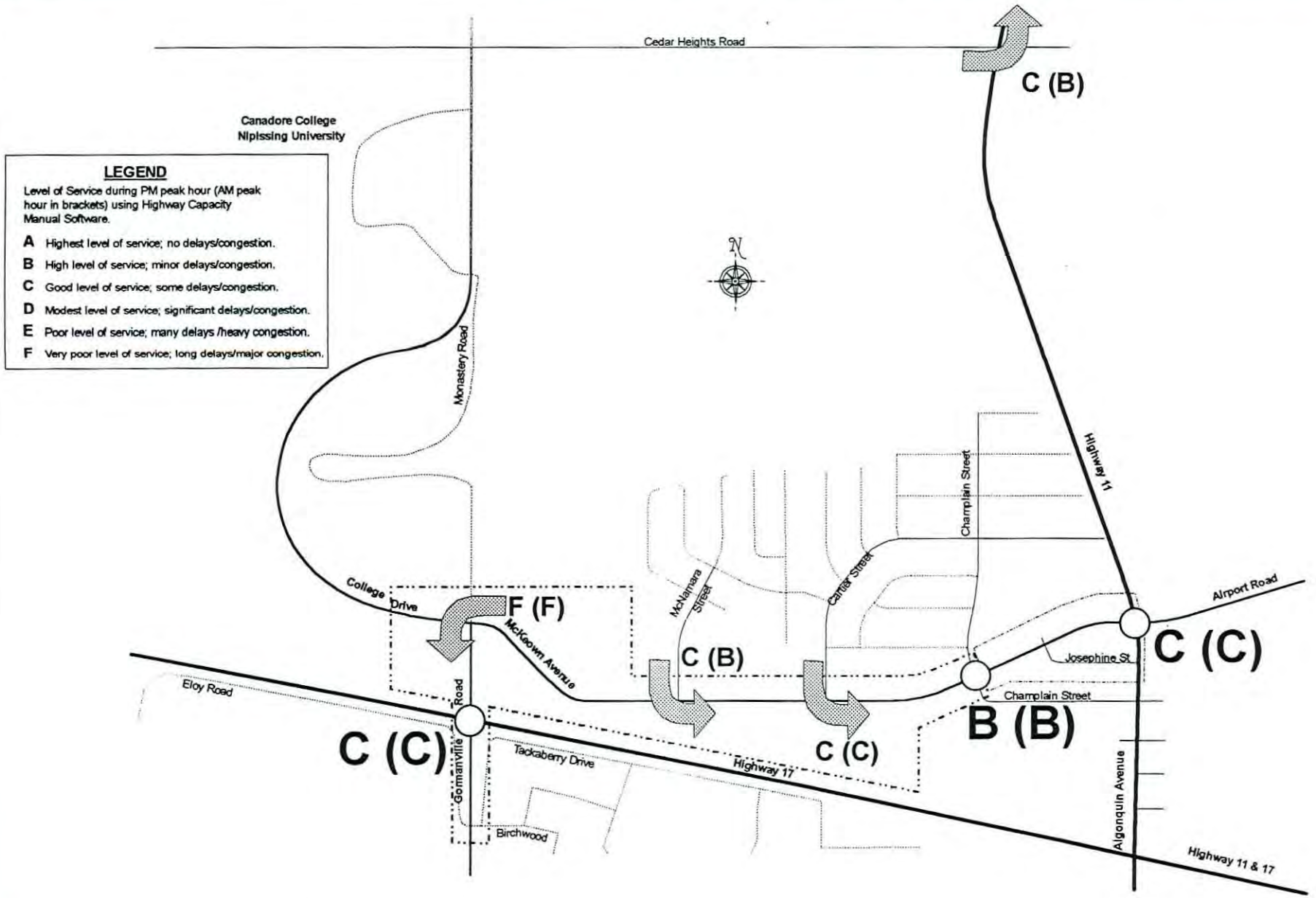
The traffic volumes shown in Exhibit 3.1 were assessed against the capacity of the intersections using the Highway Capacity Manual software. The Levels of Service[3] during weekday morning and afternoon peak hours are shown in Exhibit 3.7.

All intersections were found to be operating at a good Level of Service ("C" or better) except for the Gormanville/McKeown intersection where the westbound to southbound left turn is currently operating at Level of Service "F" in the morning and afternoon peak hours. All other movements at this unsignalized intersection are operating at Level of Service "B" or better.

The Highway 11 (Algonquin Avenue)/McKeown Avenue (Airport Road) intersection was calculated to be operating at Level of Service "C" during the AM and PM peak hours. The McKeown Avenue/Champlain Street intersection was found to be operating at Level of Service "B" during both AM and PM peak hours.

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[3] Level of Service (LOS) is commonly used in traffic engineering to describe the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing amounts of congestion with "F" representing a complete breakdown in traffic flow. Level of Service "C" and "D" are commonly used as design standards. The Highway Capacity Manual software for signalized and unsignalized intersections was used to calculate the Levels of Service.



tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 3.7 Existing Level of Service

3.7 Turning Lanes

The previous study for the McKeown Avenue/Josephine Street area identified a need at the present time for left turn storage lanes at the driveway adjacent to the McDonald's Restaurant, at the driveway on the east side of the Tim Hortons, at Josephine Street (marginal), and at Champlain Street. Allowing for tapers, it was concluded that a continuous centre fifth lane should be provided between Algonquin Avenue and Champlain Street. Right turn tapers were also identified as being desirable wherever they can be accommodated without adverse impact on pedestrians and adjacent properties.

The current study examined the intersections west of Champlain Street to Gormanville Road. Left turn storage lanes are warranted at Cartier Street, McNamara Street and at Gormanville Road. Left turn lanes are also warranted at the McKeown Avenue driveway entrances to the Ontario Government Building, the Redpath Group complex and the Canadian Tire store.

The distance between Champlain Street and Cartier Street is approximately 375 metres; the tapers for the left turn lanes from Champlain Street and Cartier Street would end approximately 125 metres apart. The distance between Cartier Street and McNamara Street is approximately 350 metres; the tapers for the left turn lanes would end approximately 100 metres apart. The distance between McNamara Street and the Ontario Government Building west driveway is approximately 250 metres; the tapers for the left turn lanes would run into each other.

4. FUTURE TRAFFIC LEVELS

The planning for the traffic requirements for the area has been based on analysing the following two scenarios:

i) five year horizon (2004) assuming the level of development/redevelopment in the McKeown Avenue corridor that is considered by City Planning officials to be realistic for planning purposes (see Table 4.1).

ii) 15-20 year horizon ("full development" scenario) assuming all foreseeable development/redevelopment in the McKeown Avenue corridor (see Table 4.1).

The expected new development within five years includes approximately 150,000 square feet of new commercial retail space, 15,000 square feet of new office space, five new restaurant developments, 50 new houses above the escarpment, enrolment increases of 1.5% per annum at the University and College, full occupancy in the Ontario Government Building (former MTO Building), and development of a new hospital complex on 30-40 acres of land west of Gormanville Road[4].

In the 5-20 year timeframe, this study has assumed development of an additional 260,000 square feet of retail space (200,000 square feet on College Lowlands), 500 new residential units (350 single family homes above the escarpment), two more restaurants, a motel and continuing 1.5% per annum growth in student enrolment at Canadore and Nipissing.

4.1 Trip Generation by New Development/Redevelopment

The traffic impact of the two development scenarios has been estimated using trip generation rates provided in the Institute of Transportation Engineers' (ITE) Trip Generation Manual. There were two exceptions: growth factors (1.5% per annum) were applied to estimate growth in traffic Canadore College and Nipissing University, and Tranplan files were used for estimating trip generation by the hospital complex

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[4] If the Hospital does not select this site for its new building, it is expected that the lands will be developed with commercial retail and residential uses. Depending on the proportion of retail uses, the lands may generate approximately the same amount of traffic as the Hospital, or significantly more.

Table 4.1: Projected Changes in Land Use in Study Area

Description of Lands	Size (Approx.)	Assumed New Development /Redevelopment	Estimated Timing
1. McKeown Avenue from Algonquin Avenue to Champlain Street plus Josephine Street	Approx. 7 acres	22,500 sq ft of new retail; 15,000 sq ft of new offices; new fast food restaurant	0-5 yrs
2. McKeown Avenue from Champlain Street to Cartier Street	16 acres	110,000 sq ft of new retail; two new fast food restaurants	0-5 yrs
	5 acres	35-40,000 sq ft of new retail;	5-20 yrs
3. McKeown Avenue from Cartier Street to McNamara Street	2 acres	20-25,000 sq ft of new retail	0-5 yrs
	3 acres	30-40,000 sq ft of new retail;	5-20 yrs
4. McKeown Avenue from McNamara Street to Gormanville Road	2.5 acres	Two new fast food restaurants	0-5 yrs
	5 acres	Motel; two new restaurants	5-20 yrs
5. College Drive below Escarpment (Education Centre Lowlands)	30+ acres	Hospital complex	0-5 yrs
	30 acres	200,000 sq ft of new retail; 150 new residential units	5-20 yrs
6. College Drive above Escarpment		Canadore College/Nipissing University enrolment increase of 1.5% per annum	0-20 yrs
		50 new single family housing units	0-5 yrs
		350 new single family housing units	5-20 yrs

NOTE: Assumptions about future development have been made for planning purposes only, and do not necessarily reflect any specific knowledge of the intentions of the landowners.

(ITE trip rates for hospitals do not appear to be representative of Canadian/Ontario conditions).

Table 4.2 shows the projected trip generation by the new development/redevelopment included in the two scenarios. The expected changes in land use over the next five years are projected to generate approximately 2,000 additional vehicle trips to the McKeown Avenue corridor during the afternoon peak hour (800 inbound and 1,200 outbound). An additional 2,500 vehicle trips are expected during the same afternoon peak hour when the corridor is fully developed.

4.2 Directional Orientation of New Traffic

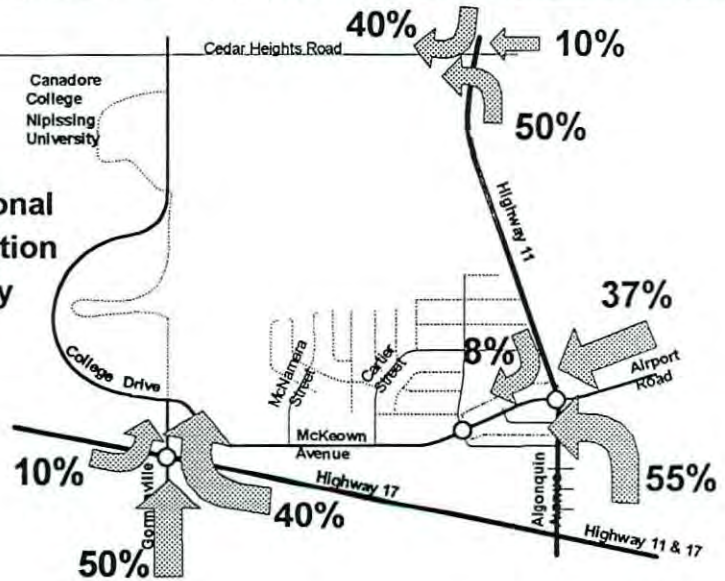
The directional orientation of the new traffic was based on observed movements at existing driveways and intersections along McKeown Avenue, including the key entry points at Algonquin Avenue and Gormanville Road (see Exhibit 4.1). A proportion of the overall traffic was assigned to the Cedar Heights/Highway 11 access route (50% of the new residential development on the escarpment, 15% of the new traffic to the University/College, and less than 10% of the other traffic to the corridor).

In the case of trips to the east end of the corridor (east of Champlain Street), 70% were assigned to approach from Algonquin Avenue; west of Champlain Street, the proportion was reduced to 60%. Of the trips which approach Nipissing University /Canadore College from the south (i.e. excluding the 15% that come via Cedar Heights Road), 80% come from Gormanville Road, as opposed to the 20% from McKeown Avenue. The Hospital and other developments on the Education Centre Lowlands are also expected to attract 80% of their traffic via Gormanville Road.

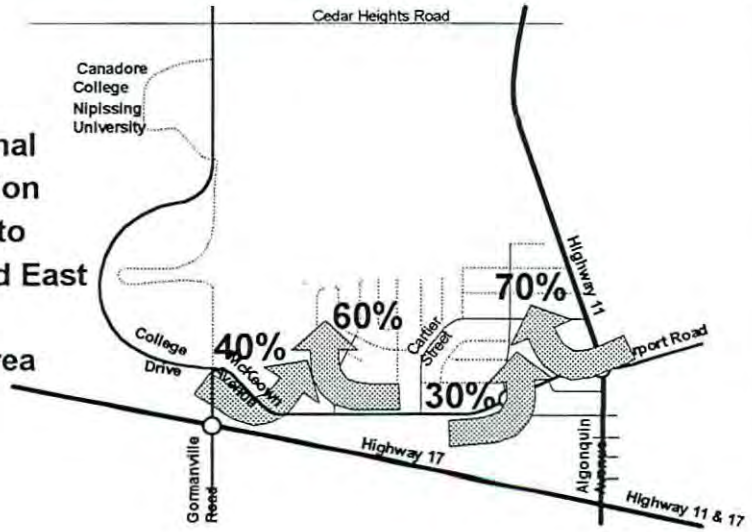
4.3 Growth in Background Traffic in the Study Area

Background traffic is defined as the traffic which passes through study area intersections, but which has neither an origin or a destination within the study area. Background traffic would include vehicles travelling through the study area along

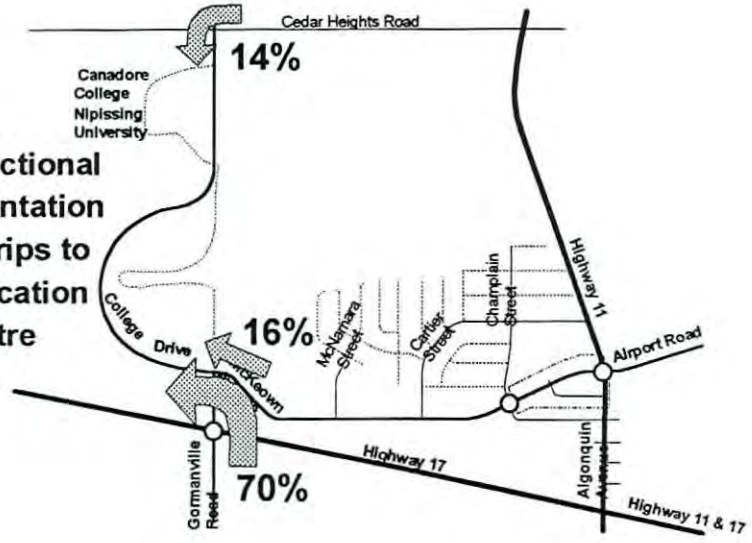
a) Directional Orientation at Study Area Entry Points



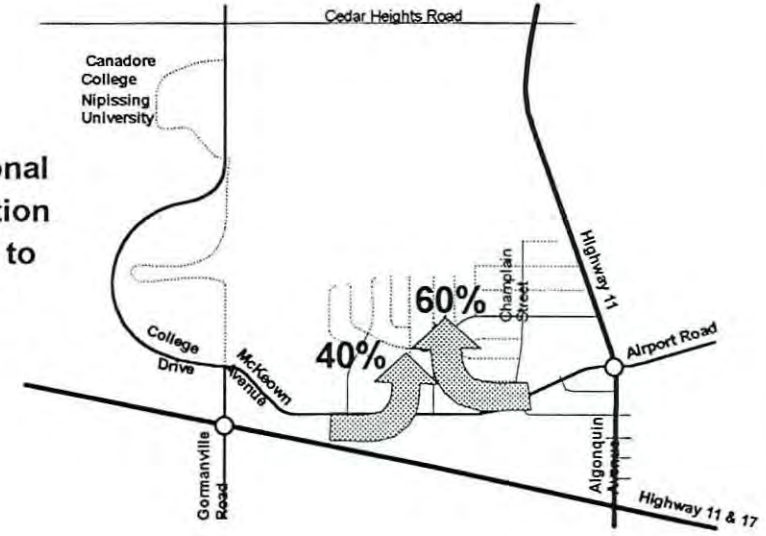
c) Directional Orientation of Trips to West and East Ends of Study Area



a) Directional Orientation of Trips to Education Centre



d) Directional Orientation of Trips to Cartier Street



tranplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 4.1 Existing Trip Orientation

Table 4.2 ESTIMATED NEW TRIP GENERATION BY CHANGES IN LAND USE

PROJECTED CHANGES IN LAND USE			WITHIN 5 YEARS								6 - 20 YEARS							
LOCATION	EXISTING USE	ASSUMED NEW USE /CHANGE IN USE	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual, 5th Edition or Feb 95 Update)	Vehicle Trips		
				Total	In	Out		Total	In	Out		Total	In	Out		Total	In	Out
McKeown Avenue Algonquin to Champlain (including Josephine)	Undeveloped	22,500 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	43 **34**	27 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **97**	126 **105**								
	Undeveloped	15,000 sq ft offices (ITE TGM #710)	Driveway traffic	**48**	**43**	**5**	Driveway traffic	**51**	**9**	**42**								
	Undeveloped	Restaurant - 2,500 sq ft (ITE TGM #834)	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**								
McKeown Avenue Champlain to Cartier	Light industrial	110,000 sq ft retail (ITE TGM #815)	Driveway traffic Less pass-by traffic Less existing ind. traffic	240 192 **168**	151 121 **106**	89 71 **62**	Driveway traffic Less pass-by traffic Less existing ind. traffic	480 384 **364**	240 184 **174**	240 200 **190**								
	Undeveloped	2 restaurants-2,500 sq ft each (ITE TGM #834)	Driveway traffic Less pass-by traffic	280 **188**	143 **96**	137 **92**	Driveway traffic Less pass-by traffic	80 **54**	42 **28**	38 **26**								
	50% undeveloped 50% light industrial	38,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	120 96 **86**	73 59 **52**	47 37 **34**	Driveway traffic Less pass-by traffic Less existing ind. traffic	500 400 **385**	250 200 **195**	250 200 **190**
McKeown Avenue Cartier to McNamara	Undeveloped	25,000 sq ft retail (ITE TGM #820)	Driveway traffic Less pass-by traffic	70 **56**	44 **34**	26 **22**	Driveway traffic Less pass-by traffic	252 **202**	126 **101**	126 **101**								
	Light industrial	40,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic Less existing ind. traffic	100 80 **60**	63 50 **35**	37 30 **25**	Driveway traffic Less pass-by traffic Less existing ind. traffic	380 304 **279**	198 152 **142**	182 152 **137**
McKeown Avenue McNamara to Gormanville	Undeveloped	3 fast food restaurants (ITE TGM #834)	Driveway traffic Less pass-by traffic	420 **281**	214 **144**	206 **138**	Driveway traffic Less pass-by traffic	270 **181**	140 **94**	130 **87**	Driveway traffic Less pass-by traffic	140 **94**	71 **48**	69 **46**	Driveway traffic Less pass-by traffic	90 **60**	47 **31**	43 **29**
	Undeveloped	One sit down restaurant (ITE TGM #832)									Driveway traffic Less pass-by traffic	74 **59**	38 **30**	36 **29**	Driveway traffic Less pass-by traffic	65 **52**	36 **29**	29 **23**
	Undeveloped	Motel (ITE TGM #320)									Driveway traffic	**50**	**19**	**32**	Driveway traffic	**50**	**28**	**22**
College Drive Education Centre Lowlands	Undeveloped	Hospital complex (Tranplan library)	Driveway traffic	**750**	**575**	**175**	Driveway traffic	**750**	**225**	**525**	Driveway traffic	**150**	**100**	**50**	Driveway traffic	**200**	**75**	**125**
	Undeveloped	200,000 sq ft retail (ITE TGM #820)									Driveway traffic Less pass-by traffic	250 **225**	158 **142**	93 **83**	Driveway traffic Less pass-by traffic	1000 **900**	500 **432**	500 **468**
	Undeveloped	150 residential units (ITE TGM #221)									Driveway traffic	**75**	**15**	**60**	Driveway traffic	**92**	**61**	**31**
College Drive Above Escarpment	Existing Colleg /University	Assume enrolment growth of 1.5% p.a.	New traffic after 5 yrs	**100**	**85**	**15**	New traffic after 5 yrs	**60**	**15**	**45**	New traffic 6-20 yrs	**200**	**170**	**30**	New traffic 6-20 yrs	**120**	**30**	**90**
	Undeveloped	400 residential units (ITE TGM #210)	50 D.U.'s within 5 yrs	**44**	**11**	**33**	50 D.U.'s within 5 yrs	**57**	**36**	**21**	350 more D.U.'s	**250**	**60**	**190**	350 more D.U.'s	**330**	**210**	**120**
TOTAL				**1785**	**1175**	**610**		**1980**	**810**	**1170**		**1249**	**670**	**579**		**2468**	**1233**	**1235**

Note: Numbers may not add up exactly due to rounding.

Algonquin Avenue/Highway 11, Airport Road, Highway 17, and the southerly portion of Gormanville Road without turning onto McKeown Avenue or College Drive.

All background traffic has been assumed to grow at approximately 2% per annum (i.e. 10% growth in background traffic by 2004 and 30% growth in background traffic by the time of full development.

4.4 Pass-by Trips/Linked Trips

Based on information contained in the Institute of Transportation Engineers Trip Generation Manual, pass-by trips can comprise 50% of all traffic to a fast food restaurant and 25% of all trips to a retail mall. Pass-by trips consist of cars stopping at the development as they drive past it; these trips do not add traffic to the major road network, but may add, or shift turning movements along the major road.

Linked trips consist of people making two or more stops within the site. For example, a person working in the general area may drive to the site at lunch time to do their weekly banking and to have lunch at one of the restaurants. These two trips (one to the bank and the other to the restaurant) are only one additional vehicle trip on the roads and at the entrances.

This study has assumed that pass-by trips make up 33% of fast food restaurant traffic and 20% of retail mall traffic. No pass-by traffic has been assumed in the case of other land uses.

5. ANALYSIS OF FUTURE TRAFFIC VOLUMES

5.1 Combined Site and Background Traffic

Exhibit 5.1 shows the total afternoon peak hour traffic volumes as they currently exist and as projected to 2004 and at the time of Full Development. Exhibit 5.2 shows the same information for the morning peak hour. Exhibit 5.3 shows the computed Level of Service at key locations in 2004 if the expected development/redevelopment takes place and the existing roads are not improved. Exhibit 5.4 shows the Level of Service at the same locations with Full Development if no improvements are made to the road system.

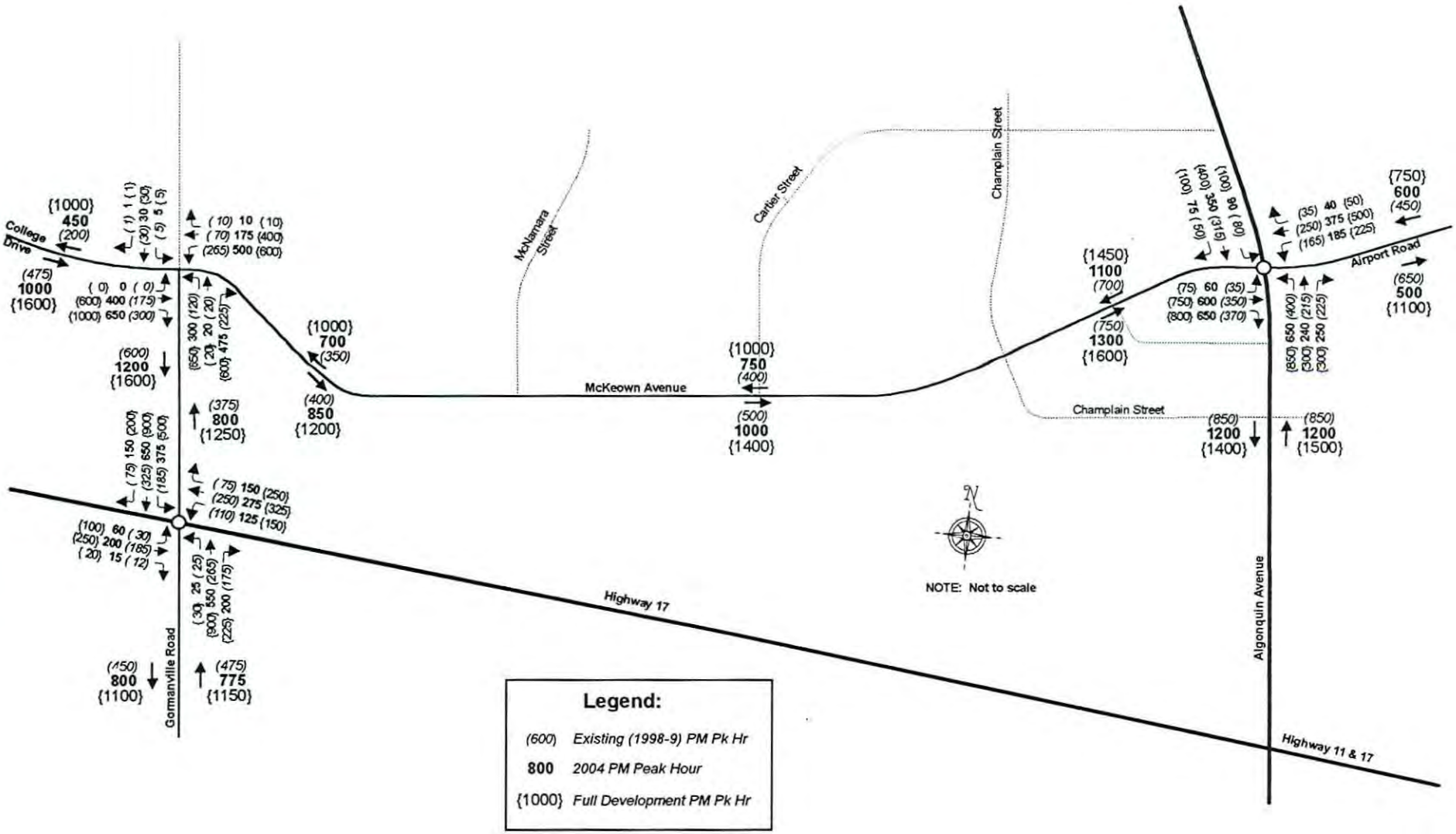
As shown in Exhibit 5.3, the Level of Service would deteriorate to "D" and "E" levels at several locations, including the two main access points, and internal unsignalized intersections would be faced with Level of Service "F" for most left turns from side streets. By Full Development (Exhibit 5.4) most locations are reduced to Level of Service "F".

5.2 McKeown Avenue at Algonquin Avenue

The McKeown Avenue-Airport Road/Algonquin Avenue-Highway 11 intersection is currently operating satisfactorily at Level of Service "C". By 2004 it is projected that the intersection will be operating at Level of Service "E" in the afternoon peak hour. However, converting the existing northbound lanes on Algonquin Avenue to a double left turn would maintain the intersection at Level of Service "C-D" through 2004. With Full Development, Level of Service "C-D" can be maintained by widening McKeown Avenue and Airport Road by one lane on their approaches to Algonquin Avenue.

5.3 McKeown Avenue from Algonquin Avenue to Champlain Street

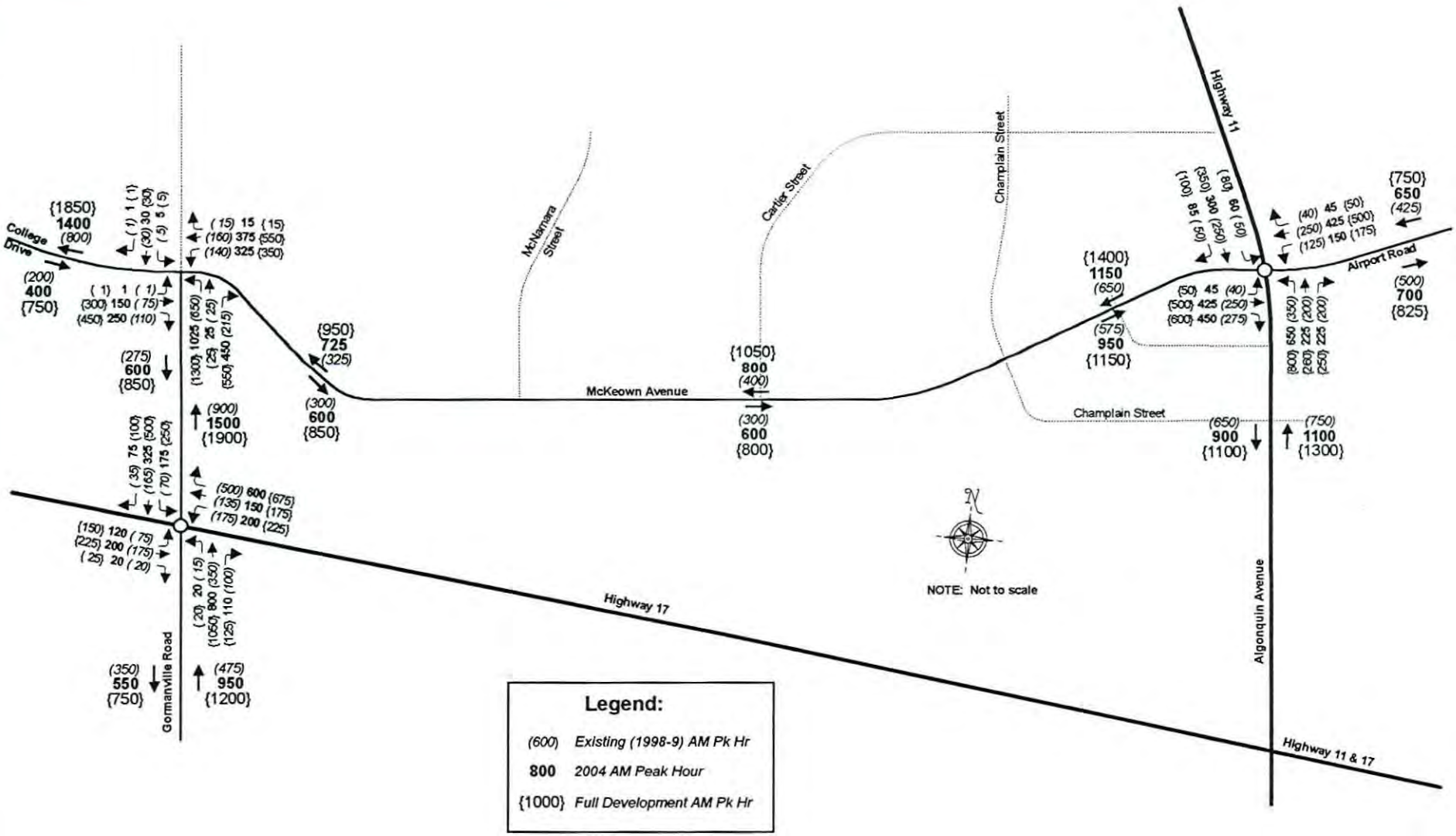
The earlier study "McKeown Avenue/Josephine Street Traffic Study" dealt with



trafplan associates
PLANNERS, ENGINEERS, MANAGEMENT CONSULTANTS
1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 5.1 Projected Afternoon Peak Hour Traffic

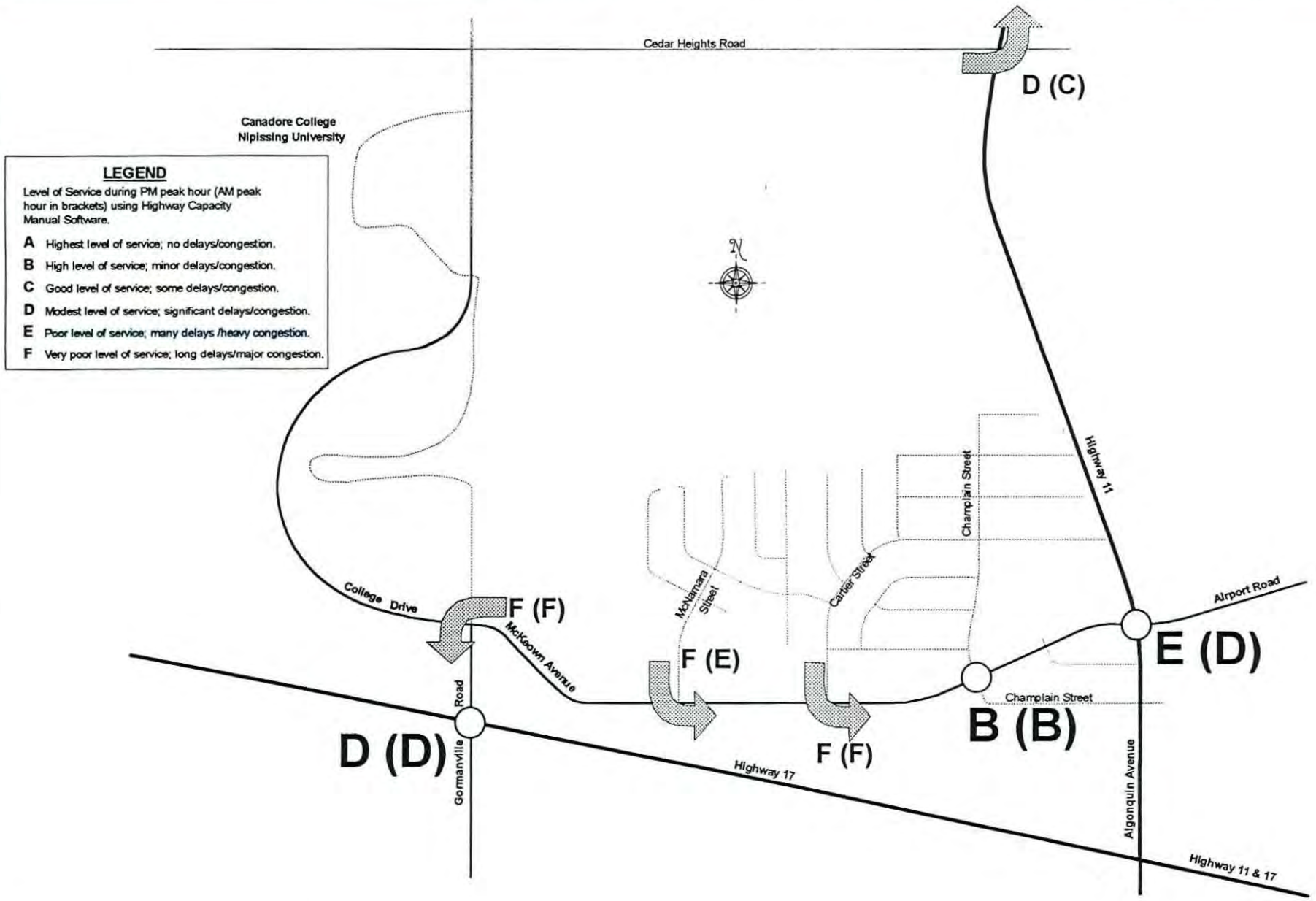
Existing, 2004 and Full Development



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Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 5.2 Projected Morning Peak Hour Traffic

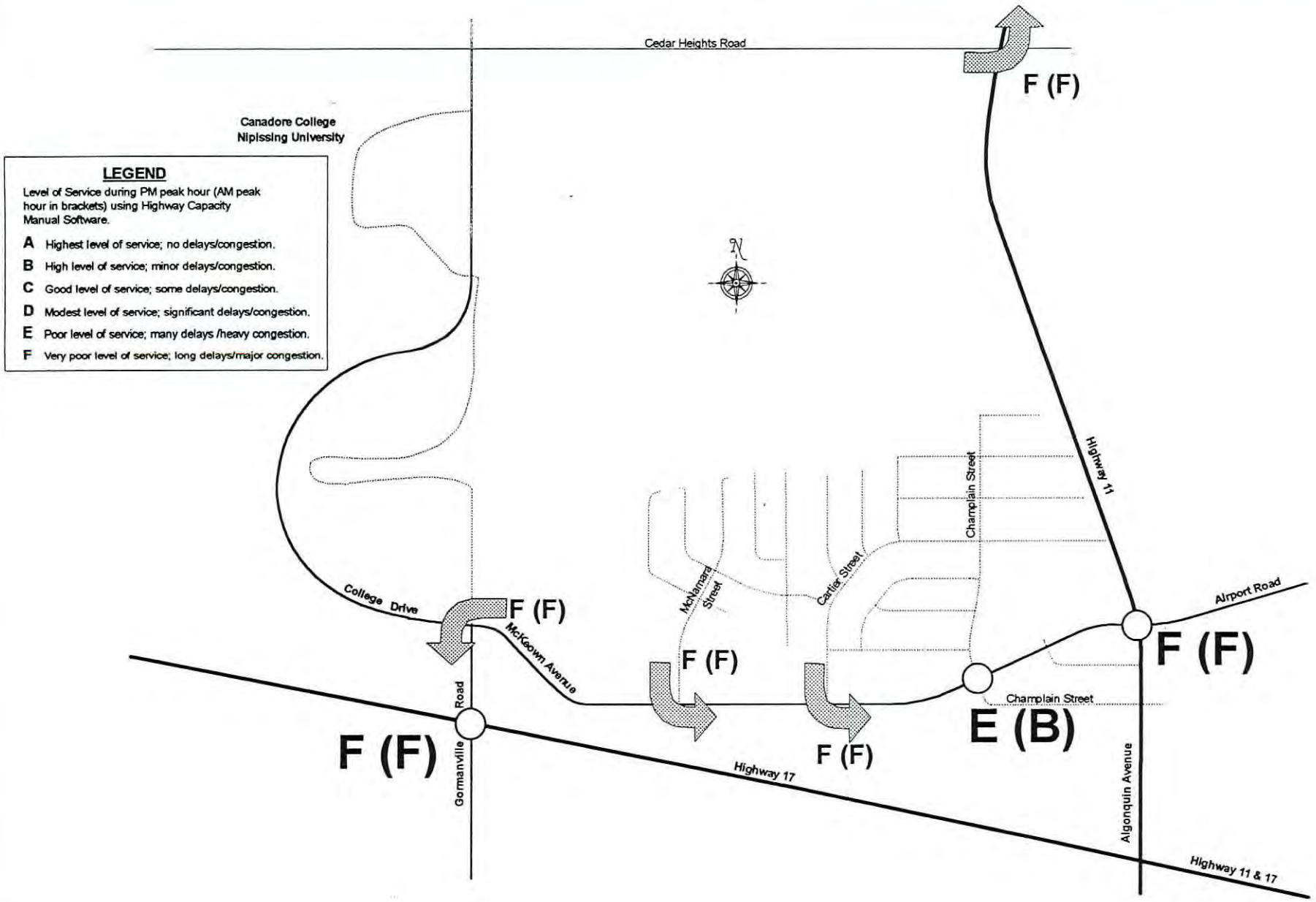
Existing, 2004 and Full Development



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 5.3 Projected Level of Service - 2004

(2004 Traffic With Existing Roadways)



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1226 WHITE OAKS BOULEVARD, SUITE 1, OAKVILLE, ONTARIO, L6H 2B9
Oakville: Tel. (905) 849-1500 Fax (905) 849-8164
Sudbury: Tel. (705) 522-0272 Fax (705) 522-1733

Exhibit 5.4 Projected Level of Service at Full Development

Existing Roadways with Traffic at Full Development Levels

Table 5.1
Summary of Intersection Analysis
Using Highway Capacity Manual Software

Location Time of Day	1999 Existing Conditions			2004 Projected Development			Full Development (approx 2015 - 2020)		
	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio	Level of Service	Average Delay (in sec/veh)	Volume /Capacity Ratio
Gormanville Rd / Highway 17									
i) Existing roads (as built)									
AM Peak Hour	C	18.5	0.6	D	35.8	1.0	F	n/a	>1.0
PM Peak Hour	C	15.1	0.5	D	35.0	0.9	F	n/a	>1.0
ii) Gormanville Rd approaches widened									
AM Peak Hour				C	19.1	0.7	D	25.1	0.9
PM Peak Hour				C	20.7	0.7	D	28.3	1.0
McKeown Ave (College Dr) / Gormanville Rd									
i) Existing roads with traffic signals									
AM Peak Hour	B	11.5	0.7	F	n/a	>1.0	F	n/a	>1.0
PM Peak Hour	B	8.7	0.5	F	n/a	>1.0	F	n/a	>1.0
ii) McKeown approach widened to 2 lanes									
AM Peak Hour				B	14.4	0.7	F	n/a	>1.0
PM Peak Hour				C	15.5	0.9	F	n/a	>1.0
iii) NB, WB and EB approaches widened*									
AM Peak Hour							C	19.4	0.9
PM Peak Hour							C	18.5	0.8
McKeown Ave (Airport Rd) / Algonquin Ave									
i) Existing road configuration									
AM Peak Hour	C	15.9	0.5	D	26.3	0.8	F	n/a	>1.0
PM Peak Hour	C	15.8	0.6	E	52.8	1.0	F	n/a	>1.0
ii) Algonquin Ave NB double left turn**									
AM Peak Hour				C	19.8	0.6	F	n/a	>1.0
PM Peak Hour				C	23.7	0.8	F	n/a	>1.0
iii) McKeown/Airport widening by one lane***									
AM Peak Hour				C	17.4	0.6	C	20.5	0.7
PM Peak Hour				C	19.6	0.7	C	24.8	0.9
McKeown Ave/Champlain Street									
i) Existing road configuration									
AM Peak Hour	B	8.4	0.4	B	9.0	0.6	B	10.1	0.6
PM Peak Hour	B	8.9	0.4	B	13.1	0.6	E	53.7	1.0
ii) Left turn lanes added to McKeown Ave									
PM Peak Hour							B	10.6	0.8
Cedar Heights Rd / Hwy 11 (unsignalized)									
- left turns from Cedar Heights to Hwy 11 N									
AM Peak Hour	B	8.7		C	13.4		F	47.9	
PM Peak Hour	C	11.2		D	20.7		F	614.8	
McNamara St/McKeown Ave (unsignalized)									
- left turns from McNamara to McKeown EB									
AM Peak Hour	B	9.4		E	38.5		F	530.0	
PM Peak Hour	C	11.3		F	163.6		F	>999.9	
Cartier St/McKeown Ave (unsignalized)									
- left turns from Cartier to McKeown EB									
AM Peak Hour	C	10.4		F	97.5		F	>999.9	
PM Peak Hour	C	12.3		F	72.0		F	>999.9	

Note *: College Dr approach widened by one lane; McKeown Ave approach widened to two lanes; Gormanville Rd NB approach widened by one lane.

Note **: Algonquin Ave NB approach changed to two left turn lanes and one through lane.

Note *** McKeown Avenue and Airport Road approaches widened by one lane (plus double left turn lane on Algonquin Ave NB)

McKeown Avenue from Algonquin Avenue to Champlain Street. It recommended a continuous two-way left turn lane along McKeown Avenue and traffic signals at its intersection with Josephine Street (with consolidation of the driveways beside the Tim Hortons). The current study supports those recommendations.

5.4 McKeown Avenue at Gormanville Road

The existing unsignalized intersection is currently operating with lengthy queues and delays for westbound McKeown Avenue traffic turning left to proceed south on Gormanville Road during peak hours. The current traffic volumes were compared against the minimum warrants for traffic signals and the key portion of the warrant is shown in Exhibit 5.5. Conditions are at 93% of the minimum standard for traffic signals. It is expected that growth within the corridor will justify traffic signals in the near future (one to five years).

Consideration was given to potential benefits from realigning the intersection to provide through movements from Gormanville Road to College Drive or to McKeown Avenue. Preliminary designs were prepared and a traffic analysis of the alternatives was carried out. Due to a combination of geometric design reasons and traffic efficiency, it was determined that the existing intersection configuration is preferred.

With traffic signals and the existing roads (configuration and number of lanes), the intersection would operate at Level of Service "B". By 2004 the Level of Service would drop to "F", but can be improved to "B-C" readily by widening the McKeown Avenue approach from one lane to two lanes. With Full Development the intersection would again be reduced to Level of Service "F"; a further widening of the McKeown Avenue approach to three lanes and the widening of the College Drive and Gormanville Road approaches by one lane would allow the intersection to operate at Level of Service "C" through the long term.

B.2.03.08 TRAFFIC SIGNAL WARRANT ANALYSIS FORM FOR INTERSECTION CONTROL

Minimum warrants for installation of traffic signals for roadways with two or more lanes.

Major street ..... *Gormanville Road* No. of lanes *1/2*
Minor street ..... *McKeown Avenue*

FREE FLOW CONDITIONS (RURAL) ☐
RESTRICTED FLOW CONDITIONS (URBAN) ☑

WARRANT 1 - MINIMUM VEHICULAR VOLUME

100 % SATISFIED - YES ☐ NO ☑
80 % SATISFIED - YES ☑ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	0830	0930	1230	1330	1430	1530	1630	1730	TOTAL ACROSS	
A. ALL APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)	*975*	*950*	*900*	*950*	*725*	*850*	*1050*	*820*		
	100% FULFILLED				*100%*	*100%*	*100%*	*100%*			*100%*		*500%*	
	80% FULFILLED								*80%*	*80%*		*80%*	*240%*	SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE												*0%*	
												TOTAL DOWN	*740%*	/8 = *93%*
B. MINOR STREET BOTH APPROACHES	120* (95)*	170* (135)*	120* (95)*	170* (135)*	*350*	*340*	*400*	*500*	*350*	*500*	*675*	*475*	TOTAL ACROSS	
	100% FULFILLED				*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*800%*	
	80% FULFILLED												*0%*	SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE												*0%*	
												TOTAL DOWN	*800%*	/8 = *100%*

* FOR 'T' INTERSECTIONS THESE VALUES SHOULD BE INCREASED BY 50%

2 - DELAY TO CROSS TRAFFIC

100 % SATISFIED - YES ☐ NO ☐
80 % SATISFIED - YES ☐ NO ☐

	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)				PERCENTAGE WARRANT									
APPROACH LANES	1		2 OR MORE		HOUR ENDING									
FLOW CONDITION	FREE FLOW ☐	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐									TOTAL ACROSS	
A. MAJOR STREET BOTH APPROACHES	480 (385)	720 (575)	600 (480)	900 (720)										
	100% FULFILLED													
	80% FULFILLED													SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE													
												TOTAL DOWN		/8 =
B. TRAFFIC CROSSING MAJOR STREET	50 (40)	75 (60)	50 (40)	75 (60)									TOTAL ACROSS	
	100% FULFILLED													
	80% FULFILLED													SECTIONAL PERCENT
	ACTUAL % IF BELOW 80% VALUE													
												TOTAL DOWN		/8 =

fFebruary, 1982

Exhibit 5.5: Traffic Signal Warrant Form - McKeown Avenue at Gormanville Road

5.5 Gormanville Road at Highway 17

The Gormanville Road/Highway 17 intersection is currently operating at Level of Service "C". By 2004 the Level of Service would drop to "D" if no improvements are made. If Gormanville Road is widened by one lane on both approaches, Level of Service "C" would be maintained. With Full Development, the Level of Service would again drop to "D".

It is anticipated that in the longer term future, as part of the realignment of the North Bay Bypass, Gormanville Road will be grade separated from Highway 17 along a more westerly alignment. This plan would deal with the capacity requirements and provide satisfactory Levels of Service into the long term future.

5.6 McKeown Avenue at Cartier Street and McNamara Street

At current levels of traffic, left turn lanes are warranted at both Cartier Street and McNamara Street for vehicles turning into both streets from mcKeown Avenue. The left turns out from both side streets are currently operating at satisfactory Levels of Service ("B" and "C"). As volumes increase along McKeown Avenue, the left turns out will become more difficult and by 2004 it is projected that they will be at Level of Service "E" and "F" during peak hours. Neither location will warrant traffic signals; it is expected that Champlain Street will act as the safety valve - neighbourhood motorists will increase their use of Champlain Street, particularly when exiting towards the east.

In the longer term, benefits may be possible from future development particularly on the south side of McKeown Avenue. While the prospects do not appear to be promising in the near term, there may be future opportunities to combine signalized access to a new development with either Cartier Street or McNamara Street.

5.7 McKeown Avenue Between Champlain Street and Cartier Street

It is expected that there will be several significant new developments within this block

by 2004 and more in the longer term. While not all the expected development will require direct driveway access from McKeown Avenue, at least one or two major new driveways can be expected. The driveways will require left turn storage lanes and when these storage lanes and their tapers are combined with the requirements at Champlain Street and at Cartier Street, the result is a continuous centre fifth lane on McKeown Avenue from Champlain Street to Cartier Street.

5.8 McKeown Avenue Between Cartier Street and McNamara Street

This section of McKeown Avenue currently has a two-lane cross-section which carries approximately 8,000 vehicles per day. By 2004 this volume is expected to double to approximately 16,000 vehicles per day. This volume is beyond the capacity of a two-lane roadway operating in an urban environment with intersecting streets, private driveways, transit and school buses and pedestrian traffic. Two through lanes in each direction will be required in this section.

It is expected that there will be at least two significant new developments in this block by 2004 with one or two major new driveways. At least one of the driveways (probably both) will require a left turn storage lane; when the storage lane and its tapers are combined with the requirements at Cartier Street and McNamara Street, the result is a continuous centre turning lane from Cartier Street to McNamara Street (i.e. a five lane section).

5.9 McKeown Avenue Between McNamara Street and Gormanville Road

McKeown Avenue between McNamara Street and Gormanville Road also has a two-lane cross-section; it carries approximately 7,000 vehicles per day. The volume is expected to reach approximately 14,000 vehicles per day by 2004 and is expected to continue to grow to approximately 20,000 vehicles per day by the time Full Development is reached. The 14,000 volume is not beyond the capacity of a two-lane roadway in an area with limited access and side friction, but would require four lanes in an urban area with relatively large turning movements and high side friction. While

this road section from McNamara Street to Gormanville Road will eventually need to be four lanes (most likely within ten years), the project can be deferred for a few years and/or implemented in stages (first from McNamara Street to the Ontario Government Building, second from the Government Building to Gormanville Road). The timing will be somewhat dependent on the speed of development on the Education Centre lands (especially the Hospital and the retail commercial uses).

As previously noted the existing traffic volumes warrant a left turn storage lane on McKeown Avenue at McNamara Street and at the Provincial Government Building Entrances. The tapers from these two turning lanes overlap and a continuous centre turning lane should be provided from McNamara Street to the west entrance to the Ontario Government Building.

While it is expected that there will be some significant new developments on the vacant lands between Gormanville Road and Hopper Motors, there may not be any new driveways west of the Government Building. If there are no new driveways, it would be possible to stop the continuous centre turning lane at the Government Building west entrance; if there is a major new driveway west of the Government Building, the centre turning lane should be continued through to Gormanville Road.

5.10 College Drive

The lane configuration of College Drive will need to be assessed as the plans for the Education Centre lands become clearer and when the Ministry of Transportation has firmer plans for the North Bay Bypass. It is likely, however, that the section of College Drive between Gormanville Road and the access points to the lands below the escarpment will need to be four laned (plus turning lanes) as development occurs.

5.11 Sidewalks

The projected future traffic volumes along McKeown Avenue, and the level of pedestrian activity which can be expected due to adjacent residential areas and the City

bus route usage, appear to justify a sidewalk along both sides of McKeown Avenue. The existing sidewalk is along the north side. Construction of a sidewalk along the south side could be phased over a number of years as development/redevelopment takes place along the south side of the road.

APPENDIX A

INTERSECTION ANALYSIS REPORTS
(Highway Capacity Manual)

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	50	174	19	175	135	265	16	331	96	58	137	29
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	18.0A	29.0P			Green	5.0A	28.0A		
Yellow/AR	5.0	5.0			Yellow/AR	5.0	5.0		

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6

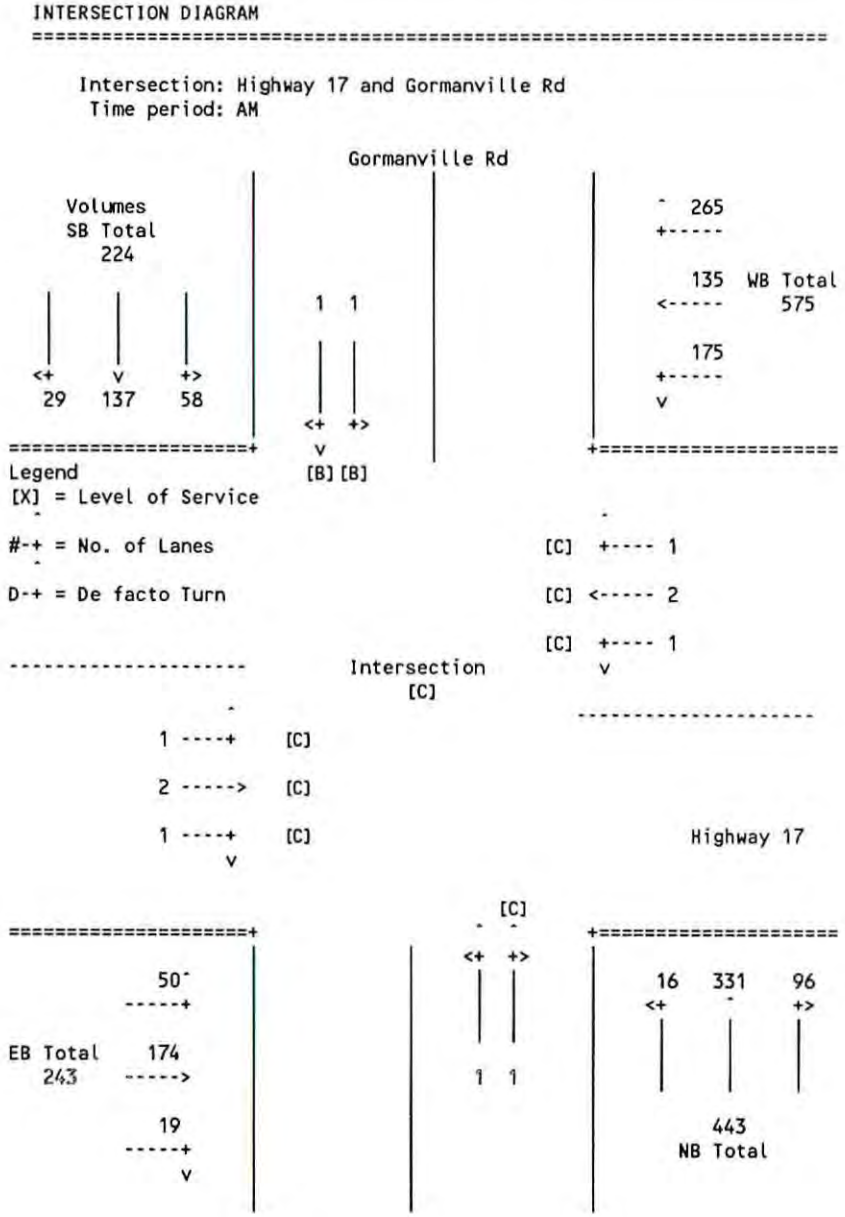
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	354	1770	0.158	0.200	21.4	C	17.2	C
	T	1155	3725	0.176	0.310	16.3	C		
	R	488	1574	0.043	0.310	15.6	C		
WB	L	354	1770	0.548	0.200	24.6	C	20.6	C
	T	1155	3725	0.136	0.310	16.1	C		
	R	488	1574	0.603	0.310	20.4	C		
NB	LTR	993	3311	0.521	0.300	19.2	C	19.2	C
SB	L	251	1770	0.255	0.400	12.7	B	12.9	B
	TR	714	1784	0.258	0.400	13.0	B		

Intersection Delay = 18.5 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.556

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M204A.HC9

Area Type: Other 3-16-99 AM

Comment: 2004

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	> 2 <			1	1 <	
Volumes	120	200	20	200	150	600	20	800	110	175	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	14.0A	35.0P			Green	8.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

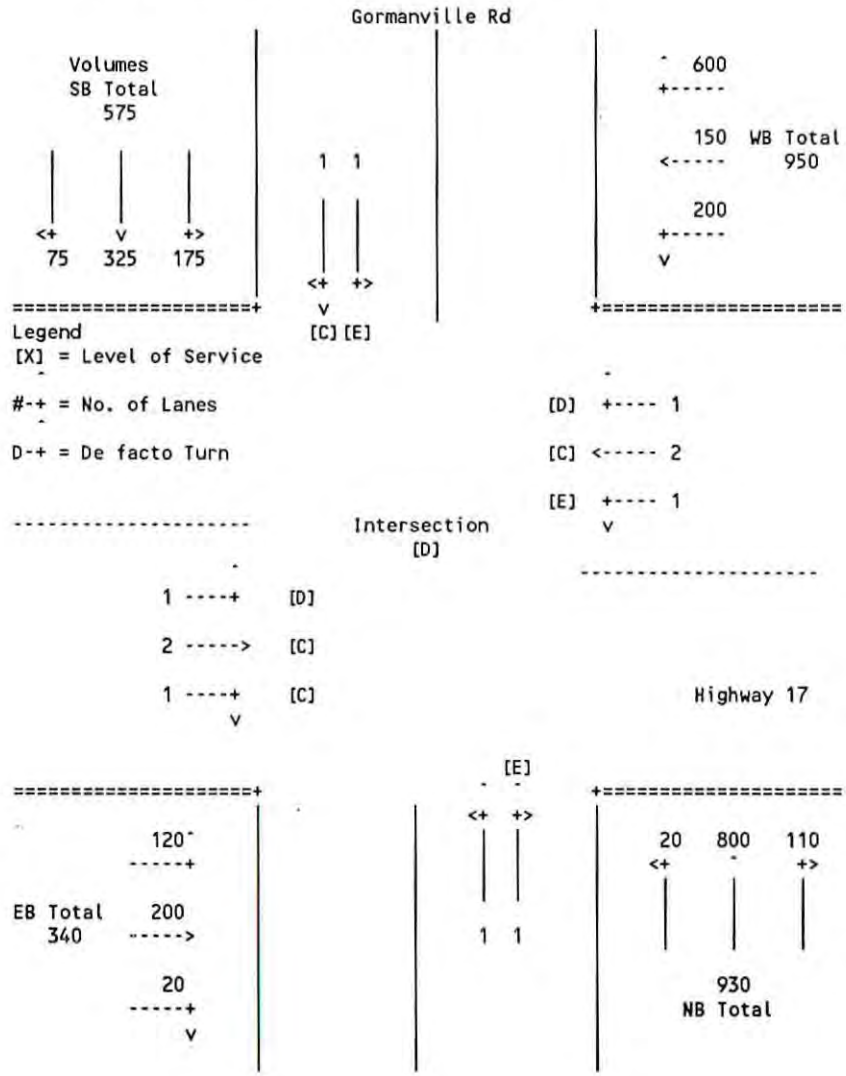
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.551	0.136	30.7	D	21.5	C
	T	1217	3619	0.191	0.336	16.7	C		
	R	529	1574	0.042	0.336	15.9	C		
WB	L	241	1770	0.920	0.136	56.6	E	36.8	D
	T	1217	3619	0.144	0.336	16.4	C		
	R	701	1574	0.951	0.445	35.6	D		
NB	LTR	1076	3198	1.009	0.336	46.7	E	46.7	E
SB	L	212	1770	0.915	0.445	44.4	E	24.1	C
	TR	793	1780	0.560	0.445	15.2	C		

Intersection Delay = 35.8 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.968

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development - no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1 <	
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right	*	*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	14.0A	30.0P			Green	12.0A	36.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

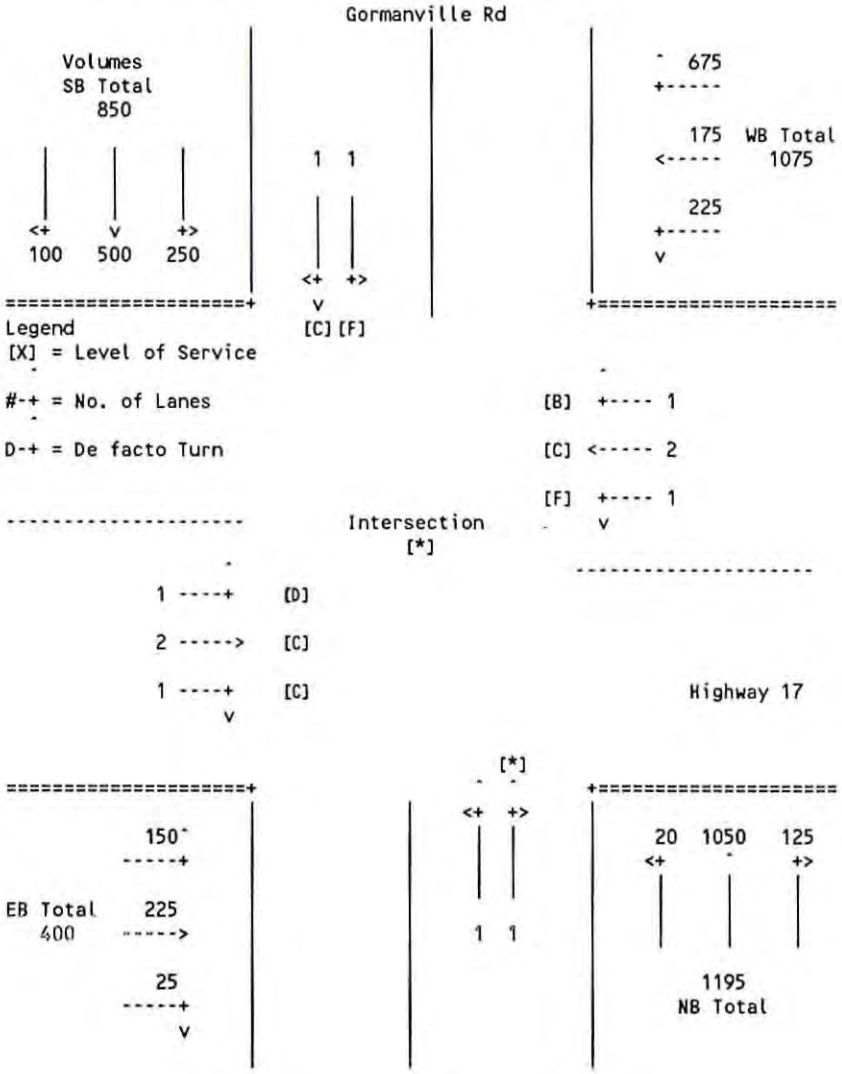
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.692	0.136	34.8	D	24.9	C
	T	1053	3619	0.249	0.291	19.3	C		
	R	456	1566	0.061	0.291	18.2	C		
WB	L	241	1770	1.036	0.136	86.4	F	30.1	D
	T	1053	3619	0.194	0.291	18.9	C		
	R	940	1566	0.798	0.600	14.4	B		
NB	LTR	1060	3067	1.316	0.345	*	*	*	*
SB	L	277	1770	1.004	0.491	63.7	F	31.1	D
	TR	876	1784	0.762	0.491	17.5	C		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd
Analyst: TR File Name: M2FDAI.HC9
Area Type: Other 3-16-99 AM
Comment: Full development - ~~no improvements~~ Gormanville Rd. widened

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2	1	1	2	<
Volumes	150	225	25	225	175	675	20	1050	125	250	500	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right	*	*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	18.0A	16.0P			Green	15.0A	43.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

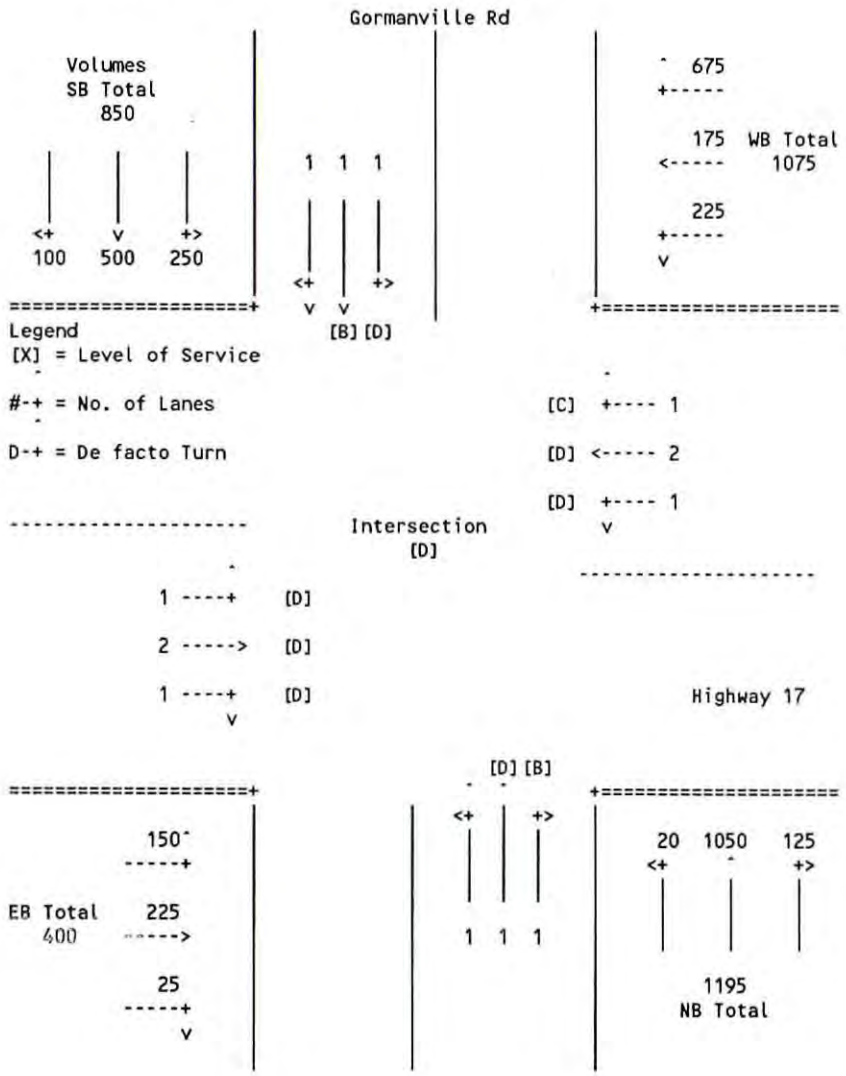
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	306	1770	0.546	0.173	28.4	D	27.5	D
	T	592	3619	0.442	0.164	27.2	D		
	R	256	1566	0.109	0.164	25.3	D		
WB	L	306	1770	0.818	0.173	39.1	D	27.0	D
	T	592	3619	0.344	0.164	26.5	D		
	R	840	1566	0.893	0.536	23.2	C		
NB	LT	1310	3203	0.952	0.409	31.4	D	29.6	D
	R	630	1541	0.220	0.409	13.7	B		
SB	L	325	1770	0.855	0.582	33.6	D	15.1	C
	TR	2093	3598	0.334	0.582	7.8	B		

Intersection Delay = 25.1 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.919

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2XP.HC9

Area Type: Other 3-16-99 PM

Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	> 2 <			1	1	<
Volumes	30	185	12	110	250	75	25	265	175	185	325	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*	*			SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	7.0A	38.0P			Green	7.0A	40.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

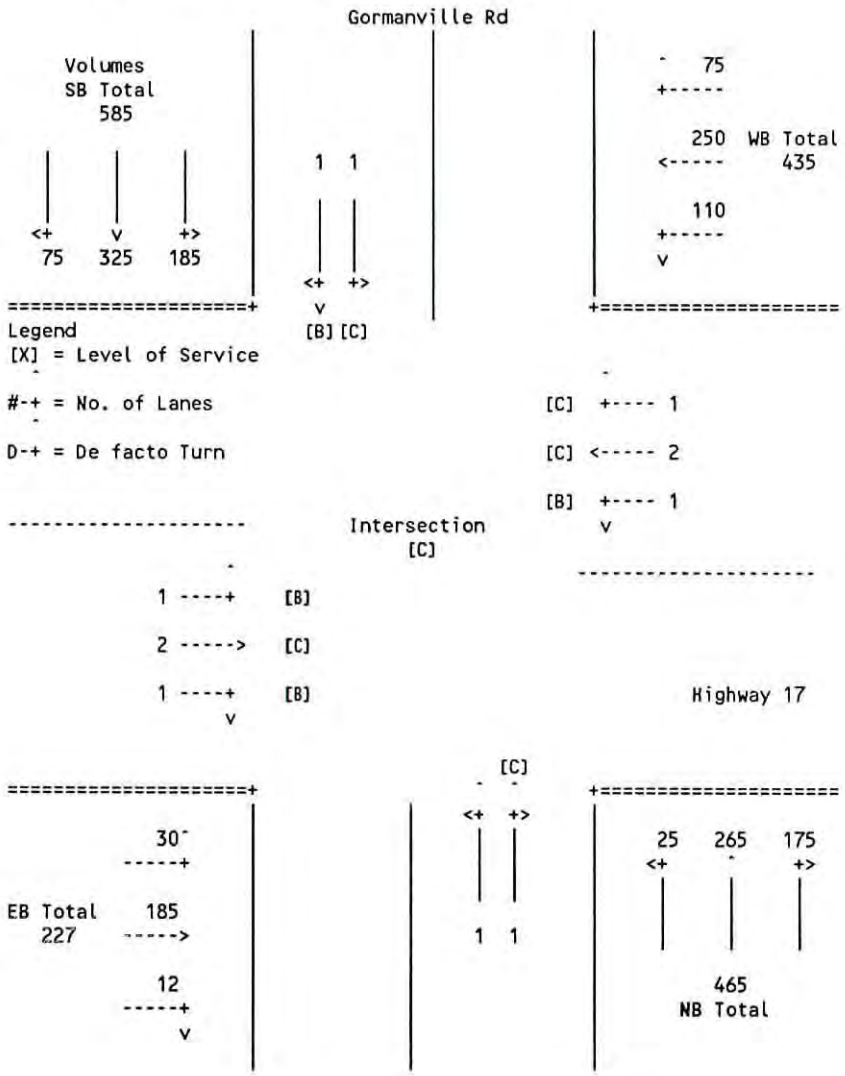
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	437	1770	0.076	0.464	10.5	B	14.6	B
	T	1355	3725	0.159	0.364	15.3	C		
	R	572	1574	0.023	0.364	14.5	B		
WB	L	500	1770	0.244	0.464	11.1	B	14.4	B
	T	1355	3725	0.216	0.364	15.6	C		
	R	572	1574	0.145	0.364	15.2	C		
NB	LTR	1077	2820	0.503	0.382	17.1	C	17.1	C
SB	L	300	1770	0.687	0.482	15.9	C	14.0	B
	TR	858	1780	0.518	0.482	13.2	B		

Intersection Delay = 15.1 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.463

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M204PI.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 with Gormanville Rd widened by one lane on each approach

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2	1	1	2	<
Volumes	60	200	15	125	275	150	25	550	200	375	650	150
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right				
Green	14.0A	21.0P			Green	22.0A	35.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

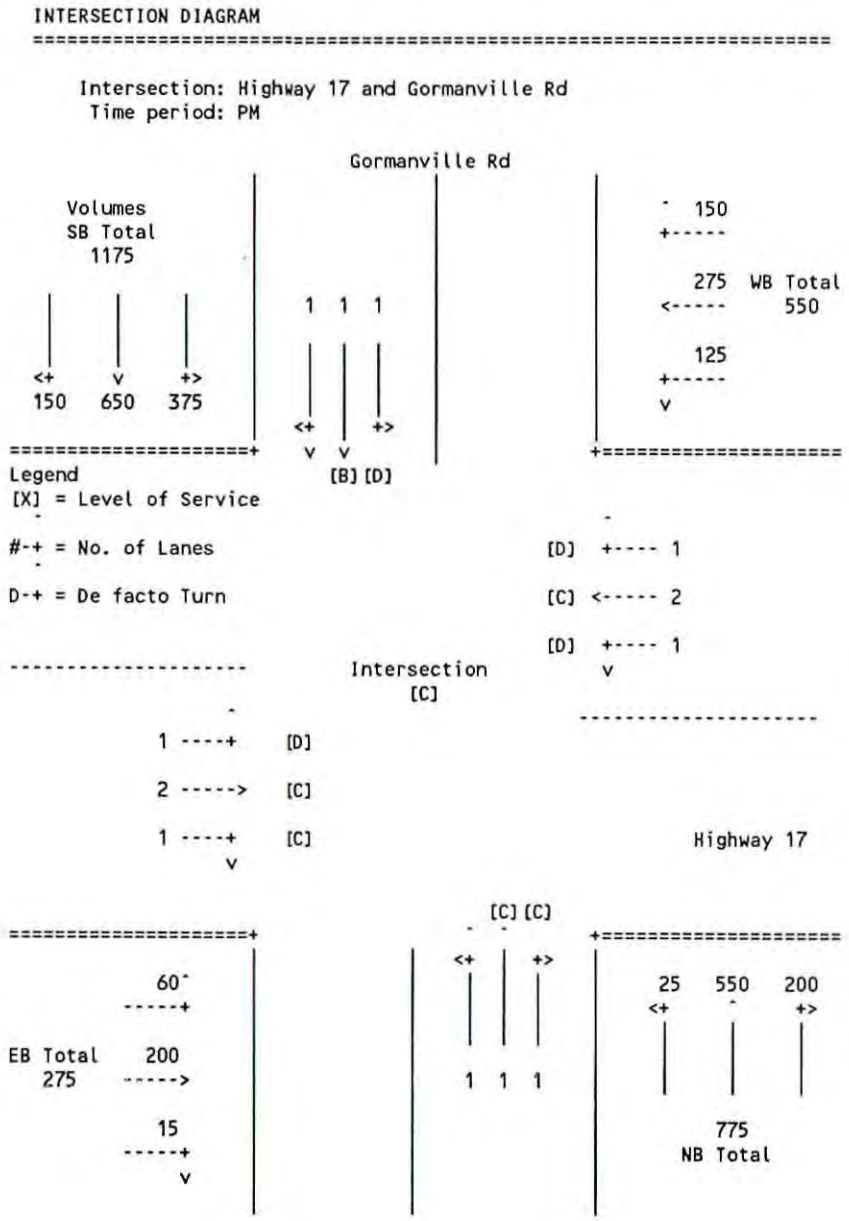
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1770	0.278	0.136	27.7	D	24.5	C
	T	779	3725	0.299	0.209	23.8	C		
	R	327	1566	0.052	0.209	22.5	C		
WB	L	241	1770	0.576	0.136	31.2	D	26.4	D
	T	779	3725	0.412	0.209	24.5	C		
	R	327	1566	0.510	0.209	26.0	D		
NB	LT	929	2763	0.722	0.336	22.6	C	21.6	C
	R	518	1541	0.428	0.336	18.6	C		
SB	L	459	1770	0.908	0.573	33.3	D	16.4	C
	TR	2053	3585	0.454	0.573	8.9	B		

Intersection Delay = 20.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.715

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDP.HC9

Area Type: Other 3-16-99 PM

Comment: Full development with existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1		> 2 <		1	1	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0		12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	12.0A	12.0P			Green	22.0A	46.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

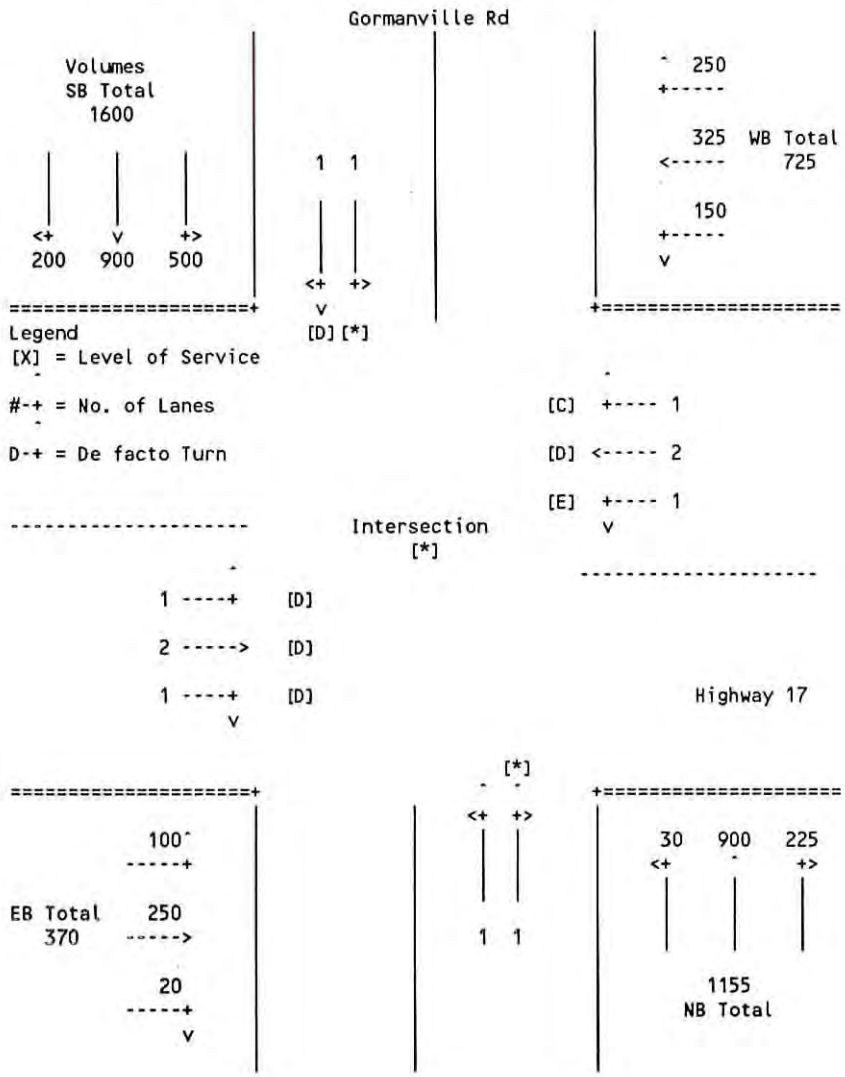
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	209	1770	0.531	0.118	31.5	D	31.0	D
	T	474	3725	0.616	0.127	31.1	D		
	R	199	1566	0.110	0.127	27.5	D		
WB	L	209	1770	0.798	0.118	43.4	E	31.7	D
	T	474	3725	0.799	0.127	36.6	D		
	R	569	1566	0.488	0.364	18.0	C		
NB	LTR	963	2206	1.399	0.436	*	*	*	*
SB	L	438	1770	1.269	0.673	*	*	*	*
	TR	1197	1780	1.020	0.673	36.7	D		

Intersection Delay = * (sec/veh) Intersection LOS = *

(g/C)*(V/c) is greater than one. Calculation of D1 is infeasable.

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) Highway 17 (N-S) Gormanville Rd

Analyst: TR File Name: M2FDPI.HC9

Area Type: Other 3-16-99 PM

Comment: Full development with Gormanville widened by one lane each side

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	<	1	2	<
Volumes	100	250	20	150	325	250	30	900	225	500	900	200
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

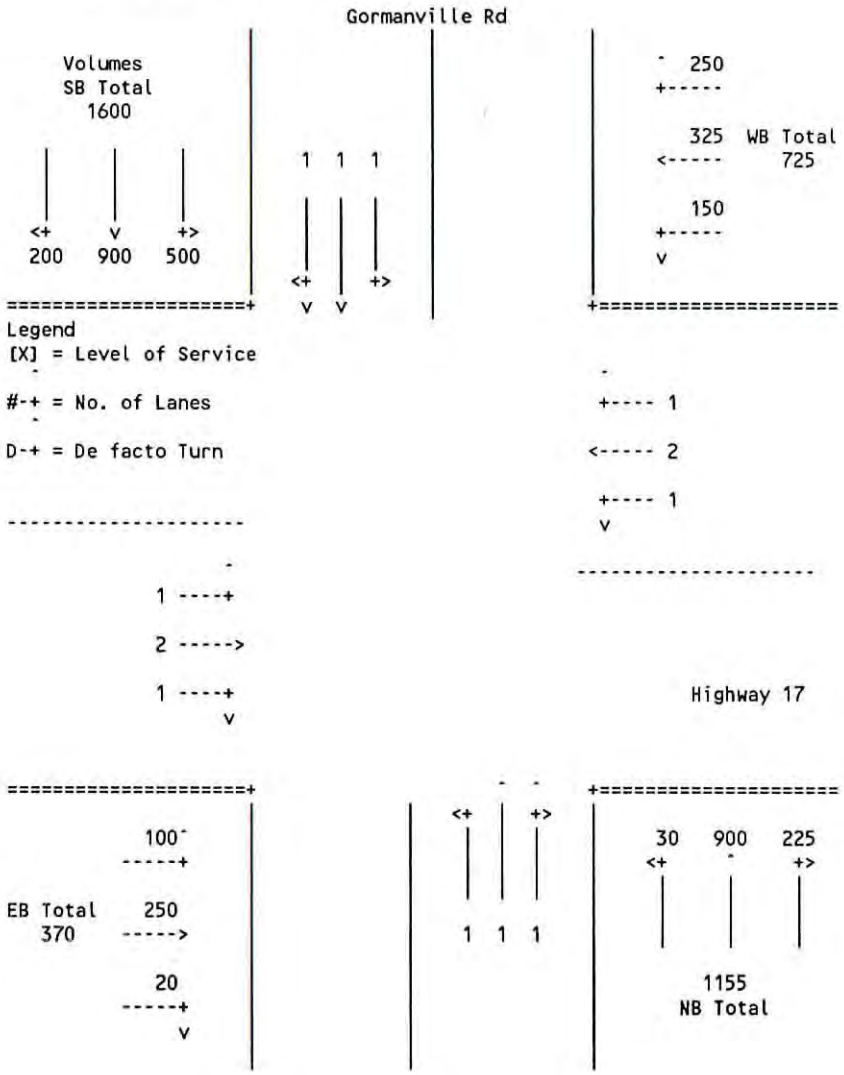
Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds		*			Peds	*	*		
WB Left	*				SB Left	*	*		
Thru		*			Thru	*	*		
Right		*			Right	*	*		
Peds		*			Peds	*	*		
NB Right					EB Right				
SB Right					WB Right	*			
Green	10.0A	14.0P			Green	28.0A	40.0A		
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0		

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6

INTERSECTION DIAGRAM

Intersection: Highway 17 and Gormanville Rd
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XA.HC9
Area Type: Other 3-16-99 AM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	48	284	319	129	243	40	349	196	185	54	260	52
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*	*		
Green	5.0A	24.0A			Green	14.0A	18.0A	26.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

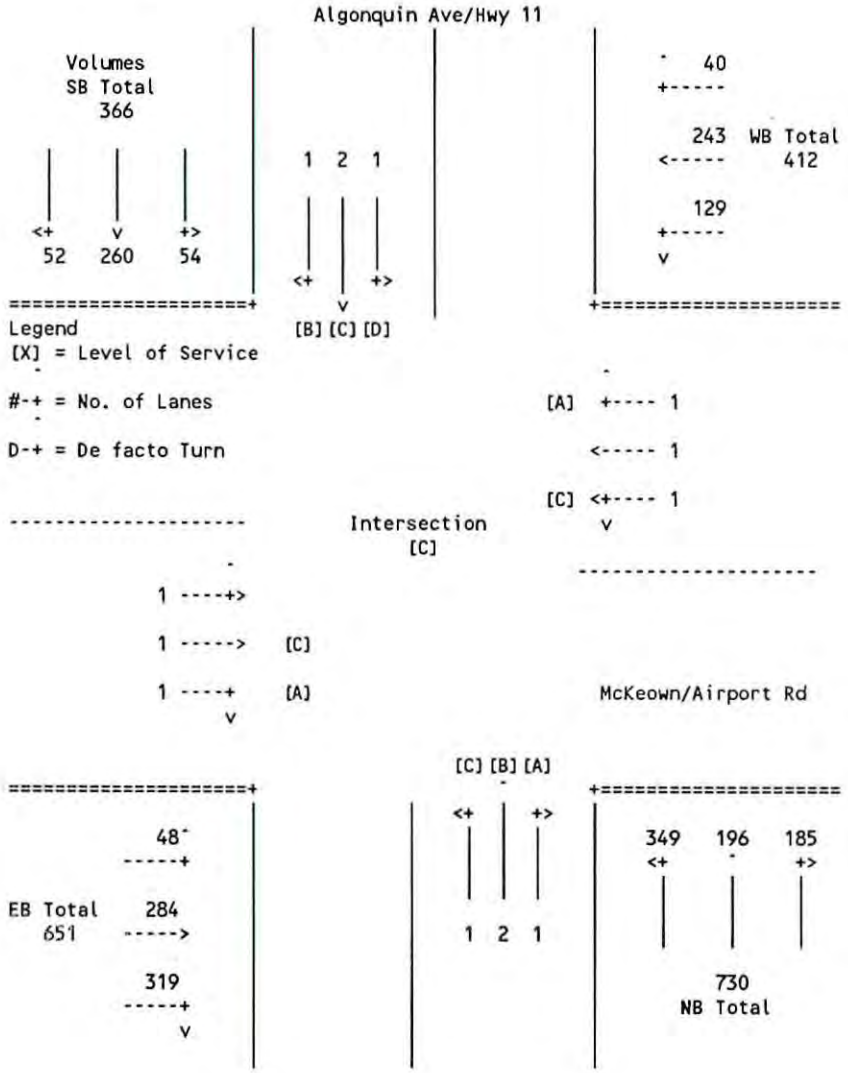
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	668	2828	0.579	0.236	24.9	C	15.1	C
	R	1087	1574	0.326	0.691	4.4	A		
WB	LT	925	2908	0.469	0.318	19.7	C	18.2	C
	R	1087	1574	0.040	0.691	3.5	A		
NB	L	611	1770	0.635	0.345	21.0	C	13.0	B
	T	1678	3619	0.136	0.464	10.9	B		
	R	1531	1574	0.135	0.973	0.0	A		
SB	L	241	1770	0.249	0.136	27.5	D	20.2	C
	T	921	3619	0.329	0.255	21.6	C		
	R	987	1574	0.059	0.627	5.1	B		

Intersection Delay = 15.9 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.492

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304A.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*	*	*	
Green	5.0A	24.0A			Green	14.0A	28.0A	16.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

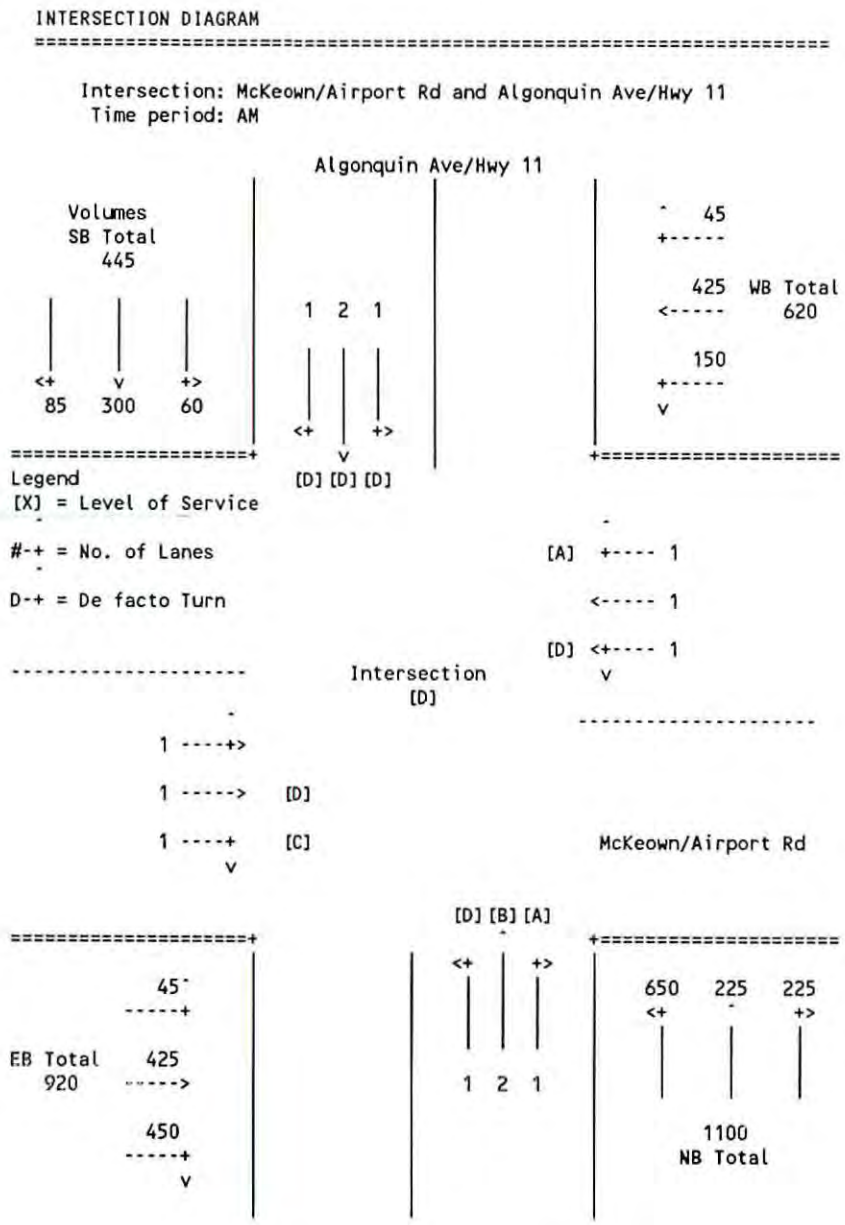
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	603	2551	0.909	0.236	39.1	D	31.7	D
	R	630	1574	0.794	0.400	23.6	C		
WB	LT	807	2535	0.832	0.318	27.7	D	25.7	D
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	772	1770	0.935	0.436	32.4	D	21.3	C
	T	1678	3619	0.156	0.464	11.0	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	241	1770	0.278	0.136	27.7	D	28.2	D
	T	592	3619	0.591	0.164	28.7	D		
	R	258	1574	0.365	0.164	26.8	D		

Intersection Delay = 26.3 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.838

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304AI.HC9

Area Type: Other 3-16-99 AM

Comment: 2004 with ~~no improvements~~ 2 LT lanes on Algonquin NB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	45	425	450	150	425	45	650	225	225	60	300	85
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left		*			NB	Left	*	*		
Thru		*				Thru		*	*	
Right		*				Right	*	*	*	
Peds		*				Peds		*	*	
WB Left	*	*			SB	Left	*			
Thru	*	*				Thru			*	
Right	*	*				Right			*	
Peds		*				Peds		*	*	
NB Right	*	*			EB	Right	*			
SB Right					WB	Right	*	*	*	
Green	5.0A	30.0A			Green		12.0A	16.0A	24.0P	
Yellow/AR	4.0	5.0			Yellow/AR		4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

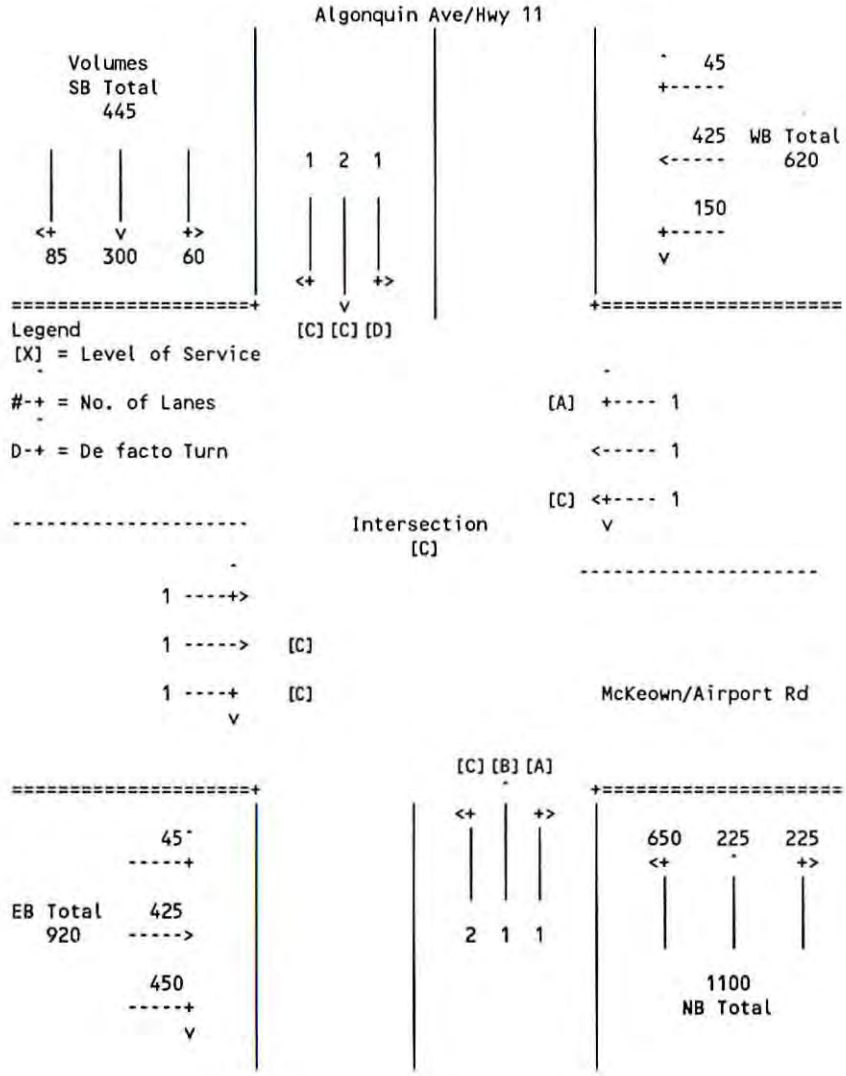
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	757	2602	0.724	0.291	25.0	C	22.3	C
	R	687	1574	0.728	0.436	19.3	C		
WB	LT	945	2535	0.710	0.373	20.8	C	19.3	C
	R	1531	1574	0.033	0.973	0.0	A		
NB	L	1094	3539	0.680	0.309	22.7	C	16.3	C
	T	773	1810	0.323	0.427	13.6	B		
	R	1531	1574	0.163	0.973	0.0	A		
SB	L	209	1770	0.320	0.118	29.0	D	23.7	C
	T	855	3619	0.409	0.236	23.1	C		
	R	372	1574	0.253	0.236	22.1	C		

Intersection Delay = 19.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.623

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M3FDA.HC9

Area Type: Other 3-16-99 AM

Comment: Full development with NB double left and extra lanes EB and WB

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	50	500	600	175	500	50	800	260	250	80	350	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	10.0A	24.0A			Green	16.0A	14.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

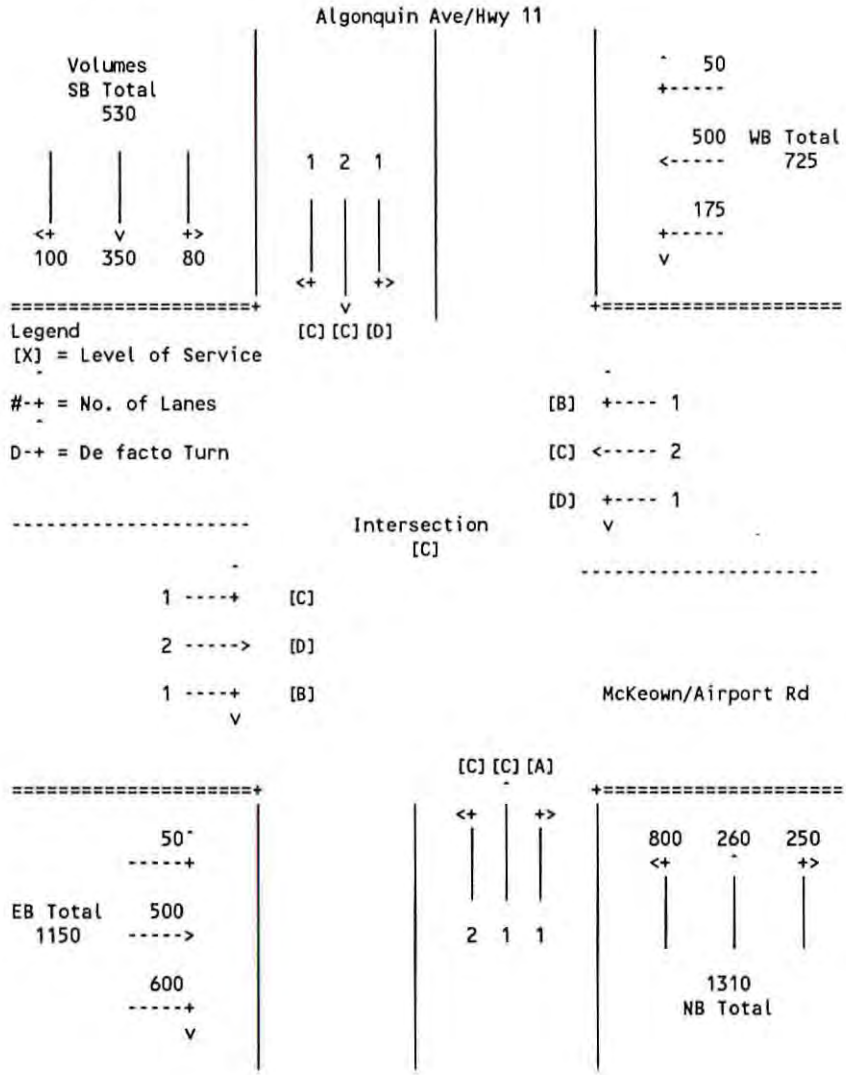
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	126	532	0.445	0.236	24.8	C	18.9	C
	T	880	3725	0.663	0.236	25.9	D		
	R	930	1574	0.717	0.591	12.2	B		
WB	L	245	1770	0.792	0.364	28.2	D	19.1	C
	T	1355	3725	0.431	0.364	17.2	C		
	R	859	1574	0.065	0.545	7.6	B		
NB	L	1158	3539	0.791	0.327	24.4	C	18.1	C
	T	724	1810	0.399	0.400	15.4	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	274	1770	0.325	0.155	27.0	D	24.5	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.310	0.227	23.0	C		

Intersection Delay = 19.4 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.693

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 03-22-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3XP.HC9
Area Type: Other 3-16-99 PM
Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	35	350	375	165	250	35	400	215	225	80	315	50
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

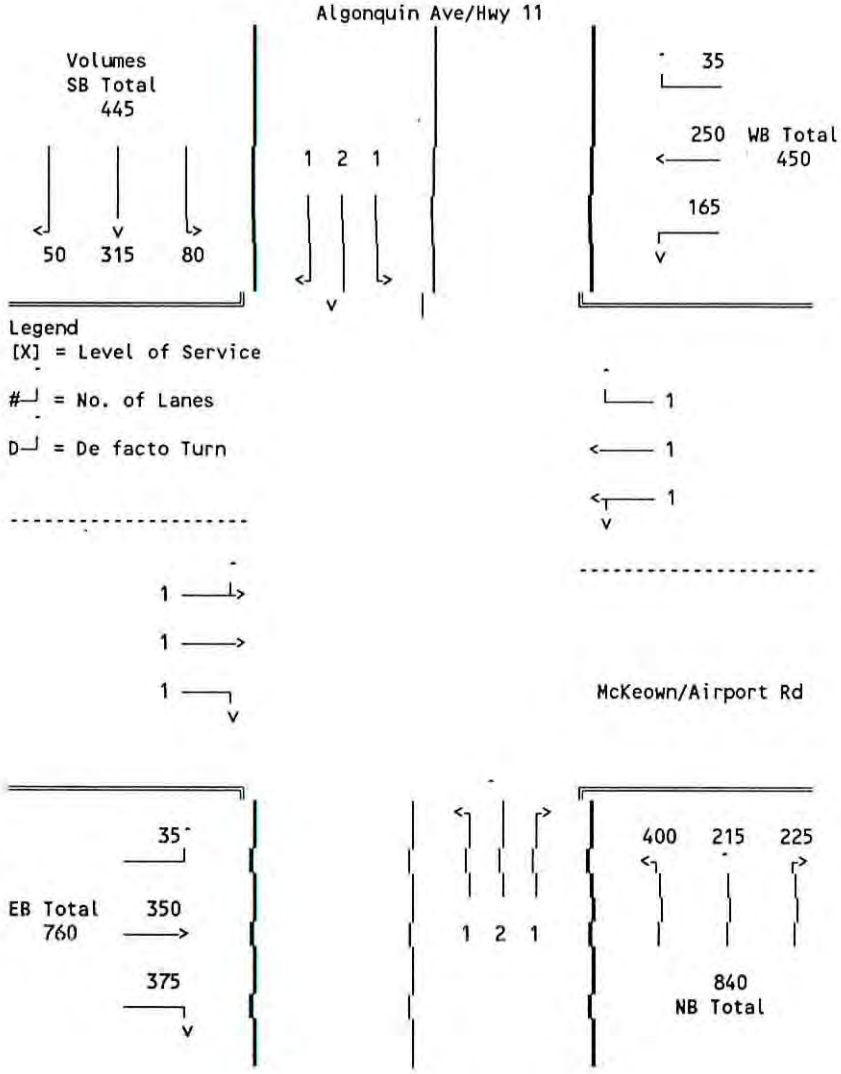
Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right	*	*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	5.0A	22.0A			Green	10.0A	18.0A	20.0P	
Yellow/AR	5.0	5.0			Yellow/AR	3.0	6.0	6.0	

Cycle Length: 100 secs Phase combination order: #1 #2 #5 #6 #7

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304P.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 - existing roads as is

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	1	2	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	10.0A	31.0A			Green	10.0A	26.0A	10.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

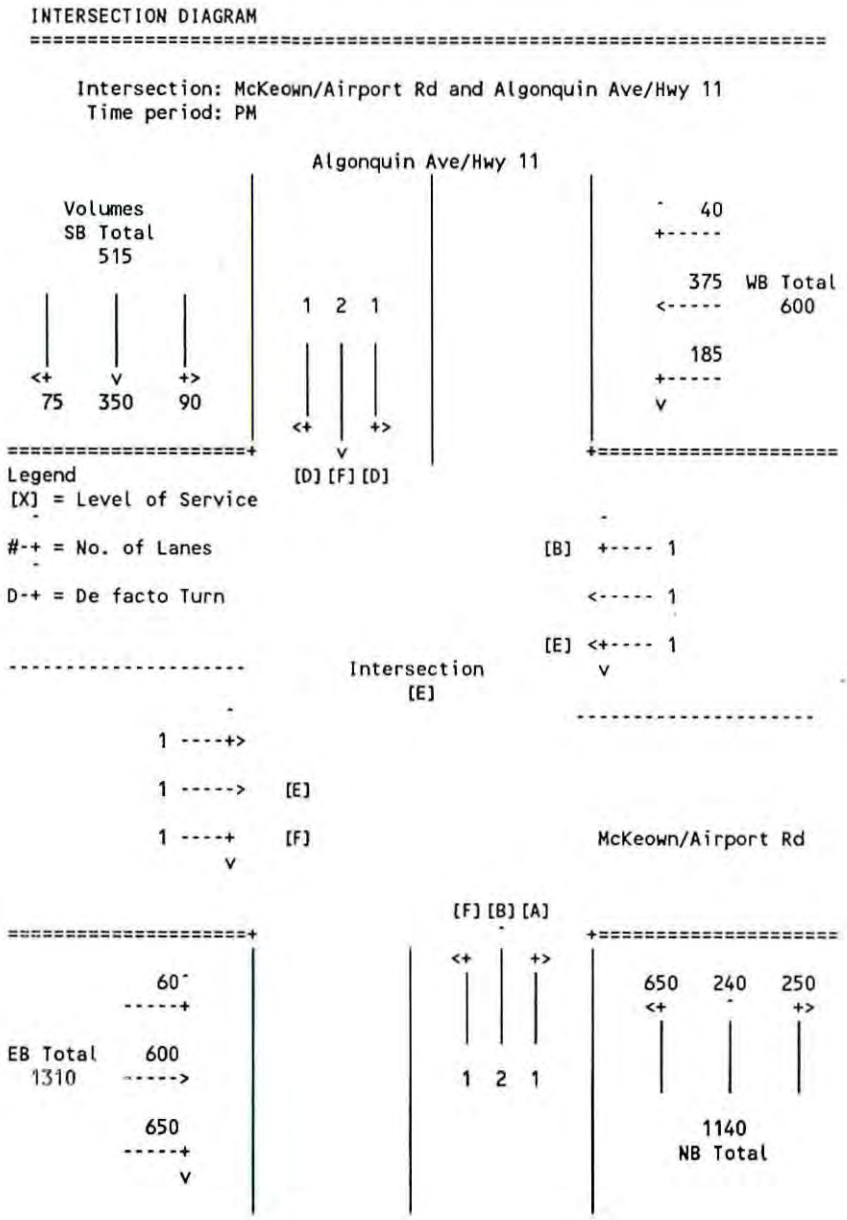
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	779	2598	0.989	0.300	47.1	E	58.2	E
	R	673	1574	1.074	0.427	70.1	F		
WB	LT	637	1492	1.026	0.427	54.7	E	51.7	E
	R	873	1574	0.050	0.555	7.3	B		
NB	L	676	1770	1.068	0.382	69.6	F	42.4	E
	T	1415	3619	0.198	0.391	14.3	B		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	177	1770	0.565	0.100	33.6	D	62.7	F
	T	395	3619	1.033	0.109	76.1	F		
	R	172	1574	0.483	0.109	31.5	D		

Intersection Delay = 52.8 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 1.044

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M304PI1.HC9
Area Type: Other 3-16-99 PM
Comment: 2004-Algonquin NB changed to double left turn (no other change)

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2	1		> 2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*			
SB Right					WB Right	*			
Green	6.0A	40.0A			Green	12.0A	10.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

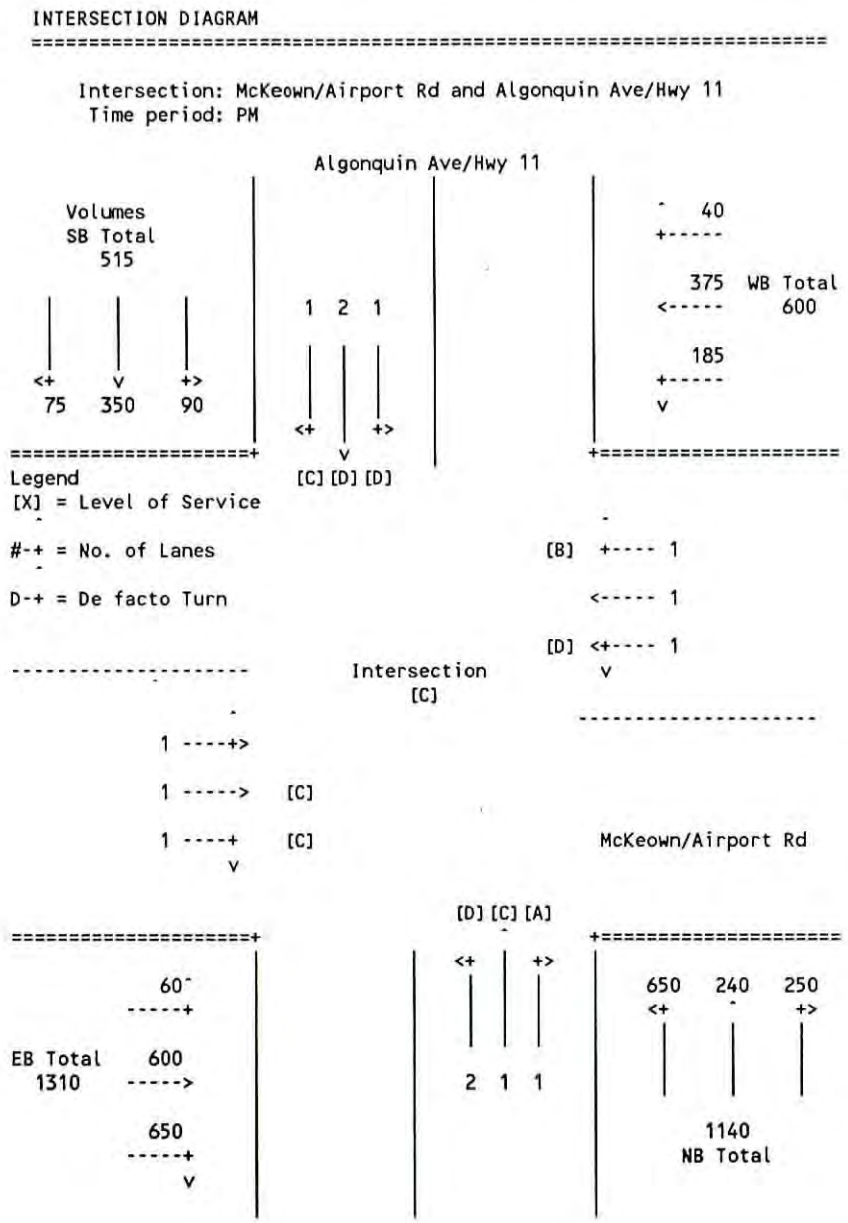
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	994	2603	0.776	0.382	22.0	C	21.9	C
	R	830	1574	0.870	0.527	21.7	C		
WB	LT	705	1492	0.927	0.473	30.9	D	29.3	D
	R	973	1574	0.045	0.618	5.3	B		
NB	L	901	3539	0.826	0.255	29.5	D	21.0	C
	T	592	1810	0.451	0.327	19.2	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	209	1770	0.478	0.118	30.6	D	27.4	D
	T	691	3619	0.591	0.191	27.2	D		
	R	300	1574	0.276	0.191	24.7	C		

Intersection Delay = 23.7 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.829

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11

Analyst: TR File Name: M304P12.HC9

Area Type: Other 3-16-99 PM

Comment: 2004-Algonquin NB double LT + McKeown/Airport widening

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	60	600	650	185	375	40	650	240	250	90	350	75
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*	*		
Thru		*			Thru		*	*	
Right		*			Right	*	*	*	
Peds		*			Peds		*	*	
WB Left	*	*			SB Left	*			
Thru	*	*			Thru			*	
Right	*	*			Right			*	
Peds		*			Peds		*	*	
NB Right	*	*			EB Right	*	*		
SB Right					WB Right	*			
Green	11.0A	26.0A			Green	18.0A	9.0A	23.0P	
Yellow/AR	4.0	5.0			Yellow/AR	4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

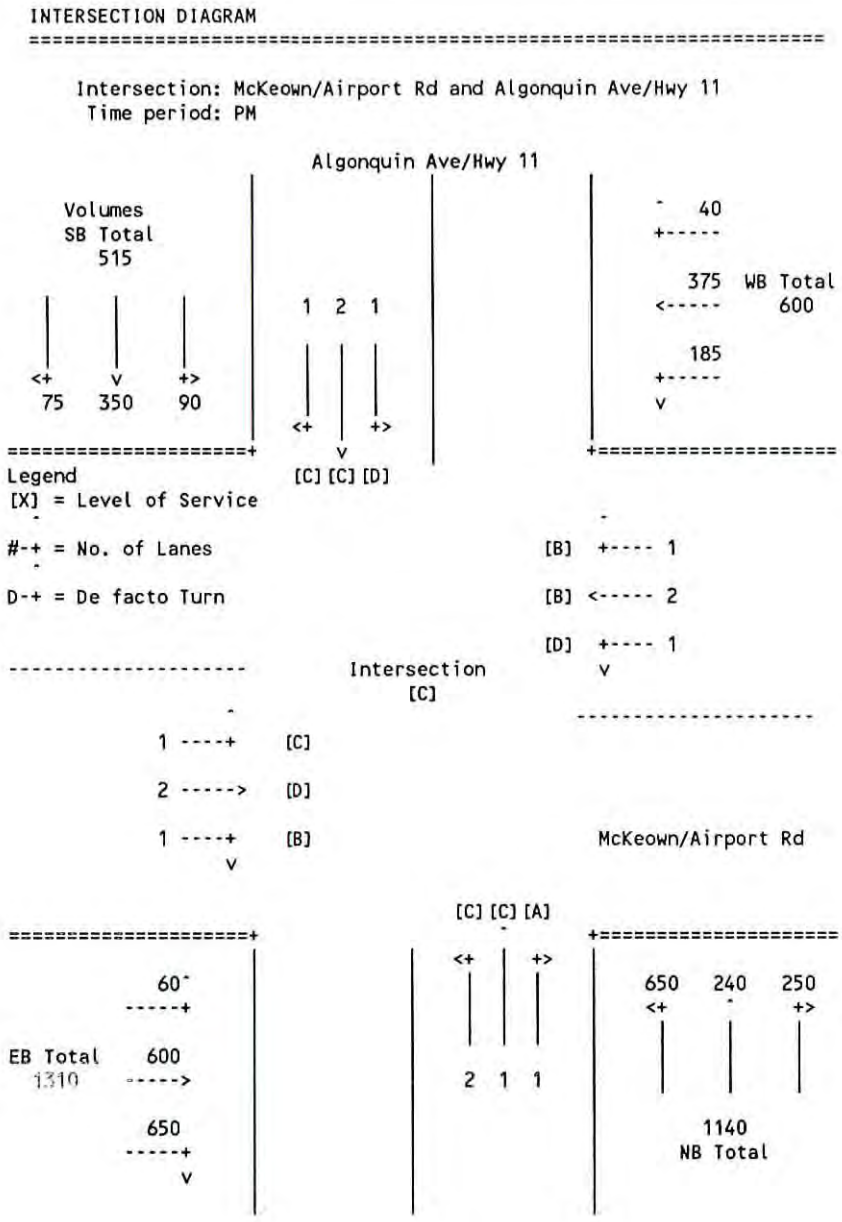
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	180	709	0.371	0.255	22.4	C	20.6	C
	T	948	3725	0.738	0.255	26.5	D		
	R	916	1574	0.788	0.582	14.7	B		
WB	L	261	1770	0.789	0.391	26.7	D	17.9	C
	T	1456	3725	0.301	0.391	15.0	B		
	R	930	1574	0.047	0.591	6.1	B		
NB	L	1062	3539	0.701	0.300	23.5	C	17.2	C
	T	642	1810	0.416	0.355	17.6	C		
	R	1531	1574	0.182	0.973	0.0	A		
SB	L	306	1770	0.327	0.173	26.0	D	24.3	C
	T	822	3619	0.496	0.227	24.3	C		
	R	358	1574	0.232	0.227	22.5	C		

Intersection Delay = 19.6 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.741

INTERSECTION DIAGRAM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown/Airport Rd (N-S) Algonquin Ave/Hwy 11
Analyst: TR File Name: M3FDP1.HC9
Area Type: Other 3-16-99 PM
Comment: Full development - McKeown/Airport widened, Algonquin NB 2LT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	2	1	1	1	2	1
Volumes	75	750	800	225	500	50	850	300	300	100	400	100
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left		*			NB	Left	*	*		
Thru		*				Thru		*	*	
Right		*				Right	*	*	*	
Peds		*				Peds		*	*	
WB Left	*	*			SB	Left	*			
Thru	*	*				Thru			*	
Right	*	*				Right			*	
Peds		*				Peds		*	*	
NB Right	*	*			EB	Right	*	*		
SB Right					WB	Right	*			
Green	13.0A	28.0A			Green		18.0A	9.0A	19.0P	
Yellow/AR	4.0	5.0			Yellow/AR		4.0	5.0	5.0	

Cycle Length: 110 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

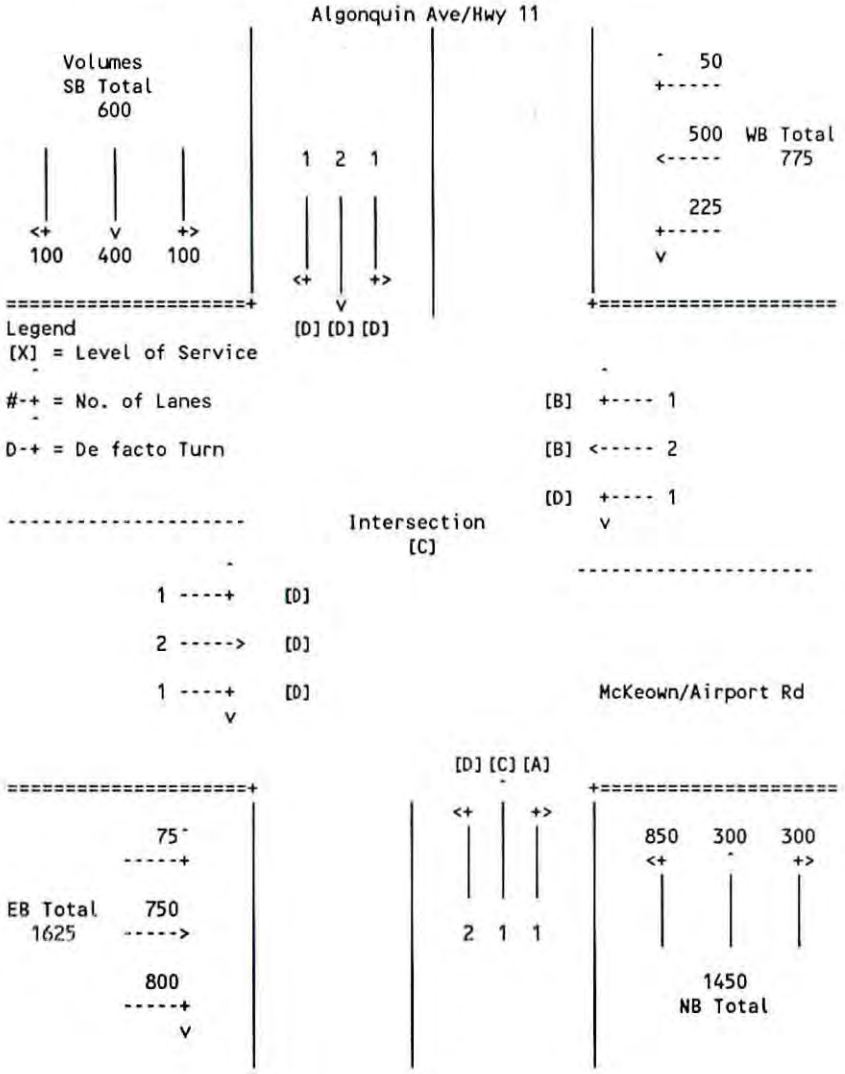
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	145	532	0.572	0.273	26.1	D	27.6	D
	T	1016	3725	0.861	0.273	30.0	D		
	R	944	1574	0.941	0.600	25.4	D		
WB	L	293	1770	0.853	0.427	31.9	D	18.4	C
	T	1592	3725	0.367	0.427	13.9	B		
	R	987	1574	0.057	0.627	5.1	B		
NB	L	1062	3539	0.916	0.300	32.7	D	23.8	C
	T	576	1810	0.578	0.318	21.3	C		
	R	1531	1574	0.217	0.973	0.0	A		
SB	L	306	1770	0.363	0.173	26.3	D	27.7	D
	T	691	3619	0.674	0.191	28.5	D		
	R	300	1574	0.369	0.191	25.4	D		

Intersection Delay = 24.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.894

INTERSECTION DIAGRAM

Intersection: McKeown/Airport Rd and Algonquin Ave/Hwy 11
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4XA.HC9

Area Type: Other 3-16-99 AM

Comment: 1999

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	281	28	35	420	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

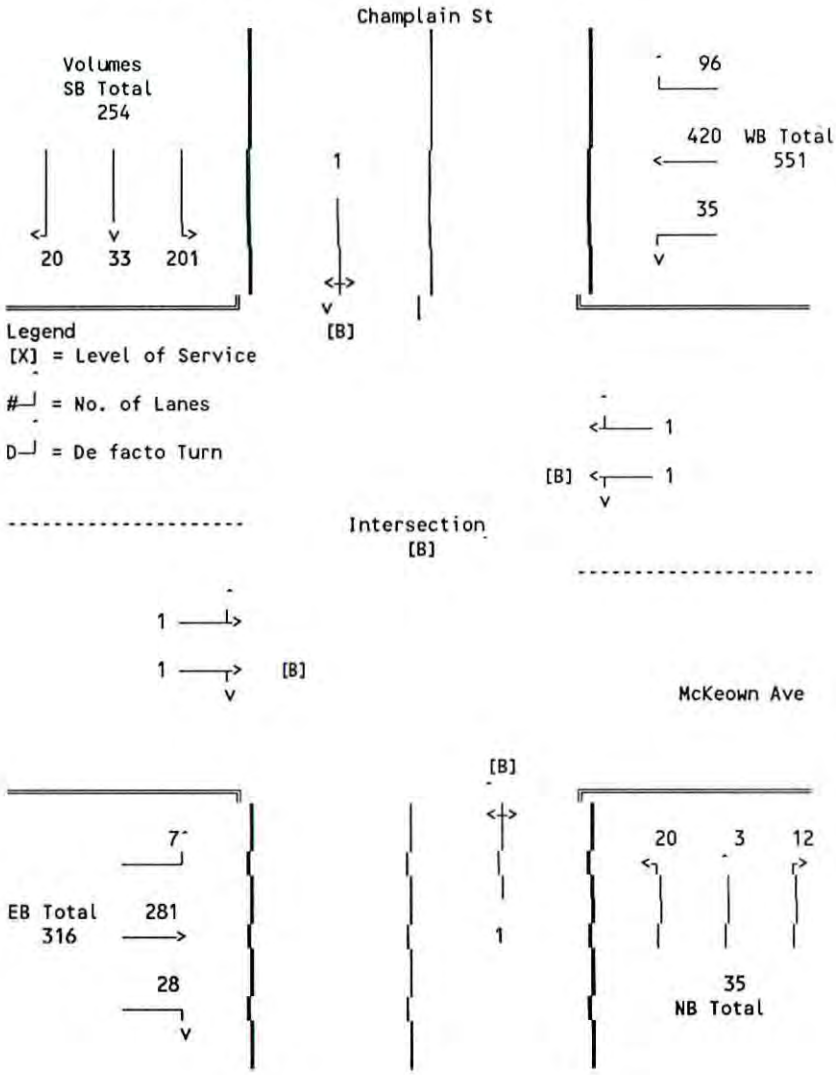
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1399	3279	0.259	0.427	9.0	B	9.0	B
WB	LTR	1971	3519	0.323	0.560	5.8	B	5.8	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 8.4 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.418

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M404A.HC9
Area Type: Other 3-16-99 AM
Comment: 2004 with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	550	28	35	800	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

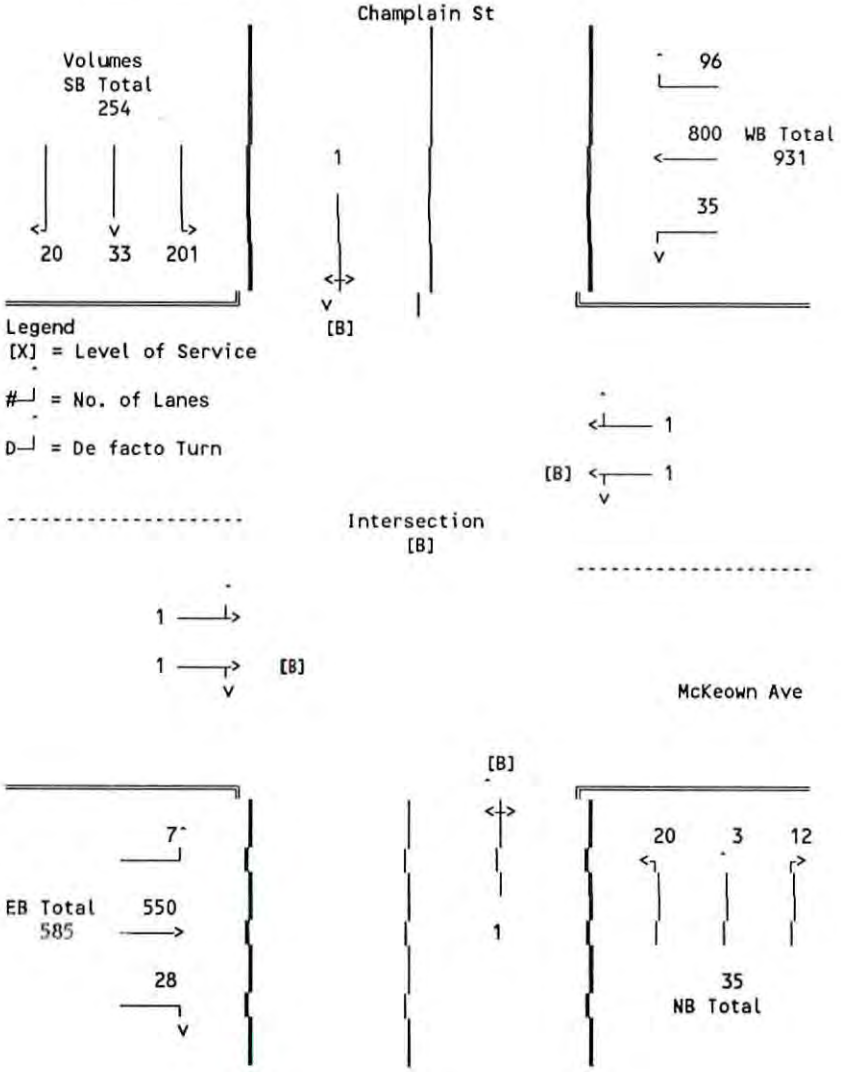
Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB LTR	1380	3234	0.490	0.427	10.3	B	10.3	B
WB LTR	1987	3548	0.544	0.560	7.0	B	7.0	B
NB LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 9.0 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.552

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4FDA.HC9

Area Type: Other Full development 3-16-99 AM

Comment: ~~2004~~ with no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	7	750	28	35	1000	96	20	3	12	201	33	20
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			2			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

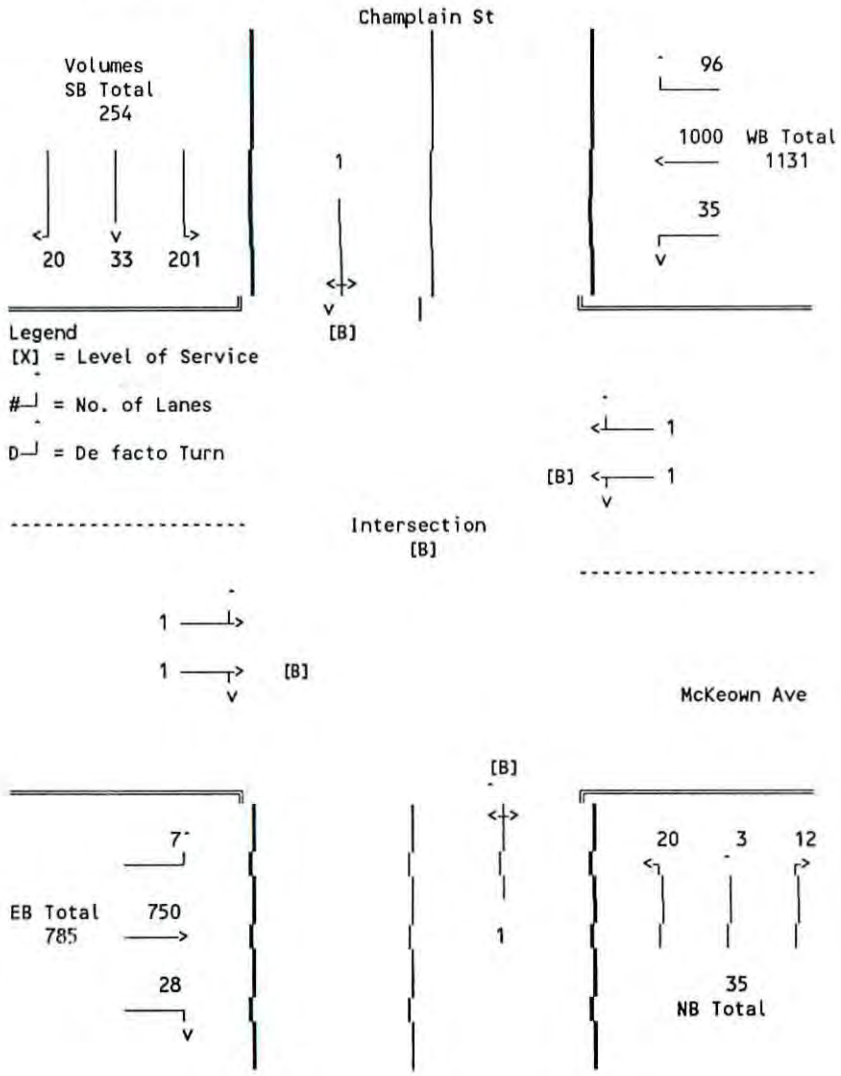
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1386	3248	0.656	0.427	11.9	B	11.9	B
WB	LTR	1973	3524	0.666	0.560	8.1	B	8.1	B
NB	LTR	392	1088	0.092	0.360	10.3	B	10.3	B
SB	LTR	495	1376	0.565	0.360	13.6	B	13.6	B

Intersection Delay = 10.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.626

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: AM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 04-07-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M404P.HC9

Area Type: Other 3-16-99 PM

Comment: 2004 no improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	963	82	80	712	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds		*			Peds	*			
WB Left	*	*			SB Left	*			
Thru	*	*			Thru	*			
Right	*	*			Right	*			
Peds		*			Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	5.0A	30.0A			Green	25.0A			
Yellow/AR	5.0	5.0			Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

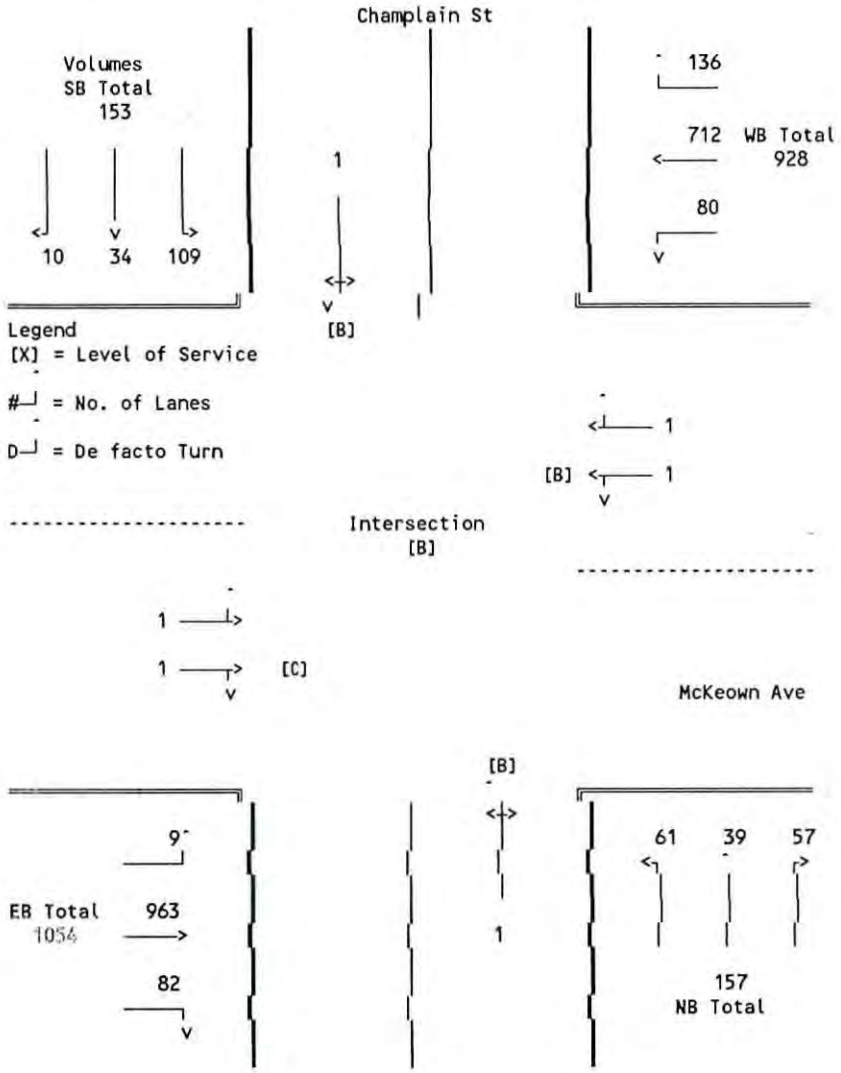
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	1391	3260	0.879	0.427	17.6	C	17.6	C
WB	LTR	1589	2838	0.677	0.560	8.4	B	8.4	B
NB	LTR	434	1205	0.376	0.360	11.7	B	11.7	B
SB	LTR	385	1069	0.437	0.360	12.3	B	12.3	B

Intersection Delay = 13.1 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.583

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999
Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St
Analyst: TR File Name: M4FDP.HC9
Area Type: Other 3-16-99 PM
Comment: Full Development - existing roads

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		> 2 <			> 2 <			> 1 <			> 1 <	
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)		12.0			12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	69.0A				Green	13.0A			
Yellow/AR	5.0				Yellow/AR	5.0			

Cycle Length: 92 secs Phase combination order: #1 #5

Intersection Performance Summary

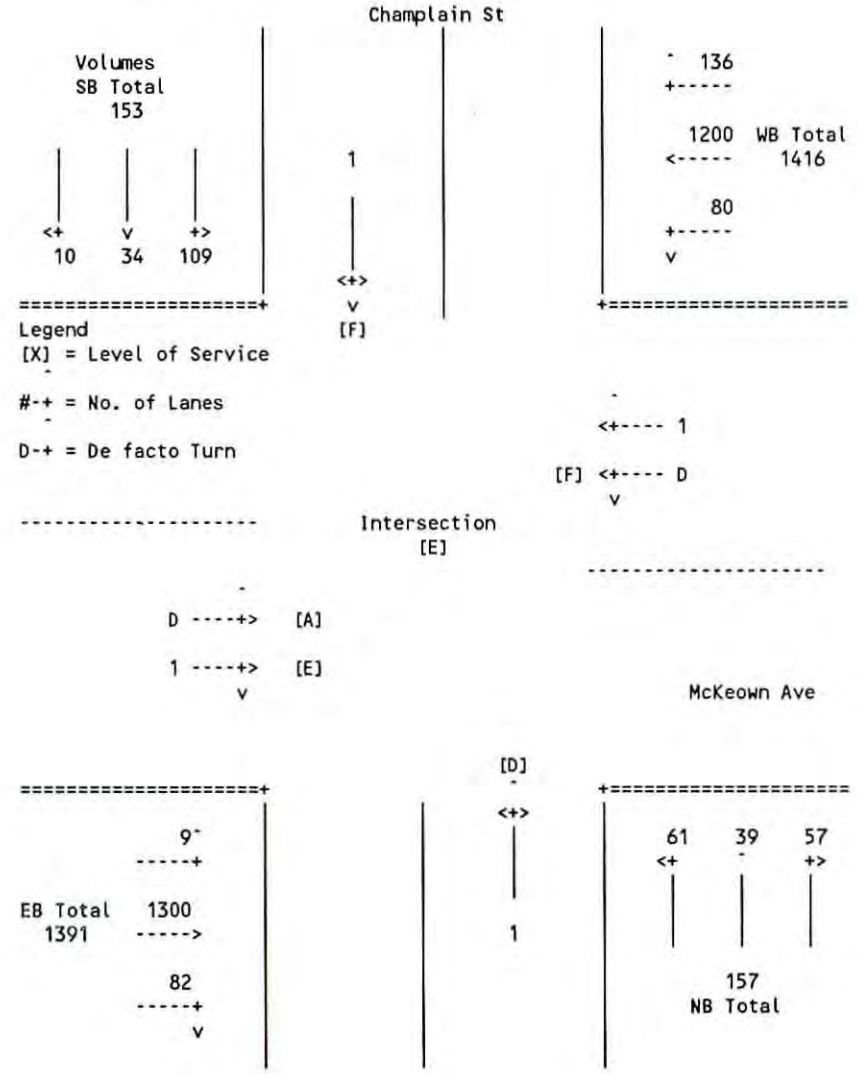
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	DfL	81	105	0.123	0.772	1.7	A	54.8	E
	TR	1401	1816	1.091	0.772	55.2	E		
WB	DfL	81	105	1.098	0.772	126.6	F	48.4	E
	TR	1391	1803	1.062	0.772	43.7	E		
NB	LTR	213	1309	0.764	0.163	33.9	D	33.9	D
SB	LTR	155	952	1.082	0.163	111.3	F	111.3	F

Intersection Delay = 53.7 sec/veh Intersection LOS = E

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 1.096

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 10-17-1999

Center For Microcomputers In Transportation

Streets: (E-W) McKeown Ave (N-S) Champlain St

Analyst: TR File Name: M4FDPI.HC9

Area Type: Other 3-16-99 PM

Comment: Full Development - LT lanes on McKeown

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	<	>	1	<	>	1	<
Volumes	9	1300	82	80	1200	136	61	39	57	109	34	10
Lane W (ft)	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vols			5			5			10			2
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	45.0A				Green	25.0A			
Yellow/AR	5.0				Yellow/AR	5.0			

Cycle Length: 80 secs Phase combination order: #1 #5

Intersection Performance Summary

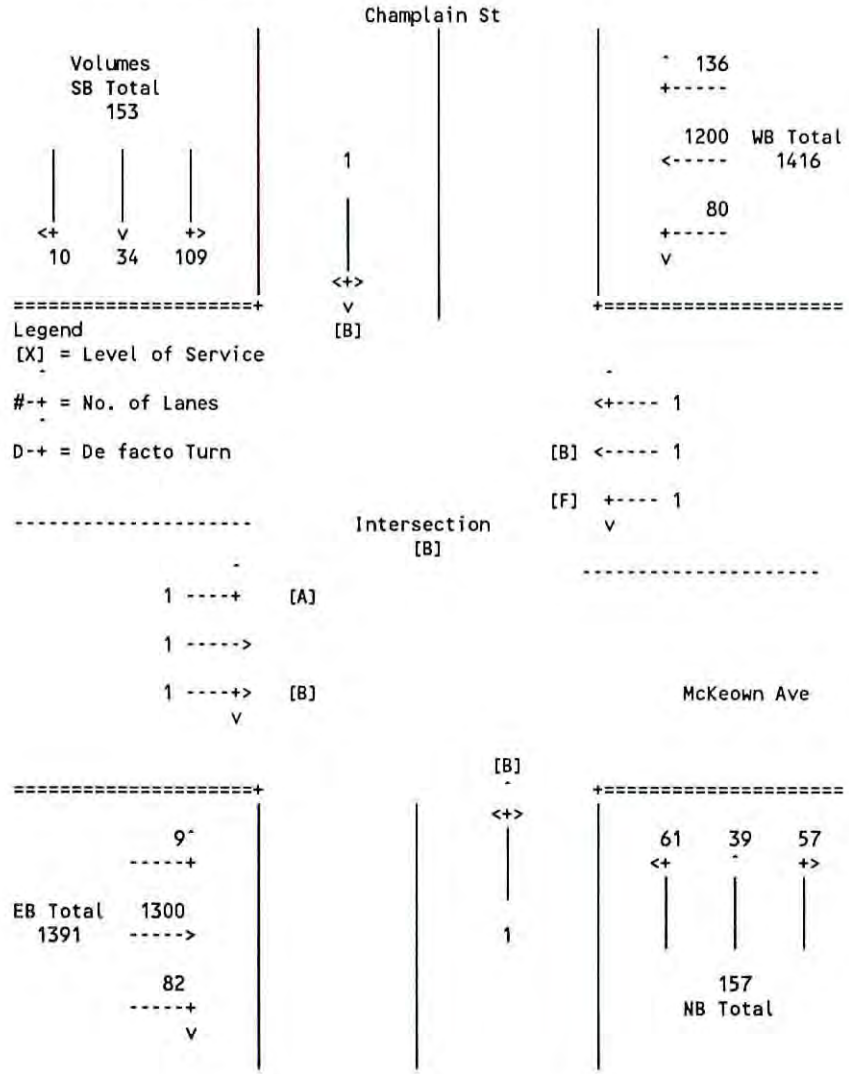
	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	93	159	0.107	0.587	4.7	A	8.8	B
	TR	2151	3662	0.746	0.587	8.9	B		
WB	L	93	159	0.953	0.587	66.4	F	11.7	B
	TR	2136	3636	0.727	0.587	8.6	B		
NB	LTR	429	1271	0.380	0.338	13.3	B	13.3	B
SB	LTR	377	1116	0.446	0.338	13.9	B	13.9	B

Intersection Delay = 10.6 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.768

INTERSECTION DIAGRAM

Intersection: McKeown Ave and Champlain St
Time period: PM



Streets: (N-S) Highway 11 (E-W) Cedar Heights Rd
Major Street Direction.... NS Length of Time Analyzed... 60 (min)
Analyst..... TR Date of Analysis..... 3/17/99
Other Information..... 1999 PM (estimated from 1994 and 1997 counts)
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 2	< 0	0	> 2	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	20	260	20	1	420	30	30	10	30	15	5	1
PHF	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	156	250
Potential Capacity: (pcph)	1154	1034
Movement Capacity: (pcph)	1154	1034
Prob. of Queue-Free State:	1.00	0.97
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	311	500
Potential Capacity: (pcph)	1167	924
Movement Capacity: (pcph)	1167	924
Prob. of Queue-Free State:	1.00	0.97
TH Saturation Flow Rate: (pcphpl)	3400	3400
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.97
Step 3: TH from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	823	818
Potential Capacity: (pcph)	360	362
Capacity Adjustment Factor due to Impeding Movements	0.97	0.97
Movement Capacity: (pcph)	349	351
Prob. of Queue-Free State:	0.98	0.97
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	796	798
Potential Capacity: (pcph)	328	327
Major LT, Minor TH Impedance Factor:	0.94	0.95
Adjusted Impedance Factor:	0.95	0.96
Capacity Adjustment Factor due to Impeding Movements	0.92	0.96
Movement Capacity: (pcph)	301	314

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	36	314	>					
EB	T	12	351	>	457	9.6	0.7	B	9.6
EB	R	36	1034	>					
WB	L	19	301	>					
WB	T	7	349	>	321	12.2	0.2	C	12.2
WB	R	1	1154	>					
NB	L	24	924			4.0	0.0	A	0.3
SB	L	1	1167			3.1	0.0	A	0.0

Intersection Delay = 1.2 sec/veh

ADDENDUM
McKeown Avenue Traffic Study

Background

As the McKeown Avenue Environmental Assessment Study was being finalized, the North Bay Health Centre site selection committee was evaluating potential sites throughout the City. The committee eventually selected a site on the west side of College Drive between Highway 17 and the base of the escarpment. The selection of this site affects the traffic forecasts for McKeown Avenue and this addendum has been prepared to assess the impact of the decision.

The current plans for the Health Care Centre consist of North Bay General Hospital with 277 beds and the Northeast Mental Health Centre with 113 beds, for a total of 390 beds. These are scheduled to be built and ready for occupancy by 2004-5. In subsequent years it is expected that ancillary facilities will locate there (e.g. medical offices, etc.). As of June, 2001, the Health Care Centre Board has proceeded with preliminary site planning studies and has prepared functional plans showing access and parking locations. These plans are preliminary in nature and are subject to a further Class Environmental Assessment that will review the options for access to the site. The preliminary plans proposed the primary access to the site to be via a signalized driveway intersection on Highway 17 west of the College Drive hill, and a secondary access via an unsignalized driveway from College Drive near the base of the hill.

Regardless of the access configuration chosen, access to the site will undergo major changes when the MTO proceeds with the construction of the Route 6 alignment of the North Bay Bypass. The new Bypass will eliminate at-grade intersections, including the existing signalized intersection at Gormanville Road. Gormanville Road is to be realigned to a grade separated interchange on Highway 17 at the base of the College Drive hill, with the existing Gormanville Road being closed at Highway 17. If the Health Centre proceeds as expected with its primary access via a signalized driveway onto Highway 17, this access is likely to be closed when the new Bypass is built. Primary access to the Health Centre would then shift to an entrance from College Drive/realigned Gormanville Road, with a secondary entrance possibly via a ramp from Highway 17.

Route 6 is currently only in MTO plans as a corridor to be protected for when it may become needed in the long-term future. There is no timetable for its construction and it is not included in any MTO funding programs. Any estimate of when it might be built would be speculative, and in fact, it is unlikely to be built within twenty years. Therefore, Route 6 and the associated changes to the road network are considered to be beyond the planning period for the McKeown Avenue EA Study.

Assumptions Included in McKeown Avenue Traffic Forecasts

The land use forecasts included in the McKeown Avenue Traffic Study, developed with North Bay Planning Department staff, included major new development on the Education Centre Lowlands (i.e. University and College lands at the base of the escarpment). It was assumed for planning purposes that the Lowlands would include a hospital, a commercial/retail mall, and residential buildings. It was projected that the development would occur in phases over the planning period, with only a hospital in the short-term period (1-5 years).

The following is a summary of the assumptions for the Lowlands area, as taken from Table 4.1 and Table 4.2 in the Traffic Study report (Appendix 4 of the McKeown Avenue EA Study report):

Short Term (1-5 years)	Basic hospital complex	750 vehicle trips in peak hours; access from College Drive only
Longer Term (5-20 years)	Expansion of Hospital site	200 additional trips in pk hr
	200,000 sq ft of new retail	1,000 vehicle trips in pk hr access from College Drive
	150 new residential units	90 new vehicle trips in pk hr; access from College Dr

In addition, the Traffic Study assumed that additional traffic would be generated from above the escarpment. Growth in University/College enrolment was assumed at 1.5 % per annum over the next 20 years, and an allowance was made for 400 new houses in new subdivisions over 20 years (50 houses in five years). The study also assumed a motel and restaurants on vacant Provincially owned lands adjacent to Gormanville Road at McKeown Avenue/College Drive.

Current Expectations for College Drive Area

In June 2001, the Hospital planners are projecting approximately 700 vehicle trips to/from the Health Care site after it opens its doors; this may increase to 800 over the longer term as the trend to more out-patient care grows. In the longer term, the Hospital planners also expect ancillary facilities to locate on the site, but the exact nature of these is unclear at this time.

The remaining Education Centre Lowlands area is expected to develop with residences and retail uses as previously projected. However, the residential use appears to be proceeding more quickly and at a larger scale than previously projected, while the retail may be somewhat smaller than the earlier estimates.

Comparison of Previous and Current Expectations

The following summarizes a comparison of the traffic impact differences between the assumptions in the McKeown Avenue Traffic Study and current thinking on development in the College Drive area.

Hospital Complex

The McKeown Avenue Traffic Study projected traffic volume levels, which are still valid for the short term and the long term planning periods (750 vehicle trips in the short term and 950 in the long term). However, detailed site location and the access have changed significantly.

With the signalized entrance on Highway 17, 85% of the Hospital traffic is expected to enter/leave directly via Highway 17. Thus Hospital traffic will have much less impact on the Gormanville Road/College Drive/McKeown Avenue intersection, but will have a greater impact on the Highway 17/Gormanville Road intersection.

Lowlands Residential

The development of student residences in the Lowlands area appears to be proceeding at a greater pace than previously projected. Nipissing University is currently building a second residence housing 304 beds and Canadore has also expressed interest in proceeding. The Traffic Study assumed 150 units over 20 years with none in the first five years.

These student residences are expected to generate very low numbers of vehicle trips. Thus, while the number of units is much higher than previously projected, the impact in terms of vehicle trips is expected to be modest, in the range of 200 additional vehicle trips in the peak hour.

Lowlands Retail

The size of the area remaining to be developed for retail is significantly reduced from the projections made during the Taffic Study. It was previously assumed that 200,000 sq.ft. of retail could be developed on the remaining Lowlands, generating 1,000 vehicle trips in the peak hour. The likely maximum now may be closer to 100,000 sq.ft.; if we assume 150,000 sq.ft., the trip generation is decreased from 1,000 to 800 vehicle trips.

Above the Escarpment

The University enrolment has been increasing at greater rates than was assumed in the Traffic Study. The trend appears to be strong, but it is difficult to forecast if this will continue into the longer-term future. While College enrolment

has not been growing, there are plans to consolidate off-campus facilities (Commerce Court in 2004) at the main campus, thereby increasing traffic flows to/from the main campus above the escarpment. In addition, the double cohort arriving from the high schools in 2003 will have an impact for a number of years. Overall, it is possible that the previously projected 30% growth over twenty years may be closer to 90%-100%. This could have the impact of increasing peak hour flows by an additional 200 vehicles within five years and by an additional 400-500 vehicles in the Full Development scenario.

The previous forecasts for the residential subdivisions above the escarpment appear to remain valid.

In summary, it is now expected that the area above the escarpment will generate approximately 200 more trips in the peak hour than previously projected within the next five years and up to 500 more trips in the peak hour in 15-20 years.

Other Development

The previous forecasts for the Provincially owned lands adjacent to Gormanville Road appear to remain valid for planning purposes.

Summary

Current information on expected development in the College Drive corridor indicates the following changes to the forecasts prepared for the McKeown Avenue Traffic Study for the flows expected to pass through the College Drive /McKeown Avenue/Gormanville Road intersection:

Development	***5 Year Horizon***	***15-20 Year Horizon[1]***
Health Care Centre	Reduction of 600 vehicles	Reduction of 750 vehicles
Lowlands Residential	Increase of 200 vehicles	Increase of 300 vehicles
Lowlands Retail	No change	Reduction of 200 vehicles
Education Centre	Increase of 200 vehicles	Increase of 500 vehicles
Other Development	No Change	No change
Net Change	***Reduction of approx. 200 vehicles***	***Reduction of approx. 200 vehicles***

The projected net decrease of 200 vehicles through the Gormanville Road /College Drive/McKeown Avenue intersection in five years represents a reduction of less than 10% from the previous forecast; in the case of the longer term forecast, the reduction is approximately 5%. These net reductions are modest and do not change the conclusions in the McKeown Avenue Traffic Study, although it may allow the implementation of the recommended improvements to be delayed by a few years.

---

[1] The 15-20 Year Horizon assumes the road network without the new Highway 17 Route 6 alignment. Main Health Centre access is via a signalized entrance on Highway 17.

On the other hand, the Highway 17/Gormanville Road intersection will experience greater impacts in terms of volume and the pattern of peak traffic movements and will require improvements to accommodate the demand. The determination of the requirements at that intersection are not within the scope of the McKeown Avenue Environmental Assessment Study, and will be assessed by the current Hospital planning studies.

APPENDIX 5

PROPERTY REQUIREMENTS

McKeown Avenue Class Environmental Assessment
Alternative B - Property Requirements

City of North Bay (Fire Station No. 2)
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

Canadian Tire Corporation Ltd.
Alternative B may require additional right-of-way width for day lighting at the Champlain Street intersection.

J.S. Redpath Holdings Inc. / J.S. Redpath Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
Alternative B may require a 1.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Board of Governors of Canadore College
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Management Board Secretariat, Director of Subsidies Branch
Alternative B may require an irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
Alternative B may require a wedge for day lighting.

McKeown Avenue Class Environmental Assessment
Alternative C - Property Requirements

1003130 Ontario Inc. / 881359 Ont. Inc. (Loeb)
a wedge tapering from 3.0 m (approximate) at the east side of the west entrance to Tim Horton's opposite Josephine Street along the McKeown Avenue frontage of the property to provide for a right turn taper into the property. A wedge tapering from 1.0 m to accommodate a return taper on the opposite side of the entrance is also needed with additional width for day lighting at both sides of the entrance.

The existing east entrance to Tim Horton's would be closed with the Alternative 'C' under consideration.

McDonald's Restaurant
A small triangle having a maximum width of approximately 1.2 m tapering from the east side of the existing entrance toward Algonquin Avenue.

Metz Furniture (Leon's)
A 1.0 m to 4.5 m strip tapering from the west edge of the property along the McKeown Avenue toward Algonquin Avenue.

Willis Enterprises Ltd.
A 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Josephine Street intersection.

Ontario Hydro
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the south-west corner of Josephine Street intersection and at the north-west corner of the Champlain Street intersection.

City of North Bay (Fire Station No. 2)
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

Canadian Tire Corporation Ltd.
a 2.0 m strip (approximate) along the McKeown Avenue frontage of the property to provide for widening to a five lane cross section plus additional width for day lighting at the Champlain Street intersection

James W. Neil Investments Ltd.
a short wedge from the north west corner of the property, described as the Remainder of Instrument No. 52566 (Techi Data Training) now Instrument No. 91879

J.S. Redpath Holdings Inc./J.S. Redpath Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Bell Canada Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

D.J. Venasse Construction (1988) Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

JKS Boyles International Inc.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

1017249 Ont. Ltd. and Johnsea Holdings Ltd.
A 4.5 m strip (approximate) along the McKeown Avenue frontage of the property.

Management Board Secretariat, Director of Subsidies Branch
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Board of Governors Canadore College
An irregular shaped triangle at the Gormanville Road and McKeown Avenue intersection to provide for a right turn channelization and ditching.

Consolidated Homes Ltd. (138 Champlain Street)
additional right-of-way width for day lighting at the Champlain Street intersection.

APPENDIX 6

COST ESTIMATES

COST ESTIMATE SUMMARY
McKeown Avenue

ALTERNATIVES	COST
'A'	$1,060,000.00 *
'B'	$2,780,000.00 *
'C'	$3,400,000.00 *

* Cost does not include improvements to existing storm sewer, sanitary sewer, watermains, utilities and improvements to the Algonquin Avenue/McKeown Avenue intersection.

COST ESTIMATES - ALTERNATIVE 'A'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	10,100	5.50	$55,550.00
2	Hot Mix H.L. 4	t	3,810	55.00	209,550.00
3	Hot Mix Miscellaneous	sq.m	4,005	10.00	40,050.00
4	Granular 'A'	t	5,655	8.50	48,068.00
5	Granular 'B'	t	13,393	5.50	73,662.00
6	Concrete Curb and Gutters	m	1,820	40.00	72,800.00
7	Concrete Sidewalks	sq.m	3,040	38.00	115,520.00
8	150 Diameter Subdrains	m	1,808	16.00	28,928.00
9	Removal of Pavement (Full Depth)	sq.m	9,145	4.50	41,153.00
10	Removal of Pavement (Partial Depth)	t	440	15.00	6,600.00
11	Removal of Concrete Curb and Gutters	m	1,820	10.00	18,200.00
12	Adjusting M.H. and C.B.	Each	39	250.00	9,750.00
13	Light Posts	Each	12	3,000.00	36,000.00
SUB-TOTAL					$755,831.00
14	Contingencies and Engineering (±40%)				$304,169.00
TOTAL					$1,060,000.00

COST ESTIMATES - ALTERNATIVE 'B'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	20,370	5.50	112,035.00
2	Hot Mix H.L. 4	t	7,422	55.00	408,210.00
3	Hot Mix Miscellaneous	sq.m	8,123	10.00	81,230.00
4	Granular 'A'	t	10,905	8.50	92,693.00
5	Granular 'B', Type 1	t	28,422	5.50	156,321.00
6	Concrete Curb and Gutters	m	4,012	40.00	160,480.00
7	Concrete Sidewalks	sq.m	3,670	38.00	139,460.00
8	150 Diameter Pipe Subdrains	m	3,110	16.00	49,760.00
9	300 Diameter Storm Sewers	m	355	110.00	39,050.00
10	1200 Diameter M.H.	Each	3	2,000.00	6,000.00
11	1500 Diameter M.H.	Each	3	2,800.00	8,400.00
12	600 x 600 C.B.	Each	43	1,100.00	47,300.00
13	600 x 1450 D.C.B.	Each	17	2,000.00	34,000.00
14	Adjusting M.H. and C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	12,346	4.50	55,557.00
16	Removal of pavement (Partial Depth)	t	557	15.00	8,355.00
17	Removal of Concrete Curb and Gutters	m	3,168	10.00	31,680.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Posts	Each	33	3,000.00	99,000.00
22	Property	Ha	0.24	330,000	79,200.00
SUB-TOTAL					$1,988,048.00
23	Contingencies and Engineering (±40%)				791,952.00
TOTAL					$2,780,000.00

COST ESTIMATES - ALTERNATIVE 'C'
McKeown Avenue

Item	Description	Unit	Quantity	Unit Price	Total
1	Earth Excavation	cu.m	27,336	5.50	$150,348.00
2	Hot Mix H.L. 4	t	9,487	55.00	521,785.00
3	Hot Mix Miscellaneous	sq.m	7,420	10.00	74,200.00
4	Granular 'A'	t	13,630	8.50	115,855.00
5	Granular 'B' Type 1	t	37,042	5.50	203,731.00
6	Concrete Curb and Gutters	m	6,132	40.00	245,280.00
7	Concrete Sidewalks	sq.m	3,657	38.00	138,966.00
8	150 Diameter Pipe Subdrains	m	4,608	16.00	73,728.00
9	300 Diameter Storm Sewer	m	395	110.00	43,450.00
10	1200 Diameter Manholes	Each	3	2,000.00	6,000.00
11	1500 Diameter Manholes	Each	3	2,800.00	8,400.00
12	600 x 600 Catchbasins	Each	43	1,100.00	47,300.00
13	600 x 1450 Catchbasins	Each	17	2,000.00	34,000.00
14	Adjusting M.H., C.B.	Each	53	250.00	13,250.00
15	Removal of Pavement (Full Depth)	sq.m	13,158	4.50	59,211.00
16	Removal of Pavement (Partial Depth)	t	566	15.00	8,490.00
17	Removal of Curb and Gutters	m	4,027	10.00	40,270.00
18	Removal of Concrete Sidewalks	sq.m	831	7.00	5,817.00
19	Removal of M.H. and C.B.	Each	41	250.00	10,250.00
20	Traffic Signals (a) Major (b) Minor	 Each Each	 1 2	 150,000.00 100,000.00	 150,000.00 200,000.00
21	Illumination Post	Each	33	3,000.00	99,000.00
22	Property	Ha	0.55	330,000.00	181,500.00
SUB-TOTAL					$2,430,831.00
23	Contingencies and Engineering (±40%)				969,169.00
TOTAL					$3,400,000.00

APPENDIX 2

TRANSPORTATION NEEDS STUDY



APPENDIX 2-1

Transportation Needs and Justification Report



McKeown Avenue EA Amendment & Design Transportation Needs and Justification Study

Draft Report

July 12, 2022

DRAFT

Prepared for:

NORTH BAY
ONTARIO CANADA
Just North Enough to be PERFECT

R.V. Anderson Associates Limited
43 Church Street Suite 104
St. Catharines Ontario L2R 7E1 Canada
Tel 905 685 5049 Fax 855 833 4022
www.rvanderson.com

July 12, 2022

RVA 216166

City of North Bay
200 McIntyre Street East,
North Bay, ON
P1B 8V6

Attention: Reid Porter, Infrastructure Engineer

Re: McKeown Avenue EA Amendment and Design
Transportation Needs & Justification Study DRAFT Report

R.V. Anderson Associates Limited (RVA) was retained by the City of North Bay (City) to undertake an Environmental Assessment (EA) Addendum for the McKeown Avenue corridor to identify and develop required corridor improvements in response to existing and future projected needs.

RVA has undertaken a Transportation Needs and Justification Study to analyze the existing and future needs of the corridor, including its intersections and options for the accommodation of active transportation facilities into the preferred design.

RVA is pleased to submit herein our Transportation Needs and Justification Study Report, presenting our methodology, analysis, identified opportunities for improvement, and recommendations with respect to transportation operations and safety along the study area corridor.

If there is any query related to this report, please feel free to contact the undersigned at 905-685-5049 or by email at mdimaria@rvanderson.com.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED

Matthew Di Maria, C.E.T., CAPM
Transportation Planner

Nick Palomba, P.Eng.
Manager, Transportation

MD:JR
Encls. Transportation Needs and Justification Report

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CANADA'S BEST MANAGED COMPANIES
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McKeown Avenue EA Amendment and Design

Transportation Needs and Justification Study

Draft Report

City of North Bay

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RVA 216166

July 12, 2022

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EXECUTIVE SUMMARY

R.V. Anderson Associates Limited (RVA) was retained by the City of North Bay to undertake an Environmental Assessment (EA) Amendment and Design for the reconstruction of McKeown Avenue, from the Gormanville Road roundabout approach (western extent) to Cartier Street (eastern extent), to identify and develop required corridor improvements to accommodate future projected traffic needs.

In support of the EA Amendment, RVA undertook a Transportation Needs and Justification Study to review its active transportation and transit facilities and evaluate the existing and future traffic needs of the corridor and intersections. This included an assessment of intersection operations under future 2041 (20-year horizon) traffic conditions for a do-nothing scenario and three future proposed cross-section scenarios for McKeown Avenue. The three proposed scenarios included a three lane cross-section (one through lane per direction and a centre two-way left turn lane), four lane cross-section (two through lane per direction) and a five lane cross-section (two through lanes per direction and a centre two-way left turn lane).

Intersection capacity analysis conducted under existing traffic conditions for the unsignalized study area intersections of McKeown Avenue with McNamara Street and Cartier Street found that both intersections are currently operating well under the weekday a.m., p.m., and Saturday midday peak hours with no critical movements, significant delay, or substantial queueing.

Under future total 2041 do-nothing traffic conditions, both intersections are forecast to continue operating well with under all three peak hours analyzed with only moderate delays (32 seconds or less) to the southbound side street movements and levels of service forecast to be “D” or better.

Future total 2041 traffic conditions for the three, four and five lane cross section scenarios proposed for McKeown Avenue indicate both study area intersections are forecast to continue operating well with no critical movements, delay or queuing under any peak hour analyzed. All three proposed cross-section scenarios do offer improved levels of service (“C” or better) and delay (19 seconds or better) for the southbound side street movements at McNamara Street and Cartier Street compared with do-nothing conditions.

The results of the intersection capacity analysis completed for the intersections of McNamara Street and Cartier Street under existing and future traffic conditions indicate that any of the proposed cross-sections (three, four or five lane options) for McKeown Avenue will operate well up to an ultimate 20-year horizon year (2041).

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1.0 INTRODUCTION

R.V. Anderson Associates Limited (RVA) was retained by the City of North Bay (City) to undertake an Environmental Assessment (EA) Amendment and Design for the reconstruction of McKeown Avenue, from the Gormanville Road roundabout approach (western extent) to Cartier Street (eastern extent), to identify and develop required corridor improvements to accommodate future projected traffic needs.

In support of the EA Amendment, RVA has undertaken this Transportation Needs and Justification Study, to analyze the existing and future needs of the corridor, including its intersections and active transportation and transit facilities, and propose recommended improvement options to be incorporated into the preferred preliminary design. This report presents our methodology, analysis, identified opportunities for improvement, and recommendations with respect to transportation operations along the study area corridor.

2.0 BACKGROUND

In 1999, an EA was completed for McKeown Avenue between Algonquin Avenue and Gormanville Road. As part of that study, a five-lane cross-section (two travel lanes in both directions plus a centre two-way left turn lane) was recommended for McKeown Avenue between Gormanville Road and Cartier Street. In 2002, this study was updated to reflect increased traffic as a result of the proposed North Bay Regional Health Centre (which is now fully built) and the five-lane cross-section for McKeown Avenue was still the recommended alternative.

A Traffic Impact Study (TIS) was then completed in 2006 to assess the intersection and roadway needs for McKeown Avenue based on staged implementation of proposed commercial developments within the corridor. This study concluded that a centre two-way left turn lane (TWLTL) is not required for the corridor however a four-lane cross-section (two through lanes per direction) was still required. This study was further updated in 2008 to confirm improvements between Algonquin Avenue and Champlain Street based on the composition of development that had been completed to that date.

3.0 STUDY AREA

3.1 Adjacent Land Use and Existing Development

The area surrounding McKeown Avenue contains a mixture of commercial, office and residential land uses. The south side of the roadway contains several car dealerships with a few industrial offices located at the east end of the study area and One Kids Place located at the west end. On the north side of McKeown Avenue there are several restaurants, the Service Ontario government building and residential townhouse units. Further north beyond the land uses immediately abutting

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the roadway, a large residential neighbourhood with single family units is present along with additional government buildings including the Ontario Provincial Police to the northwest.

Immediately east of the project study area there are numerous commercial establishments including retail and restaurants within the Cartier Plaza, McKeown Commons, Algonquin Square and McKeown Plaza. In addition, a Hampton Hotel is also located on the southeast corner of McKeown Avenue and Josephine Street. Beyond the west end of the study area, along College Drive is Canadore College, Nipissing University and the North Bay Regional Health Centre.

Figure 1 presents the McKeown Avenue study area, and the adjacent land uses directly abutting the roadway and surrounding the greater study area.

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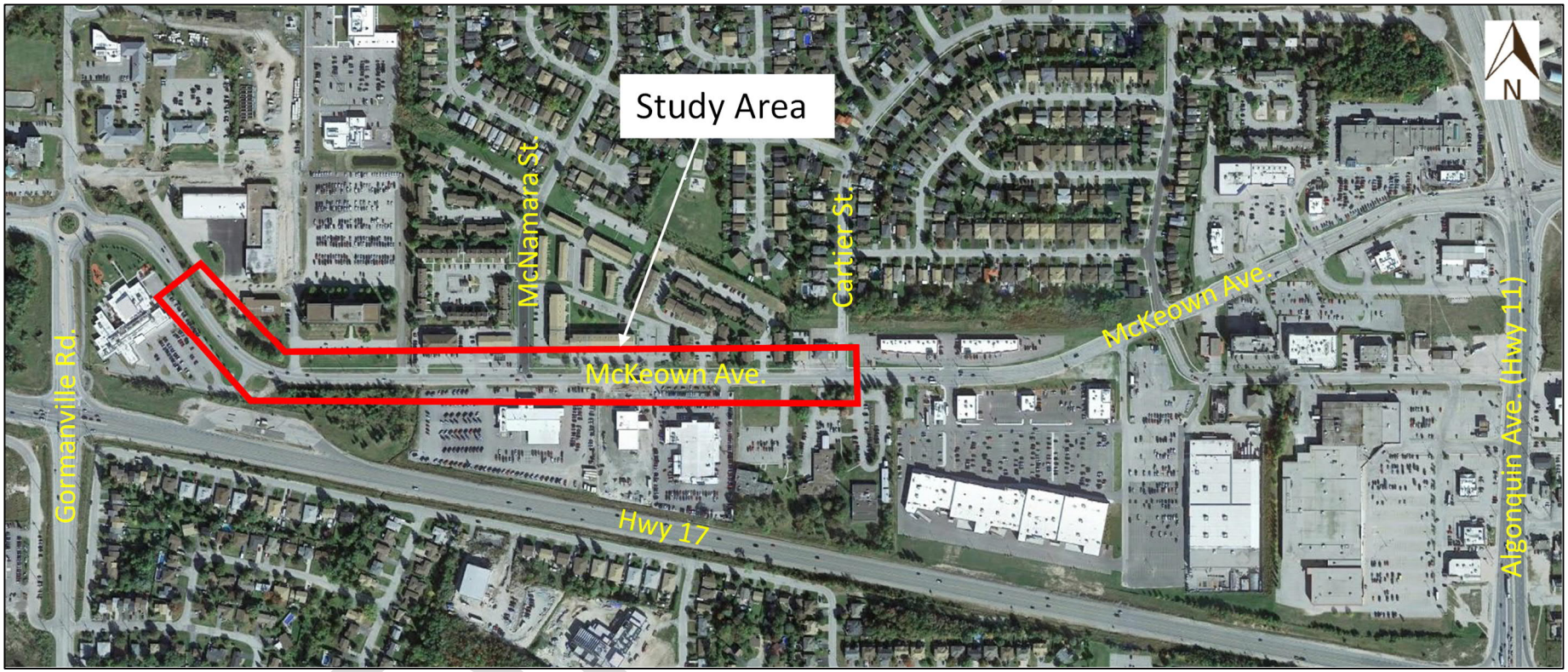


Figure 1: McKeown Avenue Study Area and Surrounding Land Uses

3.1.1 Roadway Configuration

McKeown Avenue is an east-west oriented road under the jurisdiction of the City of North Bay, with a posted regulatory speed limit of 50 km/h. According to Schedule 5 – Transportation Plan of the City's Official Plan, July 11, 2018, McKeown Avenue is identified as an arterial roadway. Under Section 5.2.1.3 of the Official Plan, it states that arterial roads in urban settings are intended to facilitate significant traffic volumes at medium to higher speeds and provide a higher mobility level of service.

Throughout the study area McKeown Avenue is a two-lane roadway (one-lane per direction) with an urban cross-section. The roadway is generally straight and flat with a gradual horizontal curve towards the north at the west end of the study area. There is no on-street parking along McKeown Avenue and no auxiliary lanes are present. Immediately west of the study area beyond Cartier Street, stretching to Highway 11 (Algonquin Avenue), McKeown Avenue is a four-lane roadway (two lanes per direction).

3.1.2 Active Transportation

Pedestrian Facilities

Currently there is a sidewalk along the north side of McKeown Avenue from the east end of the study area to the west most driveway of the Service Ontario building. Continuing west from this point, a paved shoulder is present which leads all the way to the intersection of McKeown Avenue with Gormanville Road. There are no pedestrian facilities along the south side of McKeown Avenue. However, there is an unpaved shoulder present which stretches from Cartier Street at the west end of the study area to the One Kids Place driveway. The existing pedestrian facilities and locations are presented in **Figure 2.**

Under Section 5.2.1.3 of the Official Plan, both new and re-developed arterial roadways are to be outfitted with sidewalks on both sides of the road. This is reiterated within the City's 2019 Active Transportation Master Plan which identifies McKeown Avenue as an Active Transportation or "AT Arterial". The master plan also identifies the introduction of a proposed 3.5-metre-wide asphalt trail on one side of the street. The proposed pedestrian facilities as taken from the master plan document are presented in **Figure 3**.

Cycling Facilities

Currently there are no cycling facilities along McKeown Avenue. As mentioned in the previous section, within the City's 2019 Active Transportation Master Plan, McKeown Road is identified as an "AT Arterial" roadway. As part of that designation, McKeown Avenue is proposed to contain 1.5 metre bike lanes on both sides of the street plus a 3.50 metres asphalt trail on one side of the corridor. The proposed cycling facilities as taken from the master plan document are presented in **Figure 3**.

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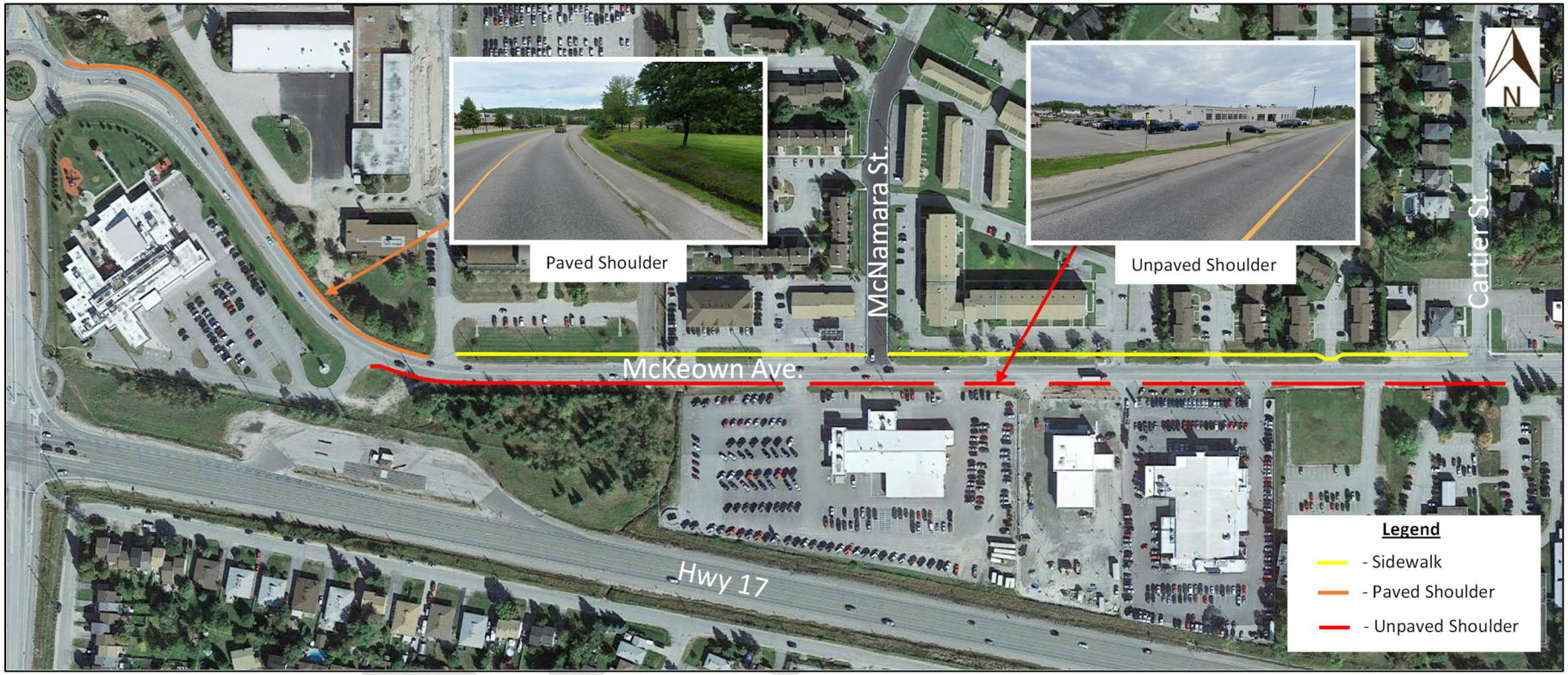


Figure 2: Existing Pedestrian Facilities

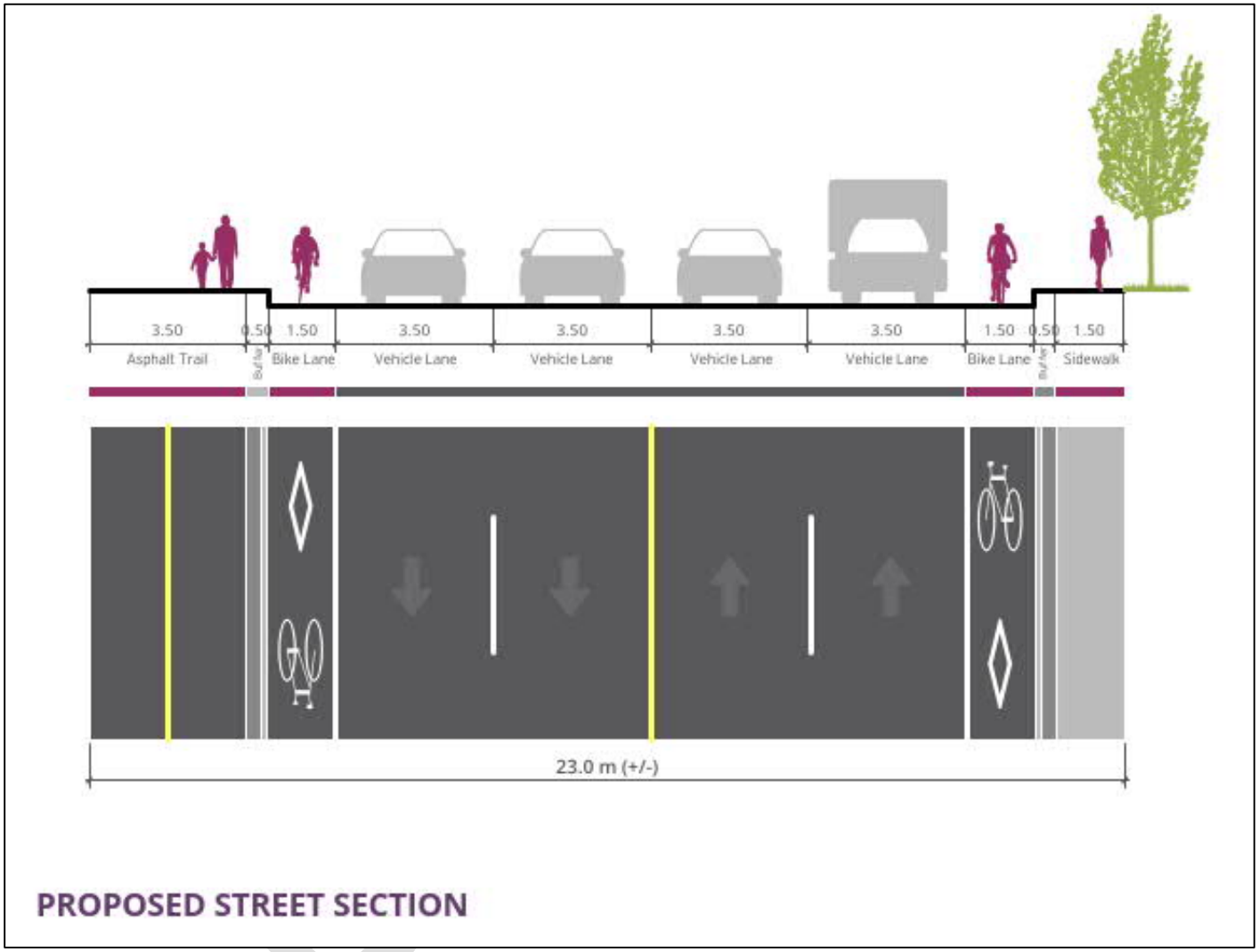


Figure 3: McKeown Avenue Active Transportation Facilities (Source: Active Transportation Master Plan, January 2019)

3.1.3 Transit Operations

There are currently four North Bay Transit routes which operate along the McKeown Avenue study area. They are as follows:

Route 1a – College-University

This route which travels only in the westbound direction through the study area connects Canadore College/Nipissing University with the North Bay Museum and Transit Terminal located south of the study area along Oak Street East. The route operates Monday to Saturday from 6:30 a.m. to 7:00 p.m. From 7:00 p.m. to 10:00/11:00 p.m. and Sunday's 8:00 a.m. to 7:00 p.m. this route is serviced by the Dynamic Dispatch System.

Route 1b – Campus Special

Rout 1b runs in the opposite direction of Route 1a travelling eastbound only through the study area connecting the same major landmarks including Canadore College/Nipissing University with the North Bay Museum and North Bay Transit and Para-Bus Terminal. The route also operates Monday to Saturday from 6:30 a.m. to 7:00 p.m. From 7:00 p.m. to 10:00/11:00 p.m. and Sunday's 8:00 a.m. to 7:00 p.m. this route is serviced by the Dynamic Dispatch System.

Route 1c – McKeown Corridor

This route travels east-west through the study area from Canadore College/Nipissing University to Stockdale Road just west of Highway 11 (Algonquin Avenue). The route operates Monday to Friday only from 7:00 a.m. to 6:00 p.m.

Route 6 – Hornell-CFB

Route 6 offers only limited service along McKeown Avenue travelling only in the eastbound direction. The route mainly connects North Bay/Jack Garland Airport in the northeast with the North Bay Transit and Para-Bus Terminal along Oak Street East. The route operates Monday to Saturday from 6:30 a.m. to 7:00 p.m. From 7:00 p.m. to 10:00/11:00 p.m. and Sunday's 8:00 a.m. to 7:00 p.m. this route is serviced by the Dynamic Dispatch System.

To facilitate the transit routes mentioned above there are currently four transit stops within the project study area. The location of each stop along with the route serviced are presented in **Figure 4**.

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Figure 4: North Bay Transit – McKeown Ave. Stop Locations

3.2 Study Area Intersections

The McKeown Avenue EA Addendum study area consists of the following two study area intersections:

3.2.1 McKeown Avenue at McNamara Street

The intersection of McKeown Avenue with McNamara Street is a three-leg unsignalized intersection. The east-west movements of McKeown Avenue are free flow while the southbound movement of McNamara Street is under stop control. There are no auxiliary left turn lanes present at any of the approaches to this intersection.

3.2.2 McKeown Avenue at Cartier Street

The intersection of McKeown Avenue with Cartier Street is also three-leg unsignalized intersection. The east-west movements of McKeown Avenue are free flow while the southbound movement of Cartier Street is under stop control. There are no auxiliary left turn lanes present at any of the approaches to this intersection.

The McKeown Avenue study area intersection lane configurations and traffic control are presented in **Figure 5**.

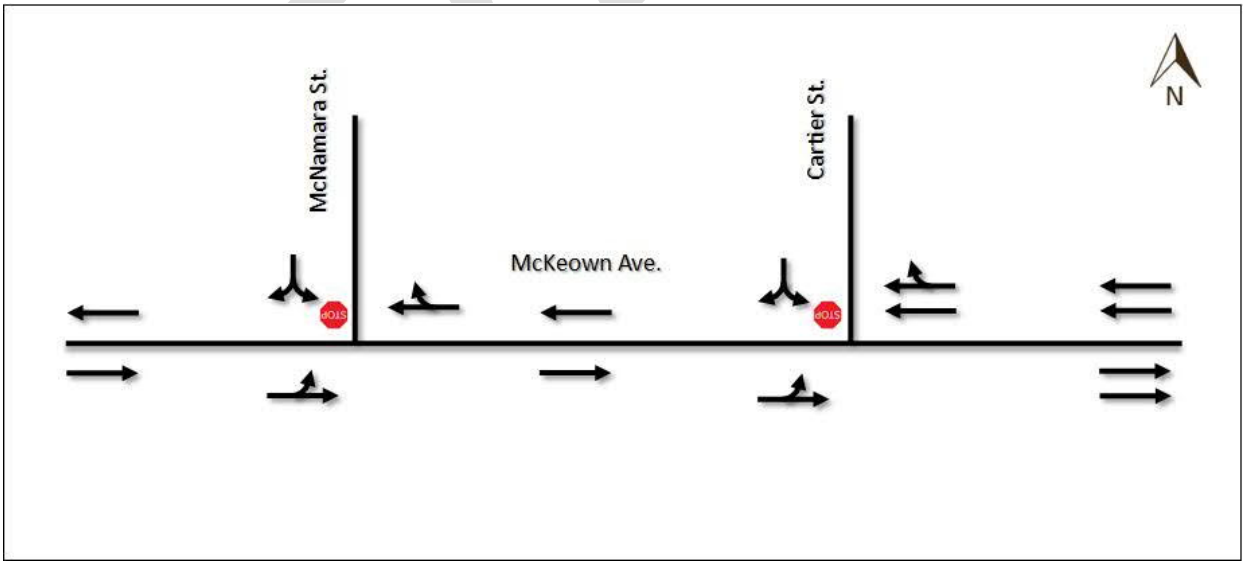


Figure 5: Existing Intersection & Roadway Lane Configurations and Traffic Control

4.0 TRAFFIC VOLUMES

4.1 Existing 24-hour Midblock Volumes

Existing 24-hour midblock traffic volumes for McKeown Avenue were provided by the City. The data was collected within the midblock section between McNamara Street and Cartier Street for approximately 10 days in June 2019. **Figure 6** presents the two-way 24-hour traffic volume distribution for each day from the collected data. The raw data is provided in **Appendix A**.

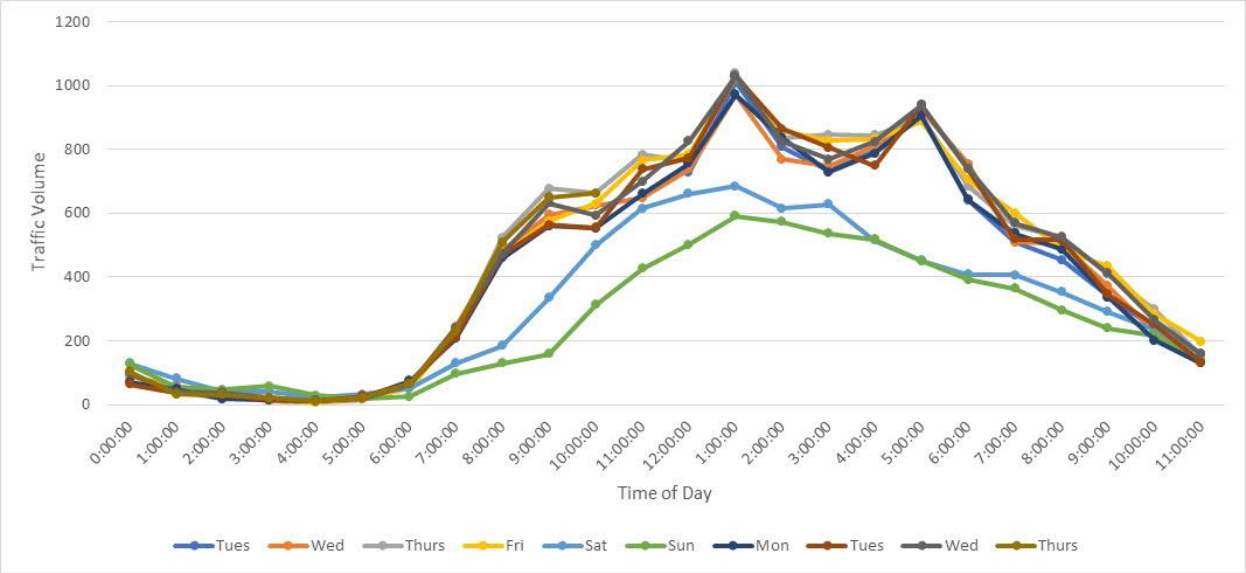


Figure 6: McKeown Ave. Two-Way 24-Hour Volume Distribution

As presented in **Figure 6**, the weekday distribution of traffic volumes generally follows the same trend each day having a morning peak between 8:00 a.m. and 9:00 a.m., a midday peak between 12:00 p.m. and 1:00 p.m. and an afternoon peak between 4:00 p.m. and 5:00 p.m. Based on the data, the peak two-way volumes for the roadway were recorded during the Midday peak hour where volumes were in and around 1,000 vehicles.

The two-way 24-hour volumes recorded over the weekend were found to be generally lower than weekday volumes and had a distribution trend consistent with a lack of commuter trips which are present during weekdays. There are no distinct morning or afternoon peak hours and the peak two-way volumes for the roadway were recorded during the Midday peak hour between 12:00 p.m. and 1:00 p.m. Volumes during this time were between approximately 600 and 700 vehicles.

4.2 Existing Turning Movement Counts

Existing turning movement count data (TMC) for the study area intersections plus was provided by the City. Additional data for intersections immediately adjacent to the study area were also provided by the City or extracted from previous studies. **Table 1** identifies the count location, source, date collected, and the peak hours identified from the data. The raw count data provided can be seen in **Appendix A**.

Table 1: Turning Movement Count Data Information

INTERSECTION	SOURCE	DATE COLLECTED	PEAK HOUR		
			AM	MIDDAY	PM
McKeown Ave. & Gormanville Rd.	McKeown Ave. TIS Nov. 2006	Thurs. Jan 12th, 2006 Sat. Jan. 14th, 2006	Not available	Not available	Not available
McKeown Ave. & McNamara St.	City of North Bay	Sat. Nov. 27th, 2021 Tues. Nov. 30th, 2021 Thurs. Dec. 2nd, 2021	- 8am – 9am 8am – 9am	12:30pm – 1:30pm 12pm – 1pm 12pm – 1pm	- 4pm – 5pm 4pm – 5pm
McKeown Ave. & Cartier St.	City of North Bay	Fri. Nov. 26th, 2021 Sun. Nov. 28th, 2021 Mon. Nov. 29th, 2021	7:45am – 8:45am - 7:45am – 8:45am	12pm – 1pm 12:45pm – 1:45pm 12pm – 1pm	4:30pm – 5:30pm - 4pm – 5pm
McKeown Ave. & Cartier Plaza	City of North Bay	Fri. Nov. 19th, 2021 Mon. Nov. 22nd, 2021 Tues. Nov. 23rd, 2021	8am – 9am 8am – 9am 8am – 9am	12pm – 1pm 12pm – 1pm 11:45am – 12:45pm	4:30pm – 5:30pm 4:45pm – 5:45pm 5pm – 6pm

Based on a review of the TMC data presented in **Table 1**, the weekday a.m. peak hours for both study area intersections generally occur between 7:45 a.m. and 9:00 a.m. The midday peak hour was generally found to be 12:00 p.m. to 1:45 p.m. and the p.m. peak hour ranged between 4:00 p.m. and 6:00 p.m.

For the purpose of establishing the existing traffic volumes for the study area intersections, the data collected on Tuesday for the intersection of McKeown Avenue and McNamara Street and Monday for McKeown Avenue and Cartier Street were utilized for analysis purposes. The volumes were then adjusted with the turning movement counts for the intersections immediately adjacent the study area to account for any significant discrepancies within the data. Turning Movement Diagrams (TMD) for the existing raw and adjusted intersection turning movement volumes during the weekday a.m., p.m. and Saturday Midday peak hours are shown in **Figure 7** and **Figure 8** respectively.

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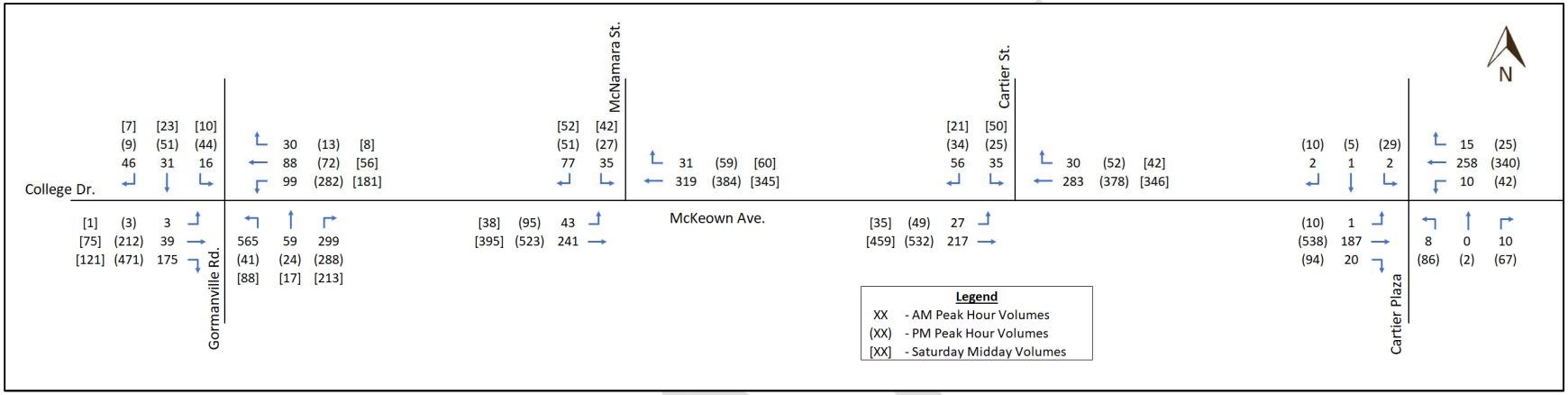


Figure 7: Existing Raw Weekday AM, PM, and Saturday Midday Traffic Volumes

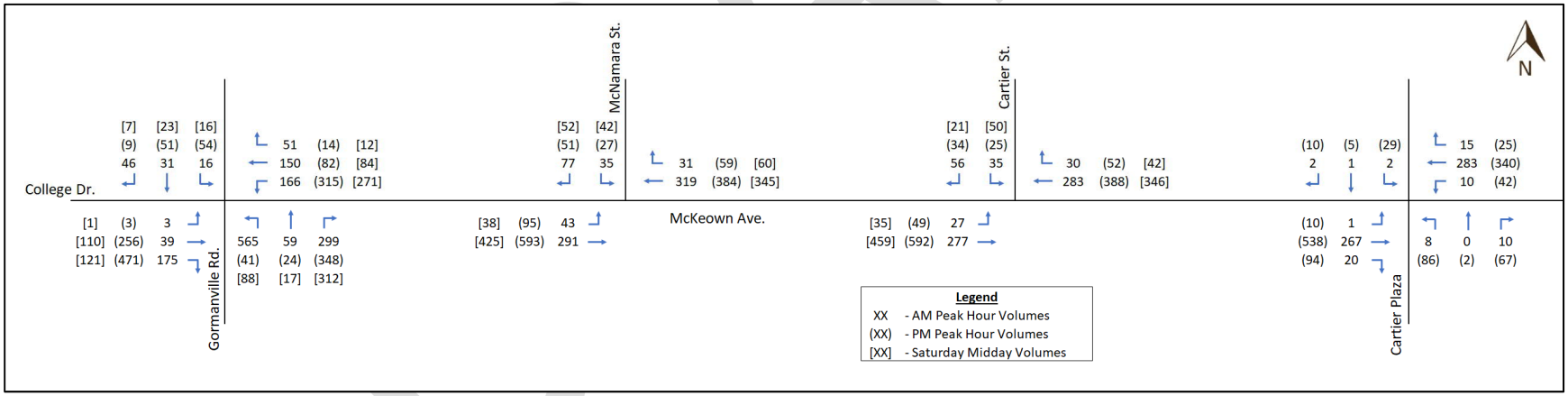


Figure 8: Existing Adjusted Weekday AM, PM, and Saturday Midday Traffic Volumes

4.3 Traffic Growth

Future background traffic growth projections for the study area intersections have been forecasted by applying a growth rate of 1.0% per annum as determine in conjunction with the City. The growth rate was applied to all intersection movements as a conservative estimate to a future 20-year horizon year of 2041.

The resulting TMD illustrating 2041 intersection turning movement volumes growth during the weekday a.m., p.m. and Saturday midday peak hours are shown in **Figure 9**.

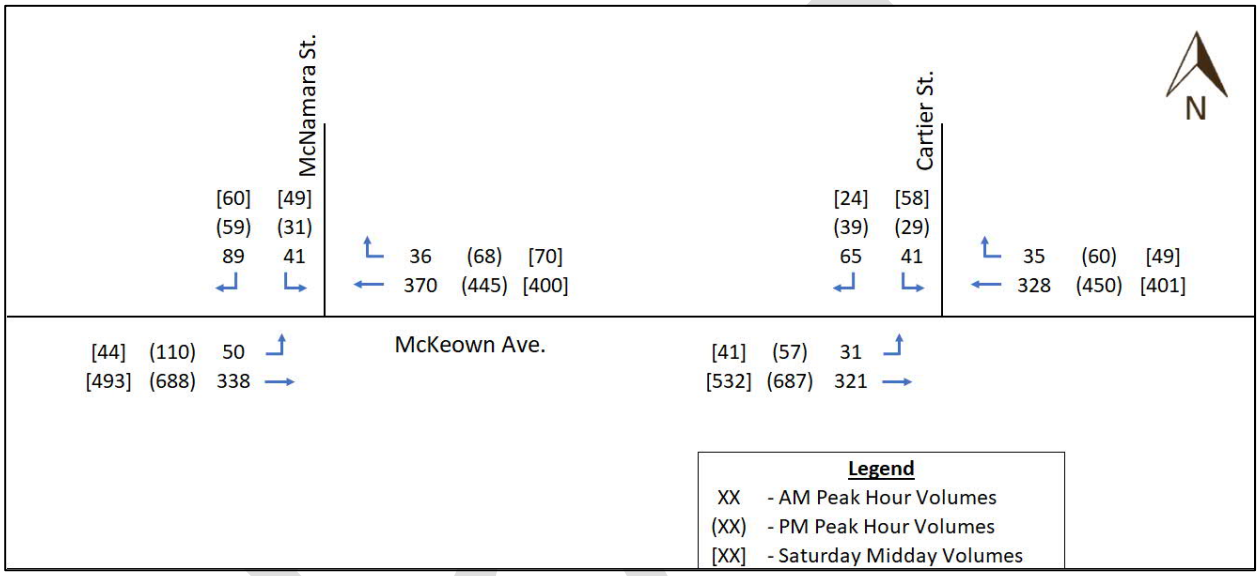


Figure 9: Future 2041 Weekday AM, PM, and Saturday Midday Traffic Growth

4.4 Background Developments

Through discussions with City planning staff, the majority of the greater McKeown Avenue study area is predominantly built out. However, there are several locations which were identified by the City where future development has been proposed or could potentially be developed based on their current knowledge. As a result, three locations were identified as follows:

- Former Trussler School and adjacent lands located along Cartier Street – To be redeveloped into multi-family housing (assumed 120 units);
- 789 Cartier Street – Potential future retail development (approximately 3,000 ft²);
- Expansion of existing Provincial Government (MTO) building along McKeown Avenue (approximately 20,000 ft²).

Site generated traffic volumes for these developments were estimated utilizing the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th edition). **Table 2** presents the site generated traffic volumes for these developments.

Table 2: Weekday AM & PM Site Generated Traffic Volumes

Development Name	LUC	No. of Units/GFA	Peak Hour	Trip Equation/Average Rate	Total Two-Way Trips	Directional Split			
						In%	Out%	In	Out
Trussler School Redevelopment	Multi-family Housing (Mid-rise - LUC 222)	120	AM	T = 0.44(X) - 11.61	41	23%	77%	9	32
			PM	T = 0.39(X) + 0.34	47	61%	39%	29	18
			SAT	Ln(T) = 1.00 Ln(X) - 0.91	48	51%	49%	24	24
Totals		**120**	**-**	**-**	**136**	**-**	**-**	**62**	**74**
789 Cartier St.	Strip Retail Plaza (<40K) (LUC 822)	3,000ft²	AM	Ln(T) = 0.66 Ln(X) + 1.84	13	60%	40%	8	5
			PM	Ln(T) = 0.71 Ln(X) + 2.72	33	50%	50%	17	16
			SAT	6.57	20	51%	49%	10	10
Totals		**-**	**-**	**-**	**66**	**-**	**-**	**35**	**31**
Provincial Government Building (MTO)	Government Office Building (LUC 730)	20,000 ft²	AM	3.34	67	75%	25%	50	17
			PM	Ln(T) = 0.97 Ln(X) + 0.62	34	25%	75%	9	25
			SAT[1]	-	-	-	-	-	-
Totals		**-**	**-**	**-**	**135**	**-**	**-**	**68**	**67**

[1] *– No trip generation equation available due to nature of land use.*

As presented in **Table 2**, the Trussler Scholl and adjacent lands redevelopment is forecasted to generate approximately 41 total two-way trips (9 inbound and 32 outbound) during the a.m. peak hour, 47 total two-way trips (29 inbound and 18 outbound) during the p.m. peak hour, and 48 total two-way trips (24 inbound and 24 outbound) during the Saturday midday.

The 789 Cartier Street potential development is forecast to generate approximately 13 total two-way trips (8 inbound and 5 outbound) during the a.m. peak hour, 33 total two-way trips (17 inbound and 16 outbound) during the p.m. peak hour and 20 total two-way trips (10 inbound and 10 outbound) during the Saturday midday.

Finally, the potential Provincial Government Building expansion is forecast to generate approximately 67 total two-way trips (50 inbound and 17 outbound) during the a.m. peak hour and 34 total two-way trips (9 inbound and 28 outbound) during the p.m. peak hour. No trip generation was completed for a Saturday midday due to the nature of an office building land use which are not typically open on weekends.

The forecasted site trips for each proposed or potential development were assigned the to the study intersections based on the trip distributions percentages outlined in **Table 3**. These percentages were extracted from the McKeown Avenue Traffic Impact Study, November 2006. The resulting trip assignments for each development are presented in **Figure 10**, **Figure 11**, **and Figure 12.**

Table 3: Trip Distribution Percentages

Origin/Destination	Percentage
West via McKeown Ave.	20%
East via McKeown Ave.	80%
Total	100%

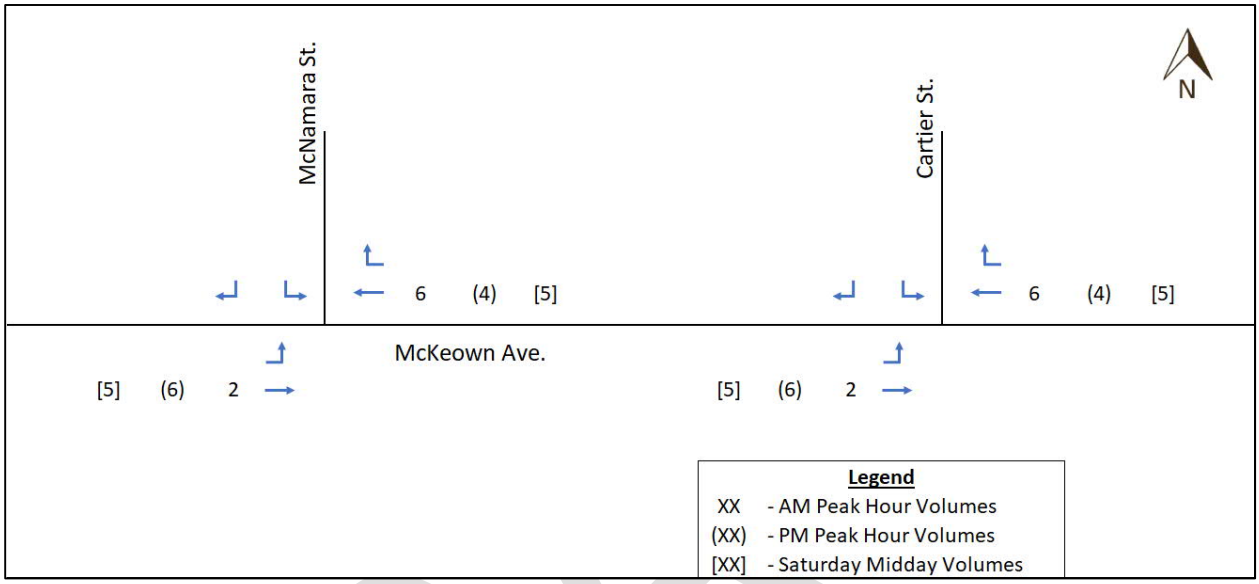


Figure 10: Trussler School Redevelopment - Weekday AM, PM, and Saturday Midday Site Generated Traffic



Figure 11: 789 Cartier St. Potential Development - Weekday AM, PM, and Saturday Midday Site Generated Traffic

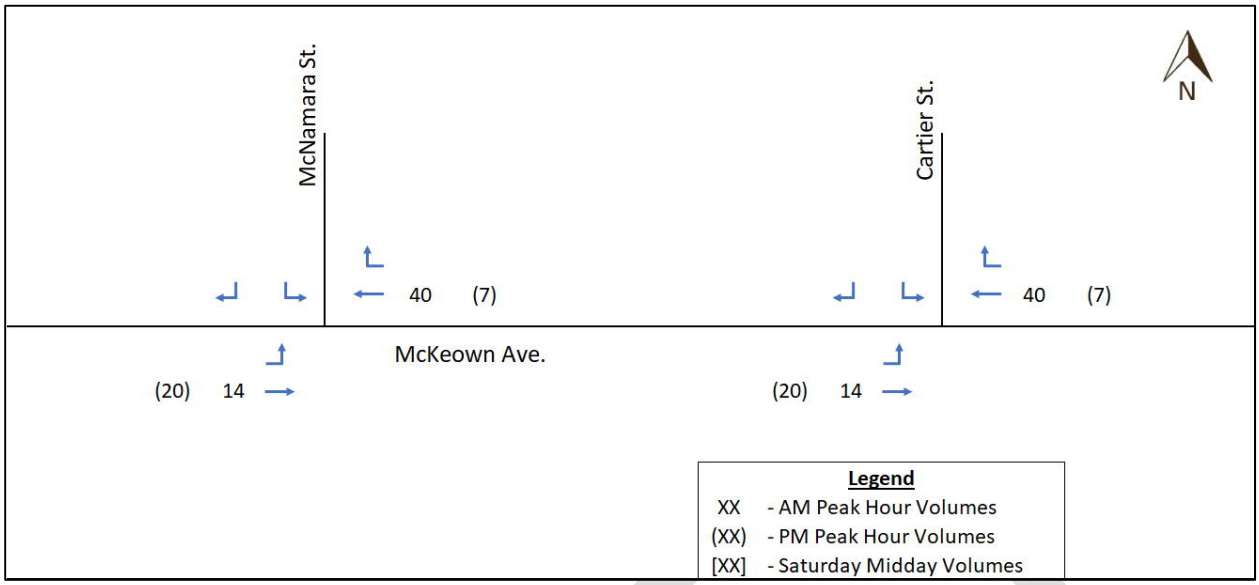


Figure 12: Provincial Building Expansion - Weekday AM, PM, and Saturday Midday Site Generated Traffic

4.5 Future Total 2041 Intersection Volumes

The future total 2041 traffic volumes for the study area intersections were established by combining the background 2041 traffic growth volumes presented in **Figure 9**, with the site generated traffic volumes established in the previous section. The resulting weekday a.m., p.m., and Saturday midday future total 2041 traffic volumes are presented in the **Figure 13** TMD.

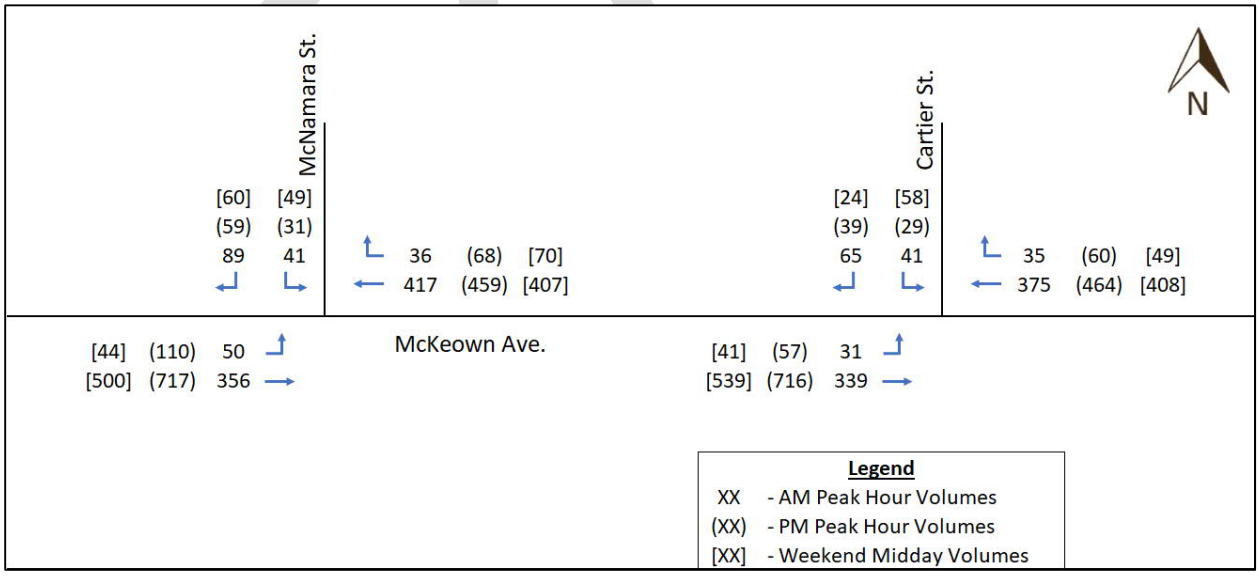


Figure 13: Future Total 2041 Weekday AM, PM, and Saturday Midday Traffic Volumes

5.0 TRAFFIC OPERATIONS

The following sections present the results of the intersection capacity analyses completed under existing and future traffic conditions for the ultimate 2041 horizon year. The future analyses undertaken examined four scenarios for McKeown Avenue including a do-nothing scenario, three lane cross-section (one through lane per direction and a centre two-way left turn lane), four lane cross-section (two through lane per direction) and a five lane cross-section (two through lanes per direction and a centre two-way left turn lane).

5.1 Intersection Analysis Methodology

The industry standard Synchro macroscopic traffic analysis software was utilized to analyse the intersections. Key performance measures such as Level of Service (LOS), volume-to-capacity ratio (v/c ratio), and 95th percentile queuing were reported, and are defined below:

- **Average vehicle control delay** is used to characterize LOS for the entire intersection, an approach, or movement. Delay quantifies the variations in travel time and is also a surrogate measure of driver discomfort and fuel consumption.
- **V/c ratio** quantifies the degree to which the capacity of each signal phase is utilized by a defined lane group.
- **95th percentile queue** is the queue length which is expected to be exceeded only 5% of the time; it is common practice to identify preferred storage length requirements for auxiliary turn lanes at signalized intersections based on estimated peak hour 95th percentile queueing.

Table 4 identifies the control delay thresholds (seconds of delay per vehicle) for each LOS based on Highway Capacity Manual (HCM) methodology.

Table 4: Characteristics of Level of Service at Intersections

LEVEL OF SERVICE (LOS)	CONTROL DELAY (seconds / vehicle)	
	SIGNALIZED INTERSECTION	UNSIGNALIZED INTERSECTION
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

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5.2 Intersection Analysis Results

The following sub-sections present the intersection analysis results for the study area intersections during the weekday a.m., p.m., and Saturday midday peak hours under existing traffic conditions and the four future traffic conditions scenarios mentioned previously.

5.2.1 McKeown Avenue at McNamara Street

The intersection capacity analysis results for the unsignalized intersection of McKeown Avenue and McNamara Street are presented in **Table 5**. Corresponding HCM output reports are provided in **Appendix B.**

Table 5: McKeown Ave. & McNamara St. - Intersection Capacity Analysis Results

SCENARIO	MVMT	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				SATURDAY MIDDAY PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing Traffic Conditions	EBLT	0.04	A	1	<1 veh	0.10	A	2	<1 veh	0.04	A	1	<1 veh
	WBTR	0.22	A	0	<1 veh	0.28	A	0	<1 veh	0.26	A	0	<1 veh
	SBLR	0.23	B	14	1 veh	0.27	C	21	9m	0.25	C	17	1 veh
Future 2041 Do-Nothing Traffic Conditions	EBLT	0.05	A	2	<1 veh	0.12	A	3	<1 veh	0.05	A	1	<1 veh
	WBTR	0.29	A	0	<1 veh	0.34	A	0	<1 veh	0.30	A	0	<1 veh
	SBLR	0.33	C	17	11m	0.42	D	32	16m	0.35	C	21	12m
Future 2041 - 3 Lane McKeown Ave.	EBL	0.05	A	9	<1 veh	0.12	A	9	<1 veh	0.05	A	1	<1 veh
	EBT	0.23	A	0	<1 veh	0.46	A	0	<1 veh	0.32	A	0	<1 veh
	WBTR	0.29	A	0	<1 veh	0.34	A	0	<1 veh	0.30	A	0	<1 veh
	SBLR	0.26	B	14	8m	0.24	C	17	1 veh	0.23	B	7	1 veh
Future 2041 – 4 Lane McKeown Ave.	EBLT	0.05	A	3	<1 veh	0.12	A	4	<1 veh	0.05	A	2	<1 veh
	EBT	0.15	A	0	<1 veh	0.31	A	0	<1 veh	0.21	A	0	<1 veh
	WBT	0.18	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.11	A	0	<1 veh	0.14	A	0	<1 veh	0.13	A	0	<1 veh
	SBLR	0.27	B	14	9m	0.29	C	20	10m	0.28	C	16	9m
Future 2041 - 5 Lane McKeown Ave.	EBL	0.05	A	9	<1 veh	0.12	A	9	<1 veh	0.05	A	9	<1 veh
	EBT	0.11	A	0	<1 veh	0.23	A	0	<1 veh	0.16	A	0	<1 veh
	EBT	0.11	A	0	<1 veh	0.23	A	0	<1 veh	0.16	A	0	<1 veh
	WBT	0.18	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.11	A	0	<1 veh	0.14	A	0	<1 veh	0.13	A	0	<1 veh
	SBLR	0.21	B	12	1 veh	0.18	B	13	<1 veh	0.19	B	12	<1 veh

Under existing traffic conditions presented in **Table 5**, the intersection of McKeown Avenue and McNamara Street is operating well with no critical movements, delay, or queuing during any of the peak hours analyzed. Under future 2041 do-nothing traffic conditions the intersection continues to operate well with only the southbound (McNamara Street) shared left/right movement forecast to operate at a level of service “D” during the p.m. peak hour.

Intersection capacity analysis completed for the three, four and five lane McKeown Avenue cross-section scenarios indicates that all three are forecast to operate well under future total 2041 traffic conditions for each peak hour analyzed. The level of service, delay and 95th percentile queues for

the southbound (McNamara Street) shared left/right turn movement are forecast to improve under all three scenarios and peak hours analyzed compared to the 2041 do-nothing scenario. All other movements at the intersection are forecast to continue operating well with no critical movements, delay, or queuing under any of the three future cross-section scenarios.

5.2.2 McKeown Avenue at Cartier Street

The intersection capacity analysis results for the unsignalized intersection of McKeown Avenue and McNamara Street are presented in **Table 5**. Corresponding HCM output reports are provided in **Appendix C.**

Table 6: McKeown Ave. & Cartier St. - Intersection Capacity Analysis Results

SCENARIO	MVMT	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR				SATURDAY MIDDAY PEAK HOUR			
		V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)	V/C	LOS	DELAY (S)	95TH % QUEUE (M)
Existing Traffic Conditions	EBLT	0.02	A	1	<1 veh	0.05	A	1	<1 veh	0.03	A	1	<1 veh
	WBT	0.12	A	0	<1 veh	0.17	A	0	<1 veh	0.15	A	0	<1 veh
	WBTR	0.08	A	0	<1 veh	0.12	A	0	<1 veh	0.10	A	0	<1 veh
	SBLR	0.18	B	13	<1 veh	0.20	C	19	<1 veh	0.25	C	21	1 veh
Future 2041 Do-Nothing Traffic Conditions	EBLT	0.03	A	1	<1 veh	0.06	A	2	<1 veh	0.04	A	1	<1 veh
	WBT	0.16	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.10	A	0	<1 veh	0.14	A	0	<1 veh	0.12	A	0	<1 veh
	SBLR	0.25	C	16	8m	0.31	D	27	10m	0.37	D	29	13m
Future 2041 - 3 Lane McKeown Ave.	EBL	0.03	A	9	<1 veh	0.06	A	9	<1 veh	0.04	A	9	<1 veh
	EBT	0.22	A	0	<1 veh	0.46	A	0	<1 veh	0.34	A	0	<1 veh
	WBT	0.16	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.10	A	0	<1 veh	0.14	A	0	<1 veh	0.12	A	0	<1 veh
	SBLR	0.19	B	12	<1 veh	0.16	B	14	<1 veh	0.20	B	15	<1 veh
Future 2041 – 4 Lane McKeown Ave.	EBLT	0.03	A	2	<1 veh	0.06	A	2	<1 veh	0.04	A	2	<1 veh
	EBT	0.14	A	0	<1 veh	0.31	A	0	<1 veh	0.23	A	0	<1 veh
	WBT	0.16	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.10	A	0	<1 veh	0.14	A	0	<1 veh	0.12	A	0	<1 veh
	SBLR	0.22	B	14	1 veh	0.20	C	17	<1 veh	0.25	C	19	8m
Future 2041 - 5 Lane McKeown Ave.	EBL	0.03	A	9	<1 veh	0.06	A	9	<1 veh	0.04	A	9	<1 veh
	EBT	0.11	A	0	<1 veh	0.23	A	0	<1 veh	0.17	A	0	<1 veh
	EBT	0.11	A	0	<1 veh	0.23	A	0	<1 veh	0.17	A	0	<1 veh
	WBT	0.16	A	0	<1 veh	0.20	A	0	<1 veh	0.17	A	0	<1 veh
	WBTR	0.10	A	0	<1 veh	0.14	A	0	<1 veh	0.12	A	0	<1 veh
	SBLR	0.18	B	12	<1 veh	0.13	B	12	<1 veh	0.16	B	13	<1 veh

As presented in **Table 6**, the intersection of McKeown Avenue and Cartier Street currently operates well under existing traffic conditions with no critical movements, delays, or queuing during any of the three peak hours evaluated. Similarly, under future 2041 do-nothing traffic conditions the intersection is forecast to continue operating well with only the southbound (Cartier Street) shared left/right turn movement forecast to operate at a level of service “D” during the p.m. and Saturday midday peak hours.

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Under the three, four and five lane cross-section scenarios analyzed under future total 2041 traffic conditions, the intersection is forecast to operate well during all three peak hours. The level of service, delay, and queuing for the southbound (Cartier Street) shared left/right have improved compared to the do-nothing scenario and all other movements are forecast to continue operating well.

6.0 SUMMARY OF FINDINGS

The following section presents a summary of the findings determined from the completion of the Transportation Needs and Justification study completed for McKeown Avenue between from the Gormanville Road roundabout approach to Cartier Street. The findings are as follows:

- Both study area intersections are currently operating well under existing traffic conditions during the weekday a.m., p.m., and Saturday midday peak hours.
- Both study area intersections are forecast to continue operating well under future total 2041 do-nothing traffic conditions during the weekday a.m., p.m., and Saturday midday peak hours.
- Intersection capacity analysis completed for the three, four and five lane McKeown Avenue cross-sections indicates that both study area intersections are forecast to operate well during all three peak hours analyzed and offer better levels of service, delay, and queuing for the side street movements from McNamara Street and Cartier Street.

DRAFT

APPENDIX A

TRAFFIC COUNT DATA

DRAFT

Day/Time Ending	85th pctl (mph)	85th pctl cnts	Total Cnts	Max Speed	Avg Speeder	% Speeders
18-Jun-2019 11:00:00 AM	57.0	402	473	69	55.2	41.4%
18-Jun-2019 12:00:00 PM	56.0	617	726	74	54.9	40.2%
18-Jun-2019 1:00:00 PM	56.0	861	1013	92	55.4	37.5%
18-Jun-2019 2:00:00 PM	55.0	686	807	72	54.4	36.7%
18-Jun-2019 3:00:00 PM	58.0	624	734	85	56.0	43.5%
18-Jun-2019 4:00:00 PM	58.0	675	794	97	55.4	48.7%
18-Jun-2019 5:00:00 PM	58.0	770	906	142	55.7	51.0%
18-Jun-2019 6:00:00 PM	59.0	544	640	72	55.7	55.6%
18-Jun-2019 7:00:00 PM	60.0	434	510	85	56.6	61.8%
18-Jun-2019 8:00:00 PM	59.0	385	453	79	55.9	55.8%
18-Jun-2019 9:00:00 PM	59.0	289	340	73	55.8	65.0%
18-Jun-2019 10:00:00 PM	59.0	203	239	83	56.8	49.8%
18-Jun-2019 11:00:00 PM	61.0	118	139	89	57.9	55.4%
19-Jun-2019 12:00:00 AM	63.0	75	88	98	58.9	52.3%
19-Jun-2019 1:00:00 AM	58.0	51	60	65	55.3	61.7%
19-Jun-2019 2:00:00 AM	56.0	26	30	81	55.4	46.7%
19-Jun-2019 3:00:00 AM	63.0	10	12	70	60.2	50.0%
19-Jun-2019 4:00:00 AM	57.0	7	8	62	56.0	37.5%
19-Jun-2019 5:00:00 AM	63.0	14	16	64	58.0	56.3%
19-Jun-2019 6:00:00 AM	64.0	54	63	69	57.9	73.0%
19-Jun-2019 7:00:00 AM	64.0	207	243	146	59.2	73.4%
19-Jun-2019 8:00:00 AM	60.0	411	483	88	56.2	65.0%
19-Jun-2019 9:00:00 AM	58.0	506	595	68	55.5	44.5%
19-Jun-2019 10:00:00 AM	57.0	530	624	76	55.6	45.0%
19-Jun-2019 11:00:00 AM	57.0	551	648	100	55.2	44.0%
19-Jun-2019 12:00:00 PM	56.0	627	738	90	54.8	38.2%
19-Jun-2019 1:00:00 PM	55.0	824	970	91	54.9	31.8%
19-Jun-2019 2:00:00 PM	57.0	654	769	73	55.2	41.3%
19-Jun-2019 3:00:00 PM	56.0	635	747	93	54.8	40.8%
19-Jun-2019 4:00:00 PM	57.0	687	808	77	54.9	47.7%
19-Jun-2019 5:00:00 PM	57.0	785	924	75	54.8	44.5%
19-Jun-2019 6:00:00 PM	59.0	641	754	89	56.3	52.8%
19-Jun-2019 7:00:00 PM	60.0	432	508	78	56.7	62.6%
19-Jun-2019 8:00:00 PM	59.0	431	507	87	56.1	52.5%
19-Jun-2019 9:00:00 PM	58.0	316	372	79	55.7	50.5%
19-Jun-2019 10:00:00 PM	60.0	192	226	78	56.4	60.2%
19-Jun-2019 11:00:00 PM	61.0	123	145	72	56.9	57.2%
20-Jun-2019 12:00:00 AM	60.0	76	90	72	56.2	60.0%
20-Jun-2019 1:00:00 AM	59.0	33	39	65	55.6	48.7%
20-Jun-2019 2:00:00 AM	64.0	15	18	68	58.8	66.7%
20-Jun-2019 3:00:00 AM	61.0	17	20	69	57.8	65.0%
20-Jun-2019 4:00:00 AM	63.0	13	15	78	58.2	80.0%
20-Jun-2019 5:00:00 AM	63.0	21	25	73	58.4	60.0%
20-Jun-2019 6:00:00 AM	62.0	52	61	79	59.7	63.9%
20-Jun-2019 7:00:00 AM	63.0	187	220	81	58.0	76.4%
20-Jun-2019 8:00:00 AM	61.0	445	524	85	56.9	60.9%
20-Jun-2019 9:00:00 AM	58.0	575	677	78	55.9	48.2%
20-Jun-2019 10:00:00 AM	57.0	564	663	75	55.3	48.2%
20-Jun-2019 11:00:00 AM	56.0	666	783	84	55.0	40.4%

20-Jun-2019 12:00:00 PM	57.0	648	762	103	55.4	40.2%
20-Jun-2019 1:00:00 PM	55.0	882	1038	86	54.7	31.2%
20-Jun-2019 2:00:00 PM	57.0	710	835	97	55.2	43.6%
20-Jun-2019 3:00:00 PM	56.0	719	846	75	54.9	39.0%
20-Jun-2019 4:00:00 PM	56.0	717	844	73	55.4	38.9%
20-Jun-2019 5:00:00 PM	56.0	766	901	72	55.3	40.4%
20-Jun-2019 6:00:00 PM	59.0	581	684	80	56.0	57.2%
20-Jun-2019 7:00:00 PM	59.0	475	559	74	56.1	57.1%
20-Jun-2019 8:00:00 PM	59.0	445	523	74	55.7	58.3%
20-Jun-2019 9:00:00 PM	58.0	347	408	74	55.6	50.0%
20-Jun-2019 10:00:00 PM	61.0	252	297	84	56.7	55.2%
20-Jun-2019 11:00:00 PM	60.0	129	152	83	57.9	46.7%
21-Jun-2019 12:00:00 AM	59.0	78	92	94	56.9	57.6%
21-Jun-2019 1:00:00 AM	62.0	41	48	92	58.7	66.7%
21-Jun-2019 2:00:00 AM	58.0	31	37	66	55.3	62.2%
21-Jun-2019 3:00:00 AM	56.0	14	16	61	54.8	56.3%
21-Jun-2019 4:00:00 AM	67.0	6	7	76	63.8	57.1%
21-Jun-2019 5:00:00 AM	63.0	16	19	65	56.2	89.5%
21-Jun-2019 6:00:00 AM	62.0	42	50	74	58.1	80.0%
21-Jun-2019 7:00:00 AM	63.0	192	226	87	57.8	75.7%
21-Jun-2019 8:00:00 AM	60.0	400	470	93	56.9	64.5%
21-Jun-2019 9:00:00 AM	58.0	488	574	76	55.5	48.7%
21-Jun-2019 10:00:00 AM	56.0	536	630	79	54.8	42.5%
21-Jun-2019 11:00:00 AM	56.0	650	765	75	55.0	39.9%
21-Jun-2019 12:00:00 PM	56.0	666	783	70	54.6	41.0%
21-Jun-2019 1:00:00 PM	56.0	873	1027	73	54.7	40.2%
21-Jun-2019 2:00:00 PM	56.0	730	859	105	55.2	39.0%
21-Jun-2019 3:00:00 PM	56.0	703	827	94	55.3	42.0%
21-Jun-2019 4:00:00 PM	56.0	707	832	76	54.9	39.7%
21-Jun-2019 5:00:00 PM	58.0	755	888	93	55.3	50.8%
21-Jun-2019 6:00:00 PM	58.0	598	704	75	55.9	51.1%
21-Jun-2019 7:00:00 PM	60.0	510	600	82	56.9	59.5%
21-Jun-2019 8:00:00 PM	61.0	413	486	82	56.7	70.4%
21-Jun-2019 9:00:00 PM	58.0	368	433	82	56.4	47.0%
21-Jun-2019 10:00:00 PM	59.0	241	283	81	56.2	54.6%
21-Jun-2019 11:00:00 PM	60.0	168	198	76	56.2	62.1%
22-Jun-2019 12:00:00 AM	62.0	110	129	79	57.4	62.8%
22-Jun-2019 1:00:00 AM	58.0	69	81	70	56.7	50.6%
22-Jun-2019 2:00:00 AM	67.0	33	39	81	60.8	61.5%
22-Jun-2019 3:00:00 AM	69.0	36	42	77	61.1	66.7%
22-Jun-2019 4:00:00 AM	59.0	20	24	66	56.5	62.5%
22-Jun-2019 5:00:00 AM	57.0	28	33	66	56.2	54.5%
22-Jun-2019 6:00:00 AM	63.0	42	50	94	59.8	66.0%
22-Jun-2019 7:00:00 AM	63.0	110	129	72	58.0	72.1%
22-Jun-2019 8:00:00 AM	61.0	157	185	93	57.7	70.8%
22-Jun-2019 9:00:00 AM	60.0	285	335	73	56.2	56.1%
22-Jun-2019 10:00:00 AM	57.0	424	499	88	55.4	39.5%
22-Jun-2019 11:00:00 AM	53.0	522	614	77	55.2	18.2%
22-Jun-2019 12:00:00 PM	51.0	561	660	73	54.5	13.3%
22-Jun-2019 1:00:00 PM	51.0	581	684	72	55.0	14.9%

22-Jun-2019 2:00:00 PM	53.0	522	614	91	54.8	18.9%
22-Jun-2019 3:00:00 PM	55.0	533	627	78	54.6	29.8%
22-Jun-2019 4:00:00 PM	59.0	437	514	74	56.0	56.4%
22-Jun-2019 5:00:00 PM	60.0	383	451	75	56.7	59.4%
22-Jun-2019 6:00:00 PM	60.0	346	407	92	56.9	59.5%
22-Jun-2019 7:00:00 PM	61.0	344	405	87	57.2	64.9%
22-Jun-2019 8:00:00 PM	60.0	299	352	72	56.7	60.2%
22-Jun-2019 9:00:00 PM	60.0	246	290	73	56.7	60.3%
22-Jun-2019 10:00:00 PM	60.0	198	233	73	56.8	51.1%
22-Jun-2019 11:00:00 PM	58.0	135	159	69	56.2	52.8%
23-Jun-2019 12:00:00 AM	61.0	107	126	89	57.5	61.9%
23-Jun-2019 1:00:00 AM	61.0	47	55	80	57.9	52.7%
23-Jun-2019 2:00:00 AM	62.0	40	47	71	57.9	68.1%
23-Jun-2019 3:00:00 AM	62.0	48	57	71	57.7	63.2%
23-Jun-2019 4:00:00 AM	60.0	24	28	71	58.1	50.0%
23-Jun-2019 5:00:00 AM	66.0	17	20	88	60.7	60.0%
23-Jun-2019 6:00:00 AM	61.0	21	25	72	58.1	64.0%
23-Jun-2019 7:00:00 AM	66.0	82	97	78	59.5	79.4%
23-Jun-2019 8:00:00 AM	62.0	110	129	69	57.1	69.8%
23-Jun-2019 9:00:00 AM	61.0	135	159	73	57.0	62.9%
23-Jun-2019 10:00:00 AM	58.0	265	312	74	55.6	58.3%
23-Jun-2019 11:00:00 AM	58.0	362	426	79	55.8	55.5%
23-Jun-2019 12:00:00 PM	58.0	427	502	73	55.5	55.1%
23-Jun-2019 1:00:00 PM	58.0	502	590	75	55.7	53.4%
23-Jun-2019 2:00:00 PM	58.0	487	573	78	55.6	55.7%
23-Jun-2019 3:00:00 PM	60.0	456	536	80	56.3	57.5%
23-Jun-2019 4:00:00 PM	59.0	440	518	74	56.1	61.8%
23-Jun-2019 5:00:00 PM	60.0	382	450	80	56.2	66.7%
23-Jun-2019 6:00:00 PM	61.0	332	391	76	56.8	70.2%
23-Jun-2019 7:00:00 PM	62.0	309	364	80	57.4	77.7%
23-Jun-2019 8:00:00 PM	62.0	252	296	75	56.9	74.0%
23-Jun-2019 9:00:00 PM	62.0	203	239	81	57.1	73.2%
23-Jun-2019 10:00:00 PM	60.0	184	217	89	57.1	56.2%
23-Jun-2019 11:00:00 PM	59.0	118	139	76	56.4	55.4%
24-Jun-2019 12:00:00 AM	60.0	60	71	72	57.0	57.7%
24-Jun-2019 1:00:00 AM	63.0	41	48	69	57.8	70.8%
24-Jun-2019 2:00:00 AM	59.0	14	17	71	56.5	70.6%
24-Jun-2019 3:00:00 AM	58.0	12	14	62	55.3	71.4%
24-Jun-2019 4:00:00 AM	58.0	11	13	133	65.1	69.2%
24-Jun-2019 5:00:00 AM	65.0	20	24	70	59.1	70.8%
24-Jun-2019 6:00:00 AM	66.0	64	75	74	59.6	78.7%
24-Jun-2019 7:00:00 AM	63.0	175	206	145	59.3	72.3%
24-Jun-2019 8:00:00 AM	59.0	390	459	96	56.0	61.0%
24-Jun-2019 9:00:00 AM	58.0	476	560	120	56.0	50.4%
24-Jun-2019 10:00:00 AM	57.0	469	552	70	55.1	46.9%
24-Jun-2019 11:00:00 AM	57.0	561	660	71	55.1	42.9%
24-Jun-2019 12:00:00 PM	56.0	643	756	93	55.0	35.8%
24-Jun-2019 1:00:00 PM	56.0	825	971	89	55.1	34.0%
24-Jun-2019 2:00:00 PM	56.0	711	836	74	54.6	34.9%
24-Jun-2019 3:00:00 PM	57.0	619	728	89	55.3	46.0%

24-Jun-2019 4:00:00 PM	56.0	669	787	77	55.0	39.8%
24-Jun-2019 5:00:00 PM	57.0	770	906	87	55.3	48.3%
24-Jun-2019 6:00:00 PM	58.0	547	643	72	55.4	48.8%
24-Jun-2019 7:00:00 PM	59.0	456	536	71	56.2	59.9%
24-Jun-2019 8:00:00 PM	59.0	414	487	93	56.1	61.0%
24-Jun-2019 9:00:00 PM	60.0	286	337	69	56.1	58.8%
24-Jun-2019 10:00:00 PM	58.0	171	201	81	56.8	48.3%
24-Jun-2019 11:00:00 PM	60.0	110	129	93	57.4	60.5%
25-Jun-2019 12:00:00 AM	63.0	54	64	94	57.9	60.9%
25-Jun-2019 1:00:00 AM	64.0	31	36	78	58.5	58.3%
25-Jun-2019 2:00:00 AM	59.0	28	33	68	57.2	57.6%
25-Jun-2019 3:00:00 AM	63.0	13	15	66	58.8	60.0%
25-Jun-2019 4:00:00 AM	58.0	8	10	62	55.7	60.0%
25-Jun-2019 5:00:00 AM	53.0	22	26	62	55.2	19.2%
25-Jun-2019 6:00:00 AM	61.0	56	66	77	58.1	69.7%
25-Jun-2019 7:00:00 AM	63.0	180	212	79	57.8	71.7%
25-Jun-2019 8:00:00 AM	60.0	400	470	92	56.8	55.0%
25-Jun-2019 9:00:00 AM	58.0	479	564	89	56.0	46.6%
25-Jun-2019 10:00:00 AM	56.0	471	554	103	56.1	39.2%
25-Jun-2019 11:00:00 AM	56.0	626	737	77	55.0	37.0%
25-Jun-2019 12:00:00 PM	56.0	656	772	101	55.1	38.0%
25-Jun-2019 1:00:00 PM	54.0	874	1028	86	54.4	30.7%
25-Jun-2019 2:00:00 PM	57.0	734	864	105	55.4	40.3%
25-Jun-2019 3:00:00 PM	57.0	684	805	92	55.5	40.7%
25-Jun-2019 4:00:00 PM	58.0	637	749	71	55.4	46.7%
25-Jun-2019 5:00:00 PM	58.0	798	939	74	55.4	51.6%
25-Jun-2019 6:00:00 PM	59.0	627	738	92	56.3	61.2%
25-Jun-2019 7:00:00 PM	60.0	439	517	98	56.2	65.0%
25-Jun-2019 8:00:00 PM	60.0	438	515	84	56.7	58.3%
25-Jun-2019 9:00:00 PM	59.0	294	346	86	56.2	60.4%
25-Jun-2019 10:00:00 PM	59.0	213	251	73	56.3	52.6%
25-Jun-2019 11:00:00 PM	60.0	111	131	79	57.1	60.3%
26-Jun-2019 12:00:00 AM	59.0	82	97	71	55.8	68.0%
26-Jun-2019 1:00:00 AM	60.0	34	40	78	58.4	52.5%
26-Jun-2019 2:00:00 AM	61.0	32	38	75	59.2	52.6%
26-Jun-2019 3:00:00 AM	64.0	18	21	66	58.6	66.7%
26-Jun-2019 4:00:00 AM	54.0	10	12	63	55.5	50.0%
26-Jun-2019 5:00:00 AM	59.0	16	19	68	57.6	57.9%
26-Jun-2019 6:00:00 AM	64.0	54	63	74	59.2	71.4%
26-Jun-2019 7:00:00 AM	65.0	203	239	79	58.6	79.5%
26-Jun-2019 8:00:00 AM	61.0	401	472	75	56.7	64.0%
26-Jun-2019 9:00:00 AM	59.0	536	631	84	56.4	53.6%
26-Jun-2019 10:00:00 AM	56.0	504	593	76	55.1	38.6%
26-Jun-2019 11:00:00 AM	58.0	594	699	74	55.5	45.1%
26-Jun-2019 12:00:00 PM	56.0	701	825	95	55.2	38.3%
26-Jun-2019 1:00:00 PM	55.0	876	1031	85	55.0	31.8%
26-Jun-2019 2:00:00 PM	57.0	700	824	104	55.3	41.5%
26-Jun-2019 3:00:00 PM	58.0	654	769	90	55.8	46.5%
26-Jun-2019 4:00:00 PM	57.0	700	824	92	55.4	45.9%
26-Jun-2019 5:00:00 PM	58.0	797	938	78	55.4	52.7%

26-Jun-2019 6:00:00 PM	58.0	629	740	99	55.9	54.5%
26-Jun-2019 7:00:00 PM	61.0	483	568	77	56.5	65.1%
26-Jun-2019 8:00:00 PM	60.0	446	525	76	56.6	56.2%
26-Jun-2019 9:00:00 PM	60.0	350	412	71	56.4	65.0%
26-Jun-2019 10:00:00 PM	58.0	225	265	69	55.9	50.9%
26-Jun-2019 11:00:00 PM	59.0	134	158	70	56.2	60.1%
27-Jun-2019 12:00:00 AM	59.0	88	103	69	55.7	61.2%
27-Jun-2019 1:00:00 AM	62.0	28	33	82	58.8	66.7%
27-Jun-2019 2:00:00 AM	63.0	26	31	68	57.9	54.8%
27-Jun-2019 3:00:00 AM	61.0	18	21	64	56.7	66.7%
27-Jun-2019 4:00:00 AM	59.0	9	11	85	59.9	72.7%
27-Jun-2019 5:00:00 AM	62.0	18	21	67	57.6	66.7%
27-Jun-2019 6:00:00 AM	65.0	55	65	77	58.4	72.3%
27-Jun-2019 7:00:00 AM	62.0	196	230	73	57.6	72.6%
27-Jun-2019 8:00:00 AM	60.0	433	509	91	56.6	60.9%
27-Jun-2019 9:00:00 AM	59.0	552	650	101	56.7	47.1%
27-Jun-2019 10:00:00 AM	57.0	564	663	78	55.1	42.1%
27-Jun-2019 11:00:00 AM	56.0	175	206	69	55.5	36.9%

Leg	McNamara					McKeown Street					McKeown Street				
Direction	Southbound					Westbound					Eastbound				
Start Time	Right	Left	U-Turn	**App Total**		Right	Thru	U-Turn	**App Total**		Thru	Left	U-Turn	**App Total**	**Int Total**
2021-11-27 07:00:00	3	8	0	**11**		5	19	0	**24**		30	10	0	**40**	**75**
2021-11-27 07:30:00	10	7	0	**17**		3	34	0	**37**		45	5	0	**50**	**104**
2021-11-27 08:00:00	14	9	0	**23**		11	39	0	**50**		44	7	0	**51**	**124**
2021-11-27 08:30:00	14	13	0	**27**		4	58	0	**62**		94	8	0	**102**	**191**
2021-11-27 09:00:00	11	9	0	**20**		9	60	0	**69**		106	4	0	**110**	**199**
2021-11-27 09:30:00	16	21	0	**37**		11	77	0	**88**		112	6	0	**118**	**243**
2021-11-27 10:00:00	14	17	0	**31**		14	102	0	**116**		156	8	0	**164**	**311**
2021-11-27 10:30:00	15	31	0	**46**		29	126	0	**155**		149	16	0	**165**	**366**
2021-11-27 11:00:00	15	22	0	**37**		23	149	0	**172**		200	8	0	**208**	**417**
2021-11-27 11:30:00	24	36	0	**60**		27	148	0	**175**		196	18	0	**214**	**449**
2021-11-27 12:00:00	13	17	0	**30**		22	167	0	**189**		208	21	0	**229**	**448**
2021-11-27 12:30:00	18	19	0	**37**		25	171	0	**196**		196	23	0	**219**	**452**
2021-11-27 13:00:00	34	23	0	**57**		35	174	0	**209**		199	15	0	**214**	**480**
2021-11-27 13:30:00	18	23	0	**41**		16	172	0	**188**		185	15	0	**200**	**429**
2021-11-27 14:00:00	15	27	0	**42**		30	181	0	**211**		191	29	0	**220**	**473**
2021-11-27 14:30:00	22	19	0	**41**		34	175	0	**209**		175	19	0	**194**	**444**
2021-11-27 15:00:00	26	18	0	**44**		18	160	0	**178**		205	36	0	**241**	**463**
2021-11-27 15:30:00	24	32	0	**56**		34	158	0	**192**		160	22	0	**182**	**430**
2021-11-27 16:00:00	12	24	0	**36**		24	154	0	**178**		161	18	0	**179**	**393**
2021-11-27 16:30:00	14	19	0	**33**		25	152	0	**177**		157	17	0	**174**	**384**
2021-11-27 17:00:00	21	17	0	**38**		23	118	0	**141**		138	23	0	**161**	**340**
2021-11-27 17:30:00	16	14	0	**30**		23	111	0	**134**		99	17	0	**116**	**280**
2021-11-27 18:00:00	14	27	0	**41**		30	129	0	**159**		137	28	0	**165**	**365**
2021-11-27 18:30:00	11	19	0	**30**		24	111	0	**135**		93	28	0	**121**	**286**
2021-11-30 07:00:00	18	12	0	**30**		1	78	0	**79**		71	8	0	**79**	**188**
2021-11-30 07:30:00	41	16	0	**57**		18	155	0	**173**		122	12	0	**134**	**364**
2021-11-30 08:00:00	41	20	0	**61**		13	174	0	**187**		103	23	0	**126**	**374**
2021-11-30 08:30:00	36	15	0	**51**		18	145	0	**163**		138	20	0	**158**	**372**
2021-11-30 09:00:00	23	17	0	**40**		18	138	0	**156**		151	23	0	**174**	**370**
2021-11-30 09:30:00	21	12	0	**33**		21	116	0	**137**		160	11	0	**171**	**341**
2021-11-30 10:00:00	22	23	0	**45**		17	157	0	**174**		210	21	0	**231**	**450**
2021-11-30 10:30:00	17	12	0	**29**		20	187	0	**207**		200	15	0	**215**	**451**
2021-11-30 11:00:00	19	13	0	**32**		10	164	0	**174**		215	21	0	**236**	**442**
2021-11-30 11:30:00	24	18	0	**42**		24	211	0	**235**		243	16	0	**259**	**536**
2021-11-30 12:00:00	22	14	0	**36**		22	228	0	**250**		312	30	0	**342**	**628**
2021-11-30 12:30:00	31	15	0	**46**		20	270	0	**290**		284	22	0	**306**	**642**
2021-11-30 13:00:00	32	24	0	**56**		18	200	0	**218**		248	26	0	**274**	**548**
2021-11-30 13:30:00	20	16	0	**36**		14	193	0	**207**		229	29	0	**258**	**501**
2021-11-30 14:00:00	17	18	0	**35**		29	169	0	**198**		198	19	0	**217**	**450**
2021-11-30 14:30:00	23	20	0	**43**		28	163	0	**191**		203	24	0	**227**	**461**
2021-11-30 15:00:00	26	14	0	**40**		19	151	0	**170**		242	40	0	**282**	**492**
2021-11-30 15:30:00	25	13	0	**38**		21	175	0	**196**		209	29	0	**238**	**472**

2021-11-30 16:00:00	28	11	0	**39**	22	205	0	**227**	281	48	0	**329**	**595**
2021-11-30 16:30:00	23	16	0	**39**	37	179	0	**216**	242	47	0	**289**	**544**
2021-11-30 17:00:00	22	20	0	**42**	26	155	0	**181**	209	39	0	**248**	**471**
2021-11-30 17:30:00	23	17	0	**40**	21	144	0	**165**	146	31	0	**177**	**382**
2021-11-30 18:00:00	18	16	0	**34**	24	128	0	**152**	164	18	0	**182**	**368**
2021-11-30 18:30:00	12	21	0	**33**	18	84	0	**102**	126	22	0	**148**	**283**
2021-12-02 07:00:00	19	13	0	**32**	3	84	0	**87**	75	9	0	**84**	**203**
2021-12-02 07:30:00	40	19	0	**59**	13	149	0	**162**	121	8	0	**129**	**350**
2021-12-02 08:00:00	32	20	0	**52**	9	148	0	**157**	126	16	0	**142**	**351**
2021-12-02 08:30:00	28	19	0	**47**	12	146	0	**158**	142	11	0	**153**	**358**
2021-12-02 09:00:00	9	25	0	**34**	19	130	0	**149**	151	10	0	**161**	**344**
2021-12-02 09:30:00	21	12	0	**33**	14	132	0	**146**	158	12	0	**170**	**349**
2021-12-02 10:00:00	15	11	0	**26**	20	125	0	**145**	197	6	0	**203**	**374**
2021-12-02 10:30:00	16	17	0	**33**	19	119	0	**138**	187	16	0	**203**	**374**
2021-12-02 11:00:00	16	12	0	**28**	20	157	0	**177**	180	13	0	**193**	**398**
2021-12-02 11:30:00	21	13	0	**34**	27	207	0	**234**	231	18	0	**249**	**517**
2021-12-02 12:00:00	25	16	0	**41**	25	225	0	**250**	290	26	0	**316**	**607**
2021-12-02 12:30:00	29	17	0	**46**	16	210	0	**226**	274	29	0	**303**	**575**
2021-12-02 13:00:00	29	21	0	**50**	22	224	0	**246**	227	26	0	**253**	**549**
2021-12-02 13:30:00	30	26	0	**56**	40	209	0	**249**	225	25	0	**250**	**555**
2021-12-02 14:00:00	21	12	0	**33**	18	161	0	**179**	216	22	0	**238**	**450**
2021-12-02 14:30:00	32	18	0	**50**	14	199	0	**213**	216	26	0	**242**	**505**
2021-12-02 15:00:00	23	23	0	**46**	28	183	0	**211**	251	49	0	**300**	**557**
2021-12-02 15:30:00	22	22	0	**44**	26	186	0	**212**	250	28	0	**278**	**534**
2021-12-02 16:00:00	20	18	0	**38**	29	180	0	**209**	278	31	0	**309**	**556**
2021-12-02 16:30:00	24	16	0	**40**	24	162	0	**186**	237	46	0	**283**	**509**
2021-12-02 17:00:00	17	18	0	**35**	31	170	0	**201**	201	28	0	**229**	**465**
2021-12-02 17:30:00	20	22	0	**42**	28	158	0	**186**	165	29	0	**194**	**422**
2021-12-02 18:00:00	16	17	0	**33**	23	140	0	**163**	153	28	0	**181**	**377**
2021-12-02 18:30:00	10	22	0	**32**	16	115	0	**131**	113	24	0	**137**	**300**
Grand Total	1513	1293	0	**2806**	1474	10833	0	**12307**	12806	1531	0	**14337**	**29450**
% Approach	53.9%	46.1%	0.0%		12.0%	88.0%	0.0%		89.3%	10.7%	0.0%		
% Total	5.1%	4.4%	0.0%	**9.5%**	5.0%	36.8%	0.0%	**41.8%**	43.5%	5.2%	0.0%	**48.7%**	
Lights	1494	1277	0	**2771**	1452	10581	0	**12033**	12588	1506	0	**14094**	**28898**
% Lights	98.7%	98.8%	0.0%	**98.8%**	98.5%	97.7%	0.0%	**97.8%**	98.3%	98.4%	0.0%	**98.3%**	**98.1%**
Single-Unit Trucks	10	10	0	**20**	9	158	0	**167**	94	10	0	**104**	**291**
% Single-Unit Trucks	0.7%	0.8%	0.0%	**0.7%**	0.6%	1.5%	0.0%	**1.4%**	0.7%	0.7%	0.0%	**0.7%**	**1.0%**
Articulated Trucks	0	1	0	**1**	2	24	0	**26**	17	0	0	**17**	**44**
% Articulated Trucks	0.0%	0.1%	0.0%	**0.0%**	0.1%	0.2%	0.0%	**0.2%**	0.1%	0.0%	0.0%	**0.1%**	**0.1%**
Buses	9	5	0	**14**	11	70	0	**81**	107	15	0	**122**	**217**
% Buses	0.6%	0.4%	0.0%	**0.5%**	0.7%	0.6%	0.0%	**0.7%**	0.8%	1.0%	0.0%	**0.9%**	**0.7%**

Study Name	McKeown and Cartier Intersection
Start Date	Friday, November 26, 2021 7:00 AM
End Date	Monday, November 29, 2021 7:00 PM
Site Code	

Road Volumes

TMV	Movement												
	Southbound			Southbound To	Westbound			Westbound To	Eastbound			Eastbound To	Grand Total
Interval	R	L	U		R	U	T		L	U	T		
2021-11-26 7:00	5	7	0	12	4	0	32	36	6	0	37	43	91
Lights	5	7	0	12	4	0	32	36	6	0	35	41	89
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 7:15	4	6	0	10	4	0	42	46	6	0	39	45	101
Lights	4	5	0	9	4	0	41	45	6	0	35	41	95
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	3	3	4
Articulated Trucks	0	1	0	1	0	0	0	0	0	0	0	0	1
2021-11-26 7:30	5	6	0	11	7	0	56	63	5	0	48	53	127
Lights	4	6	0	10	6	0	50	56	5	0	45	50	116
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	1	0	0	1	1	0	4	5	0	0	3	3	9
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-26 7:45	10	6	0	16	8	0	80	88	4	0	54	58	162
Lights	10	6	0	16	8	0	78	86	4	0	52	56	158
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 8:00	12	2	0	14	5	0	70	75	6	0	65	71	160
Lights	12	2	0	14	4	0	67	71	6	0	64	70	155
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	1	0	1	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-26 8:15	15	8	0	23	7	0	73	80	4	0	65	69	172
Lights	13	8	0	21	6	0	71	77	4	0	61	65	163
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	1	0	0	1	1	0	1	2	0	0	2	2	5
Articulated Trucks	1	0	0	1	0	0	0	0	0	0	0	0	1
2021-11-26 8:30	6	9	0	15	10	0	73	83	6	0	51	57	155
Lights	6	9	0	15	9	0	70	79	6	0	50	56	150
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	1	0	2	3	0	0	1	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 8:45	9	2	0	11	9	0	64	73	6	0	82	88	172

Lights	9	1	0	10	9	0	61	70	6	0	78	84	164
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	1	0	1	0	0	3	3	0	0	2	2	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 9:00	4	4	0	8	9	0	75	84	7	0	75	82	174
Lights	4	4	0	8	9	0	72	81	7	0	69	76	165
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	5	5	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 9:15	8	8	0	16	15	0	59	74	5	0	77	82	172
Lights	8	8	0	16	13	0	56	69	5	0	72	77	162
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	0	0	0	0	2	0	2	4	0	0	3	3	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 9:30	6	7	0	13	24	0	49	73	6	0	79	85	171
Lights	5	5	0	10	24	0	46	70	5	0	77	82	162
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	1	2	0	3	0	0	2	2	1	0	2	3	8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 9:45	6	9	0	15	4	0	68	72	12	0	91	103	190
Lights	6	8	0	14	4	0	67	71	12	0	85	97	182
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	1	0	1	0	0	1	1	0	0	4	4	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 10:00	8	10	0	18	4	0	60	64	5	0	72	77	159
Lights	7	10	0	17	4	0	55	59	5	0	68	73	149
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	1	0	0	1	0	0	2	2	0	0	4	4	7
Articulated Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
2021-11-26 10:15	7	7	0	14	10	0	83	93	10	0	82	92	199
Lights	7	7	0	14	9	0	77	86	9	0	78	87	187
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	1	0	4	5	1	0	2	3	8
Articulated Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
2021-11-26 10:30	5	7	0	12	8	0	75	83	8	0	88	96	191
Lights	5	7	0	12	8	0	73	81	8	0	87	95	188
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 10:45	2	7	0	9	6	0	72	78	9	0	104	113	200
Lights	2	7	0	9	6	0	70	76	9	0	101	110	195
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 11:00	2	7	0	9	16	0	69	85	13	0	123	136	230
Lights	2	7	0	9	15	0	68	83	13	0	118	131	223
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1

Single-Unit Trucks	0	0	0	0	1	0	1	2	0	0	3	3	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 11:15	8	2	0	10	6	0	78	84	9	0	122	131	225
Lights	7	2	0	9	6	0	75	81	9	0	121	130	220
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	1	0	0	1	0	0	2	2	0	0	1	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 11:30	7	11	0	18	8	0	80	88	10	0	120	130	236
Lights	6	11	0	17	8	0	77	85	10	0	117	127	229
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	0	0	1	0	0	3	3	0	0	3	3	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 11:45	8	5	0	13	14	0	97	111	13	0	133	146	270
Lights	8	5	0	13	14	0	94	108	13	0	130	143	264
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	2	2	4
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-26 12:00	13	9	0	22	14	0	109	123	22	0	161	183	328
Lights	13	9	0	22	14	0	105	119	22	0	158	180	321
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	4	4	0	0	3	3	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 12:15	10	6	0	16	11	0	111	122	25	0	151	176	314
Lights	10	6	0	16	11	0	108	119	25	0	148	173	308
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	2	2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 12:30	13	5	0	18	6	0	116	122	12	0	127	139	279
Lights	13	5	0	18	6	0	113	119	11	0	125	136	273
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	3	3	1	0	2	3	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 12:45	9	9	0	18	11	0	121	132	9	0	122	131	281
Lights	9	9	0	18	11	0	119	130	9	0	118	127	275
Buses	0	0	0	0	0	0	0	0	0	0	3	3	3
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 13:00	15	5	0	20	14	0	122	136	7	0	143	150	306
Lights	14	5	0	19	14	0	117	131	7	0	142	149	299
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	0	0	1	0	0	4	4	0	0	0	0	5
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	1	1	2
2021-11-26 13:15	14	4	0	18	6	0	98	104	14	0	122	136	258
Lights	14	4	0	18	6	0	93	99	14	0	119	133	250
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	2	2	5
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1

2021-11-26 13:30	10	12	0	22	7	0	102	109	6	1	127	134	265
Lights	10	12	0	22	6	0	102	108	6	1	126	133	263
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	1	0	0	1	0	0	0	0	1
2021-11-26 13:45	5	13	0	18	10	0	95	105	9	0	113	122	245
Lights	5	13	0	18	10	0	91	101	8	0	109	117	236
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	1	1	0	2	3	4
Articulated Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
2021-11-26 14:00	9	5	0	14	9	0	100	109	11	0	105	116	239
Lights	9	5	0	14	9	0	97	106	11	0	101	112	232
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	2	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 14:15	11	11	0	22	9	0	104	113	11	0	131	142	277
Lights	11	11	0	22	9	0	103	112	11	0	128	139	273
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	3	3	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 14:30	8	10	0	18	16	0	109	125	11	0	122	133	276
Lights	8	10	0	18	16	0	104	120	11	0	122	133	271
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	5	5	0	0	0	0	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 14:45	13	13	0	26	9	0	108	117	9	0	132	141	284
Lights	13	13	0	26	9	0	106	115	9	0	130	139	280
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 15:00	9	14	0	23	16	0	85	101	17	0	134	151	275
Lights	9	14	0	23	16	0	85	101	17	0	133	150	274
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 15:15	11	8	0	19	19	0	119	138	14	0	122	136	293
Lights	11	8	0	19	19	0	114	133	14	0	120	134	286
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	5	5	0	0	1	1	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 15:30	8	9	0	17	7	0	114	121	9	0	116	125	263
Lights	8	9	0	17	7	0	110	117	9	0	113	122	256
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	1	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 15:45	7	5	0	12	9	0	110	119	17	0	157	174	305
Lights	7	5	0	12	9	0	109	118	17	0	155	172	302

Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-26 16:00	16	7	0	23	12	0	78	90	18	0	127	145	258
Lights	16	7	0	23	12	0	76	88	18	0	124	142	253
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	2	2	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-26 16:15	12	6	0	18	8	0	72	80	15	0	137	152	250
Lights	12	6	0	18	8	0	70	78	15	0	134	149	245
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	1	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 16:30	7	13	0	20	8	0	110	118	10	0	118	128	266
Lights	7	13	0	20	8	0	107	115	10	0	118	128	263
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 16:45	6	7	0	13	9	0	80	89	17	0	170	187	289
Lights	6	7	0	13	9	0	80	89	17	0	166	183	285
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	2	2	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 17:00	10	9	0	19	13	0	81	94	13	0	137	150	263
Lights	10	9	0	19	13	0	80	93	13	0	137	150	262
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 17:15	15	11	0	26	18	0	97	115	14	0	127	141	282
Lights	15	11	0	26	18	0	95	113	14	0	124	138	277
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	1	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 17:30	3	12	0	15	10	0	75	85	6	0	106	112	212
Lights	3	12	0	15	10	0	74	84	6	0	104	110	209
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	2	2	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 17:45	10	11	0	21	14	0	79	93	11	0	89	100	214
Lights	10	11	0	21	14	0	79	93	11	0	87	98	212
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 18:00	4	12	0	16	14	0	71	85	7	0	104	111	212
Lights	4	12	0	16	14	0	71	85	7	0	104	111	212
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 18:15	7	9	0	16	3	0	77	80	13	0	87	100	196
Lights	7	9	0	16	3	0	76	79	13	0	87	100	195
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 18:30	10	14	0	24	9	0	78	87	9	0	83	92	203
Lights	10	14	0	24	9	0	78	87	9	0	82	91	202
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-26 18:45	8	6	0	14	8	0	80	88	10	0	71	81	183
Lights	8	6	0	14	8	0	80	88	10	0	70	80	182
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 7:00	2	2	0	4	3	0	9	12	1	0	16	17	33
Lights	2	2	0	4	3	0	9	12	1	0	16	17	33
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 7:15	0	2	0	2	1	0	9	10	3	0	15	18	30
Lights	0	2	0	2	1	0	8	9	3	0	15	18	29
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 7:30	2	0	0	2	1	0	7	8	5	0	21	26	36
Lights	2	0	0	2	1	0	7	8	5	0	21	26	36
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 7:45	4	4	0	8	1	0	12	13	2	0	17	19	40
Lights	4	4	0	8	1	0	12	13	2	0	17	19	40
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 8:00	6	3	0	9	2	0	15	17	2	0	27	29	55
Lights	4	3	0	7	2	0	15	17	2	0	27	29	53
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	2	0	0	2	0	0	0	0	0	0	0	0	2
2021-11-28 8:15	1	1	0	2	2	0	8	10	2	0	21	23	35
Lights	1	1	0	2	2	0	8	10	2	0	21	23	35
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 8:30	3	4	0	7	2	0	23	25	2	0	22	24	56

Lights	3	4	0	7	2	0	22	24	2	0	20	22	53
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	2	2	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 8:45	2	2	0	4	5	0	32	37	3	0	35	38	79
Lights	2	2	0	4	5	0	31	36	3	0	34	37	77
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-28 9:00	3	5	0	8	8	0	29	37	3	0	28	31	76
Lights	3	5	0	8	8	0	29	37	3	0	28	31	76
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 9:15	4	3	0	7	12	0	24	36	6	0	43	49	92
Lights	4	3	0	7	12	0	24	36	6	0	41	47	90
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 9:30	3	7	0	10	13	0	37	50	7	0	56	63	123
Lights	3	7	0	10	13	0	36	49	7	0	55	62	121
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 9:45	3	13	0	16	4	0	36	40	5	0	65	70	126
Lights	3	13	0	16	4	0	36	40	5	0	65	70	126
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 10:00	1	5	0	6	9	0	46	55	4	0	70	74	135
Lights	1	5	0	6	9	0	45	54	4	0	69	73	133
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 10:15	8	9	0	17	10	0	60	70	8	0	86	94	181
Lights	8	9	0	17	10	0	60	70	8	0	86	94	181
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 10:30	2	11	0	13	10	0	62	72	5	0	87	92	177
Lights	2	11	0	13	10	0	61	71	5	0	85	90	174
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 10:45	15	10	0	25	18	0	63	81	10	0	85	95	201
Lights	15	10	0	25	18	0	63	81	10	0	85	95	201
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 11:00	3	9	0	12	7	0	58	65	6	0	89	95	172
Lights	3	9	0	12	7	0	58	65	6	0	89	95	172
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 11:15	9	8	0	17	11	0	67	78	9	0	98	107	202
Lights	9	8	0	17	11	0	67	78	9	0	96	105	200
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 11:30	4	15	0	19	6	0	69	75	2	0	80	82	176
Lights	4	15	0	19	6	0	69	75	2	0	80	82	176
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 11:45	3	10	0	13	11	0	81	92	2	0	110	112	217
Lights	3	10	0	13	11	0	81	92	2	0	109	111	216
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 12:00	4	13	0	17	14	0	97	111	8	0	117	125	253
Lights	4	13	0	17	14	0	96	110	8	0	117	125	252
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 12:15	4	12	0	16	16	0	73	89	4	0	112	116	221
Lights	4	12	0	16	16	0	73	89	4	0	110	114	219
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 12:30	9	3	0	12	9	0	59	68	8	0	115	123	203
Lights	9	3	0	12	9	0	59	68	8	0	113	121	201
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 12:45	7	11	0	18	9	0	90	99	11	0	125	136	253
Lights	7	11	0	18	9	0	89	98	11	0	124	135	251
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 13:00	2	16	0	18	14	0	85	99	8	0	118	126	243
Lights	2	16	0	18	14	0	84	98	8	0	118	126	242
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

2021-11-28 13:15	5	12	0	17	11	0	92	103	6	0	107	113	233
Lights	5	12	0	17	11	0	91	102	6	0	106	112	231
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 13:30	7	11	0	18	8	0	79	87	10	0	109	119	224
Lights	7	11	0	18	8	0	79	87	9	0	107	116	221
Buses	0	0	0	0	0	0	0	0	1	0	2	3	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 13:45	7	9	0	16	8	0	82	90	13	0	121	134	240
Lights	7	9	0	16	8	0	81	89	13	0	121	134	239
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 14:00	6	11	0	17	12	0	91	103	9	0	107	116	236
Lights	6	11	0	17	12	0	91	103	9	0	107	116	236
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 14:15	3	9	0	12	17	0	87	104	9	0	108	117	233
Lights	3	9	0	12	17	0	85	102	9	0	107	116	230
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 14:30	11	9	0	20	16	0	98	114	10	0	104	114	248
Lights	11	8	0	19	16	0	97	113	10	0	104	114	246
Buses	0	1	0	1	0	0	1	1	0	0	0	0	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 14:45	8	11	0	19	16	0	79	95	10	0	99	109	223
Lights	8	11	0	19	16	0	79	95	9	0	99	108	222
Buses	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 15:00	5	8	0	13	10	0	95	105	10	0	103	113	231
Lights	5	8	0	13	10	0	95	105	10	0	102	112	230
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 15:15	6	9	0	15	12	0	95	107	10	0	88	98	220
Lights	6	9	0	15	12	0	94	106	10	0	87	97	218
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 15:30	10	13	0	23	13	0	87	100	8	0	91	99	222
Lights	10	13	0	23	12	0	87	99	8	0	91	99	221

Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	1	0	0	1	0	0	0	0	1
2021-11-28 15:45	4	12	0	16	15	0	94	109	12	0	85	97	222
Lights	4	12	0	16	15	0	94	109	12	0	83	95	220
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 16:00	9	8	0	17	16	0	77	93	8	0	88	96	206
Lights	9	8	0	17	16	0	76	92	8	0	88	96	205
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 16:15	6	10	0	16	5	0	90	95	7	0	83	90	201
Lights	6	10	0	16	5	0	90	95	7	0	83	90	201
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 16:30	4	9	0	13	7	0	71	78	6	0	80	86	177
Lights	4	9	0	13	7	0	69	76	6	0	79	85	174
Buses	0	0	0	0	0	0	2	2	0	0	1	1	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 16:45	4	11	0	15	15	0	65	80	5	0	70	75	170
Lights	4	11	0	15	15	0	65	80	5	0	70	75	170
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 17:00	3	9	0	12	4	0	57	61	3	0	58	61	134
Lights	3	9	0	12	4	0	56	60	3	0	57	60	132
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 17:15	3	9	0	12	8	0	56	64	10	0	69	79	155
Lights	3	9	0	12	8	0	56	64	10	0	69	79	155
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 17:30	7	7	0	14	10	0	62	72	9	0	60	69	155
Lights	7	7	0	14	10	0	62	72	9	0	60	69	155
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 17:45	2	8	1	11	8	0	66	74	4	0	51	55	140
Lights	2	8	1	11	8	0	66	74	4	0	49	53	138
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 18:00	5	7	0	12	6	0	64	70	5	0	51	56	138
Lights	5	7	0	12	6	0	64	70	5	0	50	55	137
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 18:15	5	4	0	9	6	0	51	57	15	0	43	58	124
Lights	5	4	0	9	6	0	50	56	15	0	43	58	123
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 18:30	9	12	0	21	9	0	58	67	4	0	39	43	131
Lights	9	12	0	21	9	0	57	66	4	0	38	42	129
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-28 18:45	9	11	0	20	6	0	53	59	4	0	42	46	125
Lights	9	11	0	20	6	0	52	58	4	0	42	46	124
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 7:00	5	5	0	10	2	0	31	33	2	0	27	29	72
Lights	5	5	0	10	2	0	31	33	2	0	26	28	71
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 7:15	5	3	0	8	6	0	43	49	6	0	35	41	98
Lights	5	3	0	8	5	0	41	46	6	0	33	39	93
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	1	0	1	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 7:30	8	3	0	11	6	0	57	63	9	0	53	62	136
Lights	8	3	0	11	5	0	55	60	9	0	53	62	133
Buses	0	0	0	0	1	0	1	2	0	0	0	0	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 7:45	8	8	0	16	5	0	76	81	10	0	47	57	154
Lights	6	8	0	14	5	0	74	79	9	0	45	54	147
Buses	2	0	0	2	0	0	0	0	1	0	1	2	4
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-29 8:00	15	4	0	19	7	0	86	93	7	0	46	53	165
Lights	12	4	0	16	6	0	82	88	7	0	41	48	152
Buses	3	0	0	3	1	0	1	2	0	0	1	1	6
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	4	4	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 8:15	21	11	0	32	12	0	66	78	5	0	63	68	178

Lights	20	11	0	31	10	0	60	70	4	0	59	63	164
Buses	1	0	0	1	2	0	3	5	1	0	2	3	9
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	2	2	4
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 8:30	12	12	0	24	6	0	55	61	5	0	61	66	151
Lights	12	11	0	23	6	0	49	55	5	0	60	65	143
Buses	0	1	0	1	0	0	2	2	0	0	1	1	4
Single-Unit Trucks	0	0	0	0	0	0	4	4	0	0	0	0	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 8:45	6	5	0	11	12	0	76	88	9	0	78	87	186
Lights	6	5	0	11	12	0	74	86	9	0	77	86	183
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 9:00	9	7	0	16	7	0	62	69	5	0	81	86	171
Lights	9	7	0	16	7	0	58	65	5	0	78	83	164
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	1	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 9:15	4	7	0	11	7	0	63	70	9	0	71	80	161
Lights	4	7	0	11	7	0	60	67	9	0	70	79	157
Buses	0	0	0	0	0	0	2	2	0	0	1	1	3
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 9:30	9	3	0	12	6	0	54	60	8	0	76	84	156
Lights	8	3	0	11	6	0	52	58	8	0	74	82	151
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	1	0	0	1	0	0	1	1	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 9:45	8	7	0	15	13	0	66	79	6	0	94	100	194
Lights	8	7	0	15	13	0	62	75	5	0	90	95	185
Buses	0	0	0	0	0	0	0	0	0	0	2	2	2
Single-Unit Trucks	0	0	0	0	0	0	4	4	1	0	2	3	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 10:00	10	7	0	17	12	0	63	75	13	0	90	103	195
Lights	9	6	0	15	11	0	63	74	13	0	89	102	191
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	1	0	2	0	0	0	0	0	0	1	1	3
Articulated Trucks	0	0	0	0	1	0	0	1	0	0	0	0	1
2021-11-29 10:15	7	4	0	11	4	0	74	78	9	0	95	104	193
Lights	7	4	0	11	4	0	69	73	9	0	94	103	187
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 10:30	12	5	0	17	12	0	76	88	15	0	113	128	233
Lights	11	5	0	16	12	0	74	86	15	0	112	127	229
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

Single-Unit Trucks	1	0	0	1	0	0	2	2	0	0	1	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 10:45	10	8	0	18	3	0	94	97	13	0	112	125	240
Lights	10	8	0	18	3	0	88	91	13	0	111	124	233
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	6	6	0	0	0	0	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 11:00	7	7	0	14	11	0	90	101	11	0	89	100	215
Lights	7	7	0	14	11	0	89	100	11	0	88	99	213
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-29 11:15	8	4	0	12	9	0	69	78	11	0	99	110	200
Lights	8	4	0	12	9	0	66	75	11	0	98	109	196
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 11:30	13	6	0	19	14	0	79	93	9	0	114	123	235
Lights	12	6	0	18	13	0	73	86	9	0	114	123	227
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	0	0	1	1	0	5	6	0	0	0	0	7
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 11:45	11	5	0	16	11	0	96	107	10	0	128	138	261
Lights	11	5	0	16	11	0	94	105	10	0	126	136	257
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 12:00	10	8	0	18	19	0	87	106	16	0	161	177	301
Lights	10	8	0	18	19	0	87	106	16	0	160	176	300
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 12:15	13	11	0	24	17	0	92	109	18	0	127	145	278
Lights	13	11	0	24	17	0	89	106	18	0	125	143	273
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
2021-11-29 12:30	4	10	0	14	16	0	106	122	5	0	121	126	262
Lights	4	10	0	14	16	0	105	121	5	0	119	124	259
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	2	2	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 12:45	10	10	0	20	13	0	118	131	15	0	115	130	281
Lights	10	10	0	20	12	0	117	129	15	0	113	128	277
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	1	0	1	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0

2021-11-29 13:00	19	10	0	29	11	0	104	115	14	0	128	142	286
Lights	19	10	0	29	11	0	104	115	14	0	127	141	285
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 13:15	5	6	0	11	8	0	96	104	9	0	128	137	252
Lights	5	6	0	11	8	0	93	101	9	0	127	136	248
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 13:30	12	14	0	26	7	0	99	106	14	0	126	140	272
Lights	12	13	0	25	7	0	92	99	14	0	126	140	264
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	7	7	0	0	0	0	7
Articulated Trucks	0	1	0	1	0	0	0	0	0	0	0	0	1
2021-11-29 13:45	5	12	0	17	8	0	95	103	12	0	107	119	239
Lights	5	12	0	17	8	0	93	101	12	0	103	115	233
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	3	3	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 14:00	6	15	0	21	7	0	119	126	15	0	100	115	262
Lights	6	15	0	21	7	0	114	121	15	0	99	114	256
Buses	0	0	0	0	0	0	1	1	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	4	4	0	0	1	1	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 14:15	7	6	0	13	9	0	87	96	13	0	115	128	237
Lights	7	6	0	13	9	0	83	92	13	0	112	125	230
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	3	0	0	2	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 14:30	7	8	0	15	13	0	94	107	9	0	92	101	223
Lights	6	8	0	14	13	0	92	105	9	0	90	99	218
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	0	0	1	0	0	2	2	0	0	2	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 14:45	11	7	0	18	11	0	106	117	9	0	115	124	259
Lights	11	7	0	18	11	0	104	115	9	0	113	122	255
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 15:00	10	11	0	21	8	0	100	108	13	0	128	141	270
Lights	10	10	0	20	8	0	98	106	12	0	127	139	265
Buses	0	1	0	1	0	0	0	0	1	0	1	2	3
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 15:15	9	8	0	17	11	0	98	109	18	0	128	146	272
Lights	9	8	0	17	11	0	94	105	17	0	126	143	265

Buses	0	0	0	0	0	0	2	2	1	0	1	2	4
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 15:30	10	10	0	20	10	0	94	104	17	0	116	133	257
Lights	8	10	0	18	10	0	90	100	15	0	113	128	246
Buses	2	0	0	2	0	0	2	2	2	0	3	5	9
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
2021-11-29 15:45	15	9	0	24	15	0	101	116	13	0	133	146	286
Lights	11	8	0	19	15	0	98	113	13	0	131	144	276
Buses	4	1	0	5	0	0	2	2	0	0	2	2	9
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 16:00	8	4	0	12	15	0	99	114	15	0	118	133	259
Lights	7	4	0	11	15	0	99	114	15	0	116	131	256
Buses	1	0	0	1	0	0	0	0	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 16:15	10	3	0	13	14	0	106	120	7	0	137	144	277
Lights	10	3	0	13	13	0	103	116	7	0	136	143	272
Buses	0	0	0	0	0	0	2	2	0	0	1	1	3
Single-Unit Trucks	0	0	0	0	1	0	1	2	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 16:30	11	8	0	19	13	0	92	105	14	0	132	146	270
Lights	11	8	0	19	13	0	90	103	14	0	130	144	266
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	2	0	0	1	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 16:45	5	10	0	15	10	0	81	91	13	0	145	158	264
Lights	5	10	0	15	10	0	80	90	13	0	144	157	262
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 17:00	5	13	0	18	10	0	70	80	15	0	116	131	229
Lights	5	13	0	18	10	0	70	80	15	0	113	128	226
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	2	2	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 17:15	7	14	0	21	11	0	81	92	17	0	105	122	235
Lights	7	14	0	21	11	0	79	90	17	0	104	121	232
Buses	0	0	0	0	0	0	2	2	0	0	1	1	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 17:30	6	6	0	12	12	0	73	85	11	0	91	102	199
Lights	6	6	0	12	12	0	72	84	11	0	90	101	197
Buses	0	0	0	0	0	0	0	0	0	0	1	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1

Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 17:45	9	10	0	19	13	0	81	94	13	0	81	94	207
Lights	9	10	0	19	13	0	79	92	13	0	79	92	203
Buses	0	0	0	0	0	0	1	1	0	0	2	2	3
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 18:00	7	11	0	18	14	0	77	91	10	0	62	72	181
Lights	7	11	0	18	14	0	76	90	10	0	62	72	180
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 18:15	13	6	0	19	16	0	66	82	8	0	69	77	178
Lights	13	6	0	19	16	0	63	79	8	0	67	75	173
Buses	0	0	0	0	0	0	2	2	0	0	2	2	4
Single-Unit Trucks	0	0	0	0	0	0	1	1	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 18:30	10	10	0	20	5	0	51	56	8	0	65	73	149
Lights	10	10	0	20	5	0	50	55	8	0	61	69	144
Buses	0	0	0	0	0	0	1	1	0	0	1	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	3	3	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-29 18:45	4	5	0	9	6	0	57	63	1	0	52	53	125
Lights	4	5	0	9	6	0	55	61	1	0	49	50	120
Buses	0	0	0	0	0	0	2	2	0	0	2	2	4
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	1	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1088	1158	1	2247	1400	0	10862	12262	1323	1	13247	14571	29080

Study Name	McKeown and Cartier Plaza Intersection
Start Date	Friday, November 19, 2021 7:00 AM
End Date	Tuesday, November 23, 2021 7:00 PM
Site Code	

Road Volumes

TMV	Movement																				
	Southbound				Southbound To	Westbound				Westbound To	Northbound				Northbound To	Eastbound				Eastbound To	Grand Total
Interval	R	T	L	U		R	T	L	U		R	T	L	U		R	T	L	U		
2021-11-19 7:00	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	15	0	0	15	33
Lights	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	14	0	0	14	31
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 7:15	0	0	0	0	0	0	31	2	0	33	1	0	0	0	1	1	21	0	0	22	56
Lights	0	0	0	0	0	0	31	2	0	33	1	0	0	0	1	1	21	0	0	22	56
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 7:30	0	0	0	0	0	0	44	2	0	46	4	0	1	0	5	1	18	0	0	19	70
Lights	0	0	0	0	0	0	44	2	0	46	4	0	1	0	5	0	17	0	0	17	68
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
2021-11-19 7:45	0	0	0	0	0	2	46	5	0	53	1	0	0	0	1	2	36	0	0	38	92
Lights	0	0	0	0	0	1	45	5	0	51	1	0	0	0	1	2	36	0	0	38	90
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 8:00	0	0	0	0	0	1	39	2	0	42	1	0	2	0	3	1	34	0	0	35	80
Lights	0	0	0	0	0	1	37	2	0	40	1	0	2	0	3	1	32	0	0	33	76
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 8:15	0	0	1	0	1	1	44	3	0	48	5	0	2	0	7	4	55	0	0	59	115
Lights	0	0	0	0	0	1	44	3	0	48	5	0	2	0	7	3	54	0	0	57	112
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 8:30	1	0	0	0	1	2	72	4	0	78	2	0	2	0	4	9	43	0	0	52	135
Lights	1	0	0	0	1	2	69	4	0	75	2	0	2	0	4	9	42	0	0	51	131
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 8:45	0	0	3	0	3	1	85	6	0	92	2	0	5	0	7	3	50	1	0	54	156
Lights	0	0	3	0	3	1	83	6	0	90	2	0	4	0	6	3	47	1	0	51	150
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2
2021-11-19 9:00	0	2	2	0	4	3	78	0	0	81	4	1	5	0	10	10	63	2	0	75	170
Lights	0	2	2	0	4	3	74	0	0	77	4	1	4	0	9	10	61	2	0	73	163
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	1	0	0	1	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-19 9:15	0	0	0	0	0	3	84	6	0	93	5	0	2	0	7	11	61	1	0	73	173
Lights	0	0	0	0	0	3	80	6	0	89	5	0	2	0	7	11	57	1	0	69	165
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-19 9:30	1	1	3	0	5	8	70	7	0	85	2	2	6	0	10	9	49	1	0	59	159
Lights	1	1	3	0	5	8	67	7	0	82	2	2	6	0	10	9	49	1	0	59	156
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-19 9:45	2	1	3	0	6	10	60	8	0	78	6	2	5	0	13	15	70	2	0	87	184
Lights	2	1	3	0	6	10	57	8	0	75	6	2	4	0	12	15	67	2	0	84	177
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	2
2021-11-19 10:00	1	3	3	0	7	7	63	7	0	77	8	0	5	0	13	18	66	1	0	85	182

Lights	1	2	3	0	6	6	61	7	0	74	8	0	5	0	13	17	64	1	0	82	175
Buses	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 10:15	1	1	2	0	4	7	61	8	0	76	9	2	9	0	20	16	54	2	0	72	172
Lights	1	1	2	0	4	7	58	8	0	73	9	2	9	0	20	15	50	2	0	67	164
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 10:30	4	1	8	0	13	8	51	17	0	76	11	1	8	0	20	21	65	1	0	87	196
Lights	4	1	8	0	13	8	48	17	0	73	11	1	8	0	20	21	63	1	0	85	191
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 10:45	3	2	6	0	11	16	52	16	0	84	12	1	16	0	29	27	83	3	0	113	237
Lights	3	2	5	0	10	15	49	16	0	80	12	1	15	0	28	27	79	3	0	109	227
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2
2021-11-19 11:00	1	2	11	0	14	9	69	28	0	106	20	0	24	0	44	22	67	3	0	92	256
Lights	0	2	11	0	13	9	67	28	0	104	19	0	24	0	43	22	67	1	0	90	250
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
2021-11-19 11:15	6	0	4	0	10	6	59	24	0	89	28	1	12	0	41	29	78	3	0	110	250
Lights	6	0	4	0	10	6	56	24	0	86	27	1	11	0	39	29	74	3	0	106	241
Buses	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	3	0	0	3	5
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	1	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 11:30	2	3	8	0	13	5	81	25	0	111	21	0	17	0	38	31	65	3	0	99	261
Lights	2	3	8	0	13	5	78	25	0	108	21	0	17	0	38	31	61	3	0	95	254
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 11:45	2	1	6	0	9	8	75	20	0	103	13	1	17	0	31	32	90	6	0	128	271
Lights	2	1	6	0	9	8	70	20	0	98	13	1	17	0	31	31	88	6	0	125	263
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	3
Single-Unit Trucks	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	4
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-19 12:00	0	5	8	0	13	7	80	19	0	106	17	1	22	0	40	31	68	8	0	107	266
Lights	0	5	8	0	13	7	78	18	0	103	17	1	22	0	40	30	65	8	0	103	259
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	1	2	0	0	3	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 12:15	2	4	8	0	14	10	82	12	0	104	24	2	25	0	51	33	85	2	0	120	289
Lights	2	4	8	0	14	10	81	12	0	103	24	2	25	0	51	33	84	2	0	119	287
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-19 12:30	4	5	10	0	19	14	79	33	0	126	28	0	29	0	57	37	108	6	0	151	353
Lights	4	5	10	0	19	13	74	32	0	119	28	0	29	0	57	37	107	6	0	150	345
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	1	5	1	0	7	0	0	0	0	0	0	1	0	0	1	8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 12:45	2	4	20	0	26	11	93	22	0	126	29	0	27	0	56	49	121	5	0	175	383
Lights	2	3	20	0	25	11	90	22	0	123	28	0	26	0	54	49	118	5	0	172	374
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	1	0	0	1	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	4
2021-11-19 13:00	0	1	13	0	14	11	100	44	0	155	27	1	33	0	61	47	125	4	0	176	406
Lights	0	1	13	0	14	11	98	44	0	153	27	1	33	0	61	47	122	4	0	173	401
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-19 13:15	4	2	14	0	20	12	102	44	0	158	38	4	32	0	74	57	127	2	0	186	438
Lights	4	2	14	0	20	12	101	44	0	157	38	4	31	0	73	57	124	2	0	183	433
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	0	3	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 13:30	3	1	6	0	10	14	114	44	0	172	32	1	29	0	62	31	132	3	0	166	410
Lights	3	1	6	0	10	14	110	44	0	168	31	1	29	0	61	30	127	3	0	160	399
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	1	3	0	0	4	7
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
2021-11-19 13:45	2	4	8	0	14	9	127	21	0	157	28	1	40	0	69	37	107	4	0	148	388
Lights	2	4	8	0	14	9	127	21	0	157	28	1	40	0	69	36	105	4	0	145	385
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 14:00	5	2	10	0	17	19	125	33	0	177	23	3	29	0	55	41	130	3	0	174	423
Lights	5	2	10	0	17	19	123	33	0	175	23	3	29	0	55	41	130	3	0	174	421
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 14:15	2	3	11	0	16	9	94	30	0	133	26	1	31	0	58	39	98	2	0	139	346
Lights	2	3	11	0	16	8	91	30	0	129	26	1	31	0	58	39	97	2	0	138	341
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 14:30	5	1	10	0	16	11	101	24	0	136	34	1	33	0	68	41	101	3	0	145	365
Lights	5	1	10	0	16	11	99	24	0	134	34	1	33	0	68	41	99	3	0	143	361
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-19 14:45	1	5	10	0	16	13	96	22	0	131	29	1	32	0	62	31	112	4	0	147	356
Lights	1	5	10	0	16	11	93	22	0	126	29	1	32	0	62	31	108	4	0	143	347
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Single-Unit Trucks	0	0	0	0	0	2	3	0	0	5	0	0	0	0	0	0	1	0	0	1	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 15:00	5	1	9	0	15	10	81	28	0	119	23	3	18	0	44	32	96	2	0	130	308
Lights	4	1	9	0	14	10	80	28	0	118	23	3	18	0	44	31	93	2	0	126	302
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	2	0	0	3	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 15:15	1	0	10	0	11	3	87	31	0	121	32	0	34	0	66	27	93	6	0	126	324
Lights	1	0	10	0	11	3	83	31	0	117	32	0	34	0	66	27	91	6	0	124	318
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 15:30	3	1	10	0	14	12	96	24	0	132	27	1	36	0	64	33	134	3	0	170	380
Lights	3	1	10	0	14	12	96	24	0	132	27	1	36	0	64	33	129	3	0	165	375
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-19 15:45	4	4	9	0	17	9	94	33	0	136	26	0	24	0	50	26	117	3	0	146	349
Lights	4	4	9	0	17	9	91	33	0	133	26	0	24	0	50	26	114	3	0	143	343
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
2021-11-19 16:00	5	0	7	0	12	8	107	17	0	132	24	1	26	0	51	42	116	3	0	161	356
Lights	5	0	7	0	12	8	103	17	0	128	24	1	25	0	50	42	113	3	0	158	348
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 16:15	1	1	9	0	11	6	85	16	0	107	24	0	25	0	49	39	114	3	0	156	323
Lights	1	1	9	0	11	6	85	16	0	107	24	0	25	0	49	39	110	3	0	152	319
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 16:30	1	1	9	0	11	12	94	30	0	136	23	2	23	0	48	32	118	0	0	150	345
Lights	1	1	9	0	11	12	93	30	0	135	23	2	22	0	47	32	118	0	0	150	343
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 16:45	4	2	5	0	11	9	91	22	0	122	24	1	22	0	47	24	124	2	0	150	330
Lights	4	2	5	0	11	9	90	22	0	121	24	1	22	0	47	24	121	2	0	147	326
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 17:00	2	3	5	0	10	12	96	21	0	129	28	1	24	0	53	31	124	2	0	157	349
Lights	2	3	5	0	10	12	96	21	0	129	28	1	24	0	53	31	124	2	0	157	349
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2021-11-19 17:15	4	0	12	0	16	9	92	28	0	129	24	0	25	0	49	35	135	2	0	172	366
Lights	4	0	12	0	16	9	88	28	0	125	24	0	25	0	49	35	133	2	0	170	360
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 17:30	2	1	13	0	16	6	98	21	0	125	18	0	23	0	41	33	108	4	0	145	327
Lights	2	1	13	0	16	6	97	21	0	124	18	0	23	0	41	32	108	3	0	143	324
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 17:45	4	4	14	0	22	18	89	34	0	141	23	2	22	0	47	39	114	2	0	155	365
Lights	3	4	14	0	21	18	89	34	0	141	23	2	22	0	47	39	111	2	0	152	361
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 18:00	4	0	12	0	16	10	81	24	0	115	24	0	26	0	50	32	116	3	0	151	332
Lights	4	0	12	0	16	10	80	24	0	114	24	0	26	0	50	32	115	3	0	150	330
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 18:15	1	2	9	0	12	15	95	31	0	141	23	1	31	0	55	36	105	0	0	141	349
Lights	1	2	9	0	12	15	94	31	0	140	23	1	30	0	54	36	104	0	0	140	346
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 18:30	1	0	10	0	11	9	78	28	0	115	21	2	20	0	43	29	85	2	0	116	285
Lights	1	0	10	0	11	9	78	28	0	115	21	2	20	0	43	29	85	2	0	116	285
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-19 18:45	0	0	10	0	10	8	85	24	0	117	22	0	13	0	35	23	82	1	0	106	268
Lights	0	0	10	0	10	8	84	24	0	116	22	0	13	0	35	23	80	1	0	104	265
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 7:00	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	1	14	1	0	16	27
Lights	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	14	0	0	14	25
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
2021-11-22 7:15	0	0	0	0	0	0	20	0	0	20	2	0	0	0	2	0	16	0	0	16	38
Lights	0	0	0	0	0	0	20	0	0	20	2	0	0	0	2	0	16	0	0	16	38
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 7:30	1	0	0	0	1	0	55	2	0	57	2	0	1	0	3	2	20	0	0	22	83
Lights	1	0	0	0	1	0	52	2	0	54	1	0	1	0	2	2	20	0	0	22	79
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
2021-11-22 7:45	0	0	1	0	1	0	42	3	0	45	0	0	0	0	0	5	38	0	0	43	89
Lights	0	0	0	0	0	0	41	3	0	44	0	0	0	0	0	4	36	0	0	40	84
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
2021-11-22 8:00	0	0	0	0	0	0	39	0	0	39	5	0	0	0	5	3	28	0	0	31	75
Lights	0	0	0	0	0	0	36	0	0	36	5	0	0	0	5	3	24	0	0	27	68
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
2021-11-22 8:15	0	0	0	0	0	2	63	2	0	67	1	0	0	0	1	1	39	0	0	40	108
Lights	0	0	0	0	0	1	61	2	0	64	1	0	0	0	1	1	37	0	0	38	103
Buses	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 8:30	0	1	1	0	2	4	62	2	0	68	2	0	0	0	2	4	44	0	0	48	120
Lights	0	1	1	0	2	3	57	2	0	62	2	0	0	0	2	4	42	0	0	46	112
Buses	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
2021-11-22 8:45	0	0	0	0	0	10	113	6	0	129	2	1	5	0	8	4	52	0	0	56	193
Lights	0	0	0	0	0	7	109	6	0	122	2	1	5	0	8	4	48	0	0	52	182

Buses	0	0	0	0	0	2	1	0	0	3	0	0	0	0	0	0	3	0	0	3	6
Single-Unit Trucks	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 9:00	0	0	1	0	1	1	85	4	0	90	3	0	0	0	3	5	65	0	0	70	164
Lights	0	0	1	0	1	1	80	4	0	85	3	0	0	0	3	5	60	0	0	65	154
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
2021-11-22 9:15	0	0	0	0	0	0	77	1	0	78	1	1	7	0	9	8	66	0	0	74	161
Lights	0	0	0	0	0	0	70	1	0	71	1	0	7	0	8	8	61	0	0	69	148
Buses	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-22 9:30	1	0	0	0	1	3	78	4	0	85	3	0	3	0	6	9	68	1	0	78	170
Lights	1	0	0	0	1	3	74	4	0	81	3	0	3	0	6	9	66	1	0	76	164
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 9:45	1	1	3	0	5	6	83	4	0	93	2	1	5	0	8	11	62	3	0	76	182
Lights	1	1	3	0	5	6	79	4	0	89	2	0	5	0	7	11	57	3	0	71	172
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	3	0	0	3	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 10:00	2	1	2	0	5	4	63	13	0	80	7	0	7	0	14	13	76	4	0	93	192
Lights	2	1	2	0	5	4	60	13	0	77	7	0	7	0	14	13	73	4	0	90	186
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 10:15	0	2	3	0	5	5	48	10	0	63	5	1	7	0	13	12	69	2	0	83	164
Lights	0	2	3	0	5	5	47	10	0	62	5	1	7	0	13	11	65	2	0	78	158
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 10:30	3	1	4	0	8	3	73	7	0	83	5	2	4	0	11	15	59	4	0	78	180
Lights	3	1	4	0	8	3	67	7	0	77	5	2	4	0	11	15	56	4	0	75	171
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-22 10:45	0	4	4	0	8	8	61	16	0	85	14	1	9	0	24	17	74	2	0	93	210
Lights	0	3	4	0	7	8	58	16	0	82	14	1	9	0	24	17	70	2	0	89	202
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 11:00	2	0	8	0	10	9	65	14	0	88	17	0	11	0	28	23	61	2	0	86	212
Lights	2	0	8	0	10	9	62	14	0	85	17	0	10	0	27	22	58	1	0	81	203
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	2	1	0	4	6
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 11:15	0	3	9	0	12	8	60	21	0	89	11	2	13	0	26	26	67	1	0	94	221
Lights	0	3	8	0	11	8	57	21	0	86	11	2	13	0	26	26	66	1	0	93	216
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 11:30	2	2	7	0	11	5	81	13	0	99	14	0	18	0	32	22	79	1	0	102	244
Lights	2	2	7	0	11	5	76	13	0	94	14	0	18	0	32	22	77	1	0	100	237
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-22 11:45	0	0	6	0	6	8	62	15	0	85	16	0	19	0	35	24	81	2	0	107	233
Lights	0	0	6	0	6	8	61	15	0	84	16	0	19	0	35	23	79	2	0	104	229
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 12:00	2	1	4	0	7	7	77	15	0	99	13	0	17	0	30	22	73	1	0	96	232
Lights	2	0	4	0	6	6	74	15	0	95	13	0	17	0	30	22	71	1	0	94	225
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	1	0	0	1	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 12:15	2	5	5	0	12	8	62	22	0	92	13	0	17	0	30	29	77	6	0	112	246
Lights	2	5	5	0	12	8	60	22	0	90	13	0	17	0	30	29	75	6	0	110	242
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3

Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 12:30	0	2	7	0	9	7	67	11	0	85	19	4	20	0	43	23	79	1	0	103	240
Lights	0	2	7	0	9	7	66	11	0	84	19	4	19	0	42	23	75	1	0	99	234
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	4	0	0	4	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 12:45	3	1	9	0	13	13	79	23	0	115	22	2	16	0	40	34	107	1	0	142	310
Lights	3	1	9	0	13	13	73	23	0	109	22	2	16	0	40	34	106	1	0	141	303
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
2021-11-22 13:00	5	7	8	0	20	11	79	21	0	111	23	2	24	0	49	41	133	2	0	176	356
Lights	5	7	8	0	20	11	77	21	0	109	23	2	24	0	49	41	131	2	0	174	352
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
2021-11-22 13:15	4	3	10	0	17	10	98	30	0	138	18	2	27	0	47	36	91	3	0	130	332
Lights	4	3	10	0	17	10	97	30	0	137	18	2	27	0	47	36	90	3	0	129	330
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 13:30	4	4	7	0	15	8	91	20	0	119	35	2	23	0	60	22	106	6	0	134	328
Lights	4	4	7	0	15	8	90	20	0	118	34	2	23	0	59	22	105	6	0	133	325
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 13:45	1	3	9	0	13	9	117	33	0	159	22	3	35	0	60	28	103	4	0	135	367
Lights	1	3	9	0	13	9	115	33	0	157	22	3	35	0	60	28	101	4	0	133	363
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-22 14:00	2	6	10	0	18	6	83	21	0	110	10	1	15	0	26	22	90	6	0	118	272
Lights	2	6	10	0	18	6	82	21	0	109	10	1	15	0	26	22	88	6	0	116	269
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 14:15	4	6	6	0	16	11	88	22	0	121	24	1	22	0	47	24	106	3	0	133	317
Lights	4	6	6	0	16	11	84	22	0	117	24	1	22	0	47	23	106	3	0	132	312
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 14:30	0	4	9	0	13	9	79	13	0	101	18	3	17	0	38	33	92	7	0	132	284
Lights	0	4	9	0	13	9	75	13	0	97	17	3	17	0	37	33	92	7	0	132	279
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	0	0	0	0	0	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 14:45	2	1	10	0	13	14	96	22	0	132	22	1	23	0	46	21	105	1	0	127	318
Lights	2	1	10	0	13	14	91	22	0	127	21	1	22	0	44	21	102	1	0	124	308
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	4	0	0	4	1	0	1	0	2	0	2	0	0	2	8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 15:00	4	2	6	0	12	11	78	17	0	106	14	4	22	0	40	25	99	1	0	125	283
Lights	4	2	6	0	12	11	76	17	0	104	14	4	22	0	40	25	98	1	0	124	280
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 15:15	4	0	6	0	10	8	91	20	0	119	23	0	20	0	43	23	90	3	0	116	288
Lights	4	0	6	0	10	8	89	20	0	117	23	0	20	0	43	23	89	3	0	115	285
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 15:30	2	1	10	0	13	8	91	14	0	113	12	0	23	0	35	26	85	4	0	115	276
Lights	2	1	10	0	13	8	89	14	0	111	12	0	23	0	35	26	81	4	0	111	270
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 15:45	4	1	9	0	14	5	53	16	0	74	11	2	15	0	28	23	75	3	0	101	217
Lights	4	1	9	0	14	5	50	16	0	71	11	2	15	0	28	23	74	3	0	100	213
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 16:00	5	3	5	0	13	6	81	16	0	103	13	2	19	0	34	28	100	2	0	130	280

Lights	5	3	5	0	13	6	80	16	0	102	13	2	18	0	33	28	96	2	0	126	274
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	0	0	2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 16:15	2	2	6	0	10	11	69	15	0	95	24	1	15	0	40	25	101	1	0	127	272
Lights	2	2	6	0	10	11	65	15	0	91	24	1	15	0	40	25	101	0	0	126	267
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 16:30	1	1	5	0	7	7	85	16	0	108	16	1	21	0	38	35	99	1	0	135	288
Lights	0	1	5	0	6	7	82	16	0	105	16	1	21	0	38	35	92	1	0	128	277
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Single-Unit Trucks	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 16:45	1	3	9	0	13	6	91	19	0	116	14	0	15	0	29	24	114	4	0	142	300
Lights	1	3	9	0	13	6	86	19	0	111	14	0	15	0	29	24	105	4	0	133	286
Buses	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	8	0	0	8	12
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 17:00	4	3	9	0	16	10	88	16	0	114	19	2	21	0	42	30	151	1	0	182	354
Lights	4	3	9	0	16	10	85	16	0	111	19	2	21	0	42	30	150	1	0	181	350
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 17:15	3	1	8	0	12	7	91	15	0	113	20	0	21	0	41	31	140	2	0	173	339
Lights	3	1	8	0	12	7	88	15	0	110	20	0	21	0	41	31	138	2	0	171	334
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 17:30	3	2	8	0	13	5	89	19	0	113	11	1	29	0	41	33	130	2	0	165	332
Lights	3	2	8	0	13	5	89	19	0	113	11	1	29	0	41	33	130	2	0	165	332
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 17:45	3	0	11	0	14	9	73	20	0	102	13	0	27	0	40	34	102	3	0	139	295
Lights	3	0	11	0	14	9	72	20	0	101	13	0	27	0	40	34	99	3	0	136	291
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 18:00	2	1	6	0	9	3	83	20	0	106	17	0	23	0	40	28	123	3	0	154	309
Lights	2	1	6	0	9	3	79	20	0	102	17	0	23	0	40	27	122	3	0	152	303
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 18:15	3	2	6	0	11	8	66	12	0	86	25	0	18	0	43	24	87	1	0	112	252
Lights	3	2	6	0	11	8	64	12	0	84	25	0	18	0	43	24	86	1	0	111	249
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 18:30	2	0	6	0	8	4	90	14	0	108	24	1	20	0	45	16	77	1	0	94	255
Lights	2	0	6	0	8	4	89	14	0	107	24	1	20	0	45	16	77	1	0	94	254
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-22 18:45	1	2	4	0	7	6	84	14	0	104	10	1	17	0	28	15	53	1	0	69	208
Lights	1	2	4	0	7	6	84	14	0	104	10	1	17	0	28	15	50	1	0	66	205
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 7:00	0	0	1	0	1	1	15	0	0	16	0	0	1	0	1	0	16	0	0	16	34
Lights	0	0	1	0	1	1	15	0	0	16	0	0	1	0	1	0	16	0	0	16	34
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 7:15	0	0	2	0	2	0	23	0	0	23	1	0	1	0	2	2	13	0	0	15	42
Lights	0	0	1	0	1	0	23	0	0	23	1	0	0	0	1	2	13	0	0	15	40
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
2021-11-23 7:30	1	0	0	0	1	0	41	1	0	42	1	0	2	0	3	1	22	0	0	23	69
Lights	1	0	0	0	1	0	39	1	0	40	1	0	2	0	3	1	22	0	0	23	67
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1

Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 7:45	0	0	0	0	0	0	49	6	0	55	1	0	1	0	2	3	27	0	0	30	87
Lights	0	0	0	0	0	0	48	6	0	54	0	0	1	0	1	2	27	0	0	29	84
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 8:00	0	0	0	0	0	0	33	1	0	34	3	0	0	0	3	5	39	0	0	44	81
Lights	0	0	0	0	0	0	32	1	0	33	3	0	0	0	3	5	37	0	0	42	78
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 8:15	0	1	0	0	1	3	56	2	0	61	2	0	3	0	5	4	48	0	0	52	119
Lights	0	0	0	0	0	1	55	2	0	58	2	0	3	0	5	4	46	0	0	50	113
Buses	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
2021-11-23 8:30	1	0	0	0	1	4	81	4	0	89	2	0	2	0	4	2	44	0	0	46	140
Lights	1	0	0	0	1	4	76	4	0	84	2	0	2	0	4	2	44	0	0	46	135
Buses	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 8:45	1	0	2	0	3	8	88	3	0	99	3	0	3	0	6	9	56	1	0	66	174
Lights	1	0	2	0	3	7	86	2	0	95	3	0	3	0	6	8	52	1	0	61	165
Buses	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Single-Unit Trucks	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	1	0	0	2	4
2021-11-23 9:00	0	1	0	0	1	3	99	2	0	104	1	0	5	0	6	5	67	0	0	72	183
Lights	0	1	0	0	1	3	96	2	0	101	1	0	5	0	6	5	66	0	0	71	179
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 9:15	1	0	1	0	2	8	82	1	0	91	3	0	0	0	3	5	72	0	0	77	173
Lights	1	0	1	0	2	6	74	1	0	81	2	0	0	0	2	4	66	0	0	70	155
Buses	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	8
Single-Unit Trucks	0	0	0	0	0	2	2	0	0	4	1	0	0	0	1	1	2	0	0	3	8
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
2021-11-23 9:30	2	0	1	0	3	6	91	3	0	100	4	0	3	0	7	10	63	3	0	76	186
Lights	2	0	1	0	3	6	85	3	0	94	4	0	3	0	7	9	62	3	0	74	178
Buses	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	1	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 9:45	1	1	3	0	5	6	84	7	0	97	0	0	3	0	3	8	71	3	0	82	187
Lights	1	1	3	0	5	6	83	7	0	96	0	0	3	0	3	8	68	3	0	79	183
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 10:00	1	3	0	0	4	3	76	7	0	86	11	0	9	0	20	13	87	1	0	101	211
Lights	1	3	0	0	4	3	72	7	0	82	11	0	9	0	20	13	79	1	0	93	199
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 10:15	4	1	3	0	8	8	64	8	0	80	4	1	4	0	9	10	67	3	0	80	177
Lights	4	1	3	0	8	7	60	7	0	74	4	1	3	0	8	10	63	3	0	76	166
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	1	3	1	0	5	0	0	1	0	1	0	4	0	0	4	10
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 10:30	0	3	3	0	6	3	61	9	0	73	5	0	6	0	11	17	66	2	0	85	175
Lights	0	1	3	0	4	3	59	9	0	71	5	0	5	0	10	17	61	2	0	80	165
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	2	0	0	2	0	2	0	0	2	0	0	1	0	1	0	2	0	0	2	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-23 10:45	0	0	7	0	7	8	55	11	0	74	15	1	12	0	28	22	48	3	0	73	182
Lights	0	0	7	0	7	8	53	11	0	72	15	1	12	0	28	22	47	3	0	72	179
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 11:00	2	2	9	0	13	9	67	19	0	95	18	0	11	0	29	22	69	2	0	93	230
Lights	2	2	9	0	13	9	61	18	0	88	18	0	11	0	29	22	67	1	0	90	220
Buses	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Single-Unit Trucks	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	0	1	1	0	2	6
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1

2021-11-23 11:15	1	1	7	0	9	6	69	11	0	86	9	1	9	0	19	28	67	5	0	100	214
Lights	1	1	7	0	9	5	66	11	0	82	8	1	9	0	18	28	62	5	0	95	204
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	3	0	0	3	7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
2021-11-23 11:30	1	3	11	0	15	7	50	15	0	72	6	1	16	0	23	24	92	1	0	117	227
Lights	1	3	10	0	14	7	46	15	0	68	6	1	16	0	23	23	90	1	0	114	219
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	1	0	1	0	4	0	0	4	0	0	0	0	0	1	2	0	0	3	8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 11:45	1	1	7	0	9	8	88	16	0	112	15	1	22	0	38	33	86	1	0	120	279
Lights	1	1	7	0	9	8	87	16	0	111	15	1	22	0	38	33	84	1	0	118	276
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 12:00	1	2	5	0	8	11	71	17	0	99	19	1	16	0	36	17	63	1	0	81	224
Lights	1	2	5	0	8	11	68	16	0	95	19	1	16	0	36	17	60	1	0	78	217
Buses	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3	0	0	3	4
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 12:15	2	3	8	0	13	14	68	13	0	95	20	1	19	0	40	26	73	2	0	101	249
Lights	2	3	8	0	13	14	65	13	0	92	20	1	19	0	40	25	71	2	0	98	243
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	2	0	0	3	4
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 12:30	3	3	9	0	15	8	70	18	0	96	21	2	11	0	34	21	89	0	0	110	255
Lights	3	3	9	0	15	8	67	18	0	93	21	2	11	0	34	21	87	0	0	108	250
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 12:45	1	2	7	0	10	11	86	22	0	119	12	0	17	0	29	15	82	6	0	103	261
Lights	1	2	7	0	10	11	85	22	0	118	12	0	16	0	28	15	80	6	0	101	257
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 13:00	1	1	8	0	10	9	86	26	0	121	18	0	19	0	37	42	125	2	0	169	337
Lights	1	1	8	0	10	9	82	26	0	117	17	0	19	0	36	42	123	2	0	167	330
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	0	2	0	0	2	6
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
2021-11-23 13:15	3	2	10	0	15	11	94	27	0	132	28	2	30	0	60	33	117	3	0	153	360
Lights	2	2	10	0	14	10	92	27	0	129	28	2	30	0	60	32	113	3	0	148	351
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	1	0	0	0	1	1	1	0	0	2	0	0	0	0	0	1	2	0	0	3	6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-23 13:30	4	3	4	0	11	10	118	18	0	146	20	4	33	0	57	27	108	1	0	136	350
Lights	4	3	4	0	11	10	117	18	0	145	20	4	33	0	57	26	108	1	0	135	348
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 13:45	3	4	13	0	20	8	111	17	0	136	26	1	29	0	56	32	119	3	0	154	366
Lights	3	4	13	0	20	8	109	17	0	134	25	1	29	0	55	32	116	3	0	151	360
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	2	0	0	2	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 14:00	2	3	12	0	17	11	96	16	0	123	26	4	20	0	50	35	85	1	0	121	311
Lights	2	3	12	0	17	11	92	16	0	119	26	4	20	0	50	35	83	1	0	119	305
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 14:15	2	2	9	0	13	14	92	22	0	128	13	3	14	0	30	28	109	2	0	139	310
Lights	2	2	9	0	13	14	90	22	0	126	13	3	14	0	30	28	105	2	0	135	304
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-23 14:30	1	1	12	0	14	3	85	24	0	112	21	2	19	0	42	38	97	1	0	136	304
Lights	1	1	12	0	14	3	81	24	0	108	21	2	19	0	42	37	96	1	0	134	298
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Single-Unit Trucks	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
2021-11-23 14:45	1	3	8	0	12	9	90	27	0	126	20	1	36	0	57	20	105	5	0	130	325
Lights	1	3	8	0	12	9	89	27	0	125	20	1	36	0	57	20	104	5	0	129	323

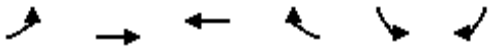
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 15:00	2	3	4	0	9	8	74	17	0	99	24	1	18	0	43	27	110	1	0	138	289	
Lights	2	3	4	0	9	8	72	17	0	97	24	0	18	0	42	26	108	1	0	135	283	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2	
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	1	1	0	0	2	4	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 15:15	3	2	5	0	10	12	80	10	0	102	21	2	9	0	32	27	92	2	0	121	265	
Lights	3	2	5	0	10	12	76	10	0	98	21	2	9	0	32	26	92	2	0	120	260	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	4	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 15:30	2	1	6	0	9	6	73	12	0	91	19	1	19	0	39	18	89	2	0	109	248	
Lights	2	1	6	0	9	6	70	12	0	88	19	1	19	0	39	18	86	2	0	106	242	
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Single-Unit Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	
2021-11-23 15:45	3	0	9	0	12	14	94	20	0	128	14	1	18	0	33	41	81	5	0	127	300	
Lights	3	0	9	0	12	14	90	19	0	123	14	1	18	0	33	41	78	4	0	123	291	
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	
Single-Unit Trucks	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	1	1	0	2	7	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 16:00	2	7	6	0	15	10	94	17	0	121	20	2	29	0	51	30	104	1	0	135	322	
Lights	2	6	6	0	14	10	90	17	0	117	19	2	28	0	49	30	101	1	0	132	312	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
Single-Unit Trucks	0	1	0	0	1	0	3	0	0	3	1	0	1	0	2	0	3	0	0	3	9	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 16:15	1	2	7	0	10	5	93	19	0	117	15	2	24	0	41	24	90	4	0	118	286	
Lights	1	2	7	0	10	5	92	19	0	116	15	2	24	0	41	24	88	4	0	116	283	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 16:30	1	2	9	0	12	6	74	14	0	94	18	1	16	0	35	32	92	2	0	126	267	
Lights	1	2	9	0	12	6	70	14	0	90	18	1	15	0	34	32	89	2	0	123	259	
Buses	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6	
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 16:45	1	1	6	0	8	9	88	16	0	113	11	0	23	0	34	29	102	0	0	131	286	
Lights	1	1	6	0	8	9	84	16	0	109	11	0	23	0	34	29	97	0	0	126	277	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	5	
Single-Unit Trucks	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3	
Articulated Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
2021-11-23 17:00	2	2	4	0	8	6	81	8	0	95	13	0	28	0	41	22	168	4	0	194	338	
Lights	2	2	4	0	8	6	80	8	0	94	13	0	28	0	41	22	167	4	0	193	336	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 17:15	3	0	10	0	13	2	93	10	0	105	20	0	21	0	41	23	134	1	0	158	317	
Lights	3	0	10	0	13	2	91	10	0	103	20	0	21	0	41	23	131	1	0	155	312	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3	
Single-Unit Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 17:30	2	2	6	0	10	10	88	11	0	109	14	0	14	0	28	23	116	1	0	140	287	
Lights	2	2	6	0	10	10	87	11	0	108	14	0	14	0	28	23	116	1	0	140	286	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 17:45	3	1	9	0	13	7	78	13	0	98	20	2	23	0	45	26	120	4	0	150	306	
Lights	3	1	9	0	13	7	78	13	0	98	20	2	23	0	45	26	118	4	0	148	304	
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 18:00	6	1	9	0	16	10	69	13	0	92	11	3	22	0	36	23	116	1	0	140	284	
Lights	6	1	9	0	16	9	68	13	0	90	11	3	22	0	36	23	115	1	0	139	281	
Buses	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	3	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2021-11-23 18:15	2	0	11	0	13	11	75	27	0	113	14	1	16	0	31	28	94	1	0	123	280	
Lights	2	0	11	0	13	11	74	27	0	112	14	1	16	0	31	28	93	1	0	122	278	
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2	
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 18:30	1	0	3	0	4	6	74	19	0	99	16	0	19	0	35	21	63	1	0	85	223
Lights	1	0	3	0	4	6	73	18	0	97	16	0	19	0	35	21	63	1	0	85	221
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Single-Unit Trucks	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021-11-23 18:45	1	0	7	0	8	8	63	11	0	82	16	0	23	0	39	16	74	1	0	91	220
Lights	1	0	7	0	8	8	63	11	0	82	16	0	23	0	39	16	72	1	0	89	218
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	257	226	871	0	1354	1036	11014	2213	0	14263	2107	128	2281	0	4516	3176	11981	293	0	15450	35583

APPENDIX B

HCM REPORTS – MCKEOWN AVE. & MCNAMARA ST.

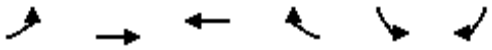
DRAFT



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	291	319	31	35	77
Future Volume (Veh/h)	43	291	319	31	35	77
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	316	347	34	38	84
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	381				774	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381				774	364
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				89	88
cM capacity (veh/h)	1189				355	685

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	363	381	122
Volume Left	47	0	38
Volume Right	0	34	84
cSH	1189	1700	531
Volume to Capacity	0.04	0.22	0.23
Queue Length 95th (m)	1.0	0.0	7.0
Control Delay (s)	1.4	0.0	13.8
Lane LOS	A		B
Approach Delay (s)	1.4	0.0	13.8
Approach LOS			B

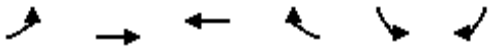
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	593	384	59	27	51
Future Volume (Veh/h)	95	593	384	59	27	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	645	417	64	29	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	481				1300	449
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	481				1300	449
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				82	91
cM capacity (veh/h)	1082				163	610

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	748	481	84
Volume Left	103	0	29
Volume Right	0	64	55
cSH	1082	1700	313
Volume to Capacity	0.10	0.28	0.27
Queue Length 95th (m)	2.5	0.0	8.5
Control Delay (s)	2.3	0.0	20.7
Lane LOS	A		C
Approach Delay (s)	2.3	0.0	20.7
Approach LOS			C

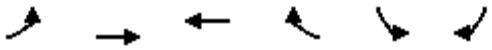
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	425	345	60	42	52
Future Volume (Veh/h)	38	425	345	60	42	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	462	375	65	46	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	440				952	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				952	408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	91
cM capacity (veh/h)	1115				280	648

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	503	440	103
Volume Left	41	0	46
Volume Right	0	65	57
cSH	1115	1700	408
Volume to Capacity	0.04	0.26	0.25
Queue Length 95th (m)	0.9	0.0	7.9
Control Delay (s)	1.1	0.0	16.8
Lane LOS	A		C
Approach Delay (s)	1.1	0.0	16.8
Approach LOS			C

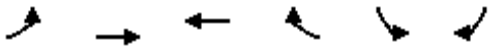
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	356	417	36	41	89
Future Volume (Veh/h)	50	356	417	36	41	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	387	453	39	45	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	492				968	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492				968	472
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				83	84
cM capacity (veh/h)	1082				270	596

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	441	492	142
Volume Left	54	0	45
Volume Right	0	39	97
cSH	1082	1700	431
Volume to Capacity	0.05	0.29	0.33
Queue Length 95th (m)	1.3	0.0	11.3
Control Delay (s)	1.5	0.0	17.4
Lane LOS	A		C
Approach Delay (s)	1.5	0.0	17.4
Approach LOS			C

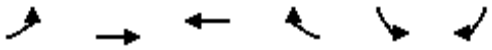
Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	717	459	68	31	59
Future Volume (Veh/h)	110	717	459	68	31	59
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	779	499	74	34	64
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	573				1555	536
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	573				1555	536
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				69	88
cM capacity (veh/h)	1000				111	545

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	899	573	98
Volume Left	120	0	34
Volume Right	0	74	64
cSH	1000	1700	231
Volume to Capacity	0.12	0.34	0.42
Queue Length 95th (m)	3.3	0.0	15.8
Control Delay (s)	3.0	0.0	31.7
Lane LOS	A		D
Approach Delay (s)	3.0	0.0	31.7
Approach LOS			D

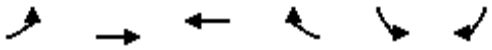
Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	500	407	70	49	60
Future Volume (Veh/h)	44	500	407	70	49	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	543	442	76	53	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				1119	480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518				1119	480
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				76	89
cM capacity (veh/h)	1043				220	590

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	591	518	118
Volume Left	48	0	53
Volume Right	0	76	65
cSH	1043	1700	336
Volume to Capacity	0.05	0.30	0.35
Queue Length 95th (m)	1.2	0.0	12.3
Control Delay (s)	1.2	0.0	21.4
Lane LOS	A		C
Approach Delay (s)	1.2	0.0	21.4
Approach LOS			C

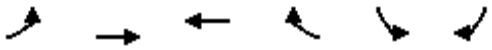
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	356	417	36	41	89
Future Volume (Veh/h)	50	356	417	36	41	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	387	453	39	45	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	492				968	472
vC1, stage 1 conf vol					472	
vC2, stage 2 conf vol					495	
vCu, unblocked vol	492				968	472
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				91	84
cM capacity (veh/h)	1082				483	596

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	54	387	492	142
Volume Left	54	0	0	45
Volume Right	0	0	39	97
cSH	1082	1700	1700	555
Volume to Capacity	0.05	0.23	0.29	0.26
Queue Length 95th (m)	1.3	0.0	0.0	8.1
Control Delay (s)	8.5	0.0	0.0	13.7
Lane LOS	A			B
Approach Delay (s)	1.0		0.0	13.7
Approach LOS				B

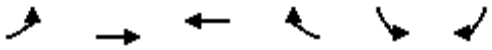
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	717	459	68	31	59
Future Volume (Veh/h)	110	717	459	68	31	59
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	779	499	74	34	64
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	573				1555	536
vC1, stage 1 conf vol					536	
vC2, stage 2 conf vol					1019	
vCu, unblocked vol	573				1555	536
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	88				88	88
cM capacity (veh/h)	1000				281	545

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	120	779	573	98
Volume Left	120	0	0	34
Volume Right	0	0	74	64
cSH	1000	1700	1700	411
Volume to Capacity	0.12	0.46	0.34	0.24
Queue Length 95th (m)	3.3	0.0	0.0	7.3
Control Delay (s)	9.1	0.0	0.0	16.5
Lane LOS	A			C
Approach Delay (s)	1.2		0.0	16.5
Approach LOS				C

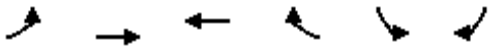
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	500	407	70	49	60
Future Volume (Veh/h)	44	500	407	70	49	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	543	442	76	53	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				1119	480
vC1, stage 1 conf vol					480	
vC2, stage 2 conf vol					639	
vCu, unblocked vol	518				1119	480
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				88	89
cM capacity (veh/h)	1043				431	590

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	48	543	518	118
Volume Left	48	0	0	53
Volume Right	0	0	76	65
cSH	1043	1700	1700	506
Volume to Capacity	0.05	0.32	0.30	0.23
Queue Length 95th (m)	1.2	0.0	0.0	7.2
Control Delay (s)	8.6	0.0	0.0	14.3
Lane LOS	A			B
Approach Delay (s)	0.7		0.0	14.3
Approach LOS				B

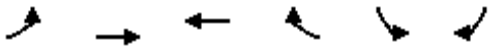
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	356	417	36	41	89
Future Volume (Veh/h)	50	356	417	36	41	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	387	453	39	45	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	492				774	246
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492				774	246
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				86	87
cM capacity (veh/h)	1082				322	760

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	183	258	302	190	142
Volume Left	54	0	0	0	45
Volume Right	0	0	0	39	97
cSH	1082	1700	1700	1700	531
Volume to Capacity	0.05	0.15	0.18	0.11	0.27
Queue Length 95th (m)	1.3	0.0	0.0	0.0	8.6
Control Delay (s)	2.8	0.0	0.0	0.0	14.2
Lane LOS	A				B
Approach Delay (s)	1.2		0.0		14.2
Approach LOS					B

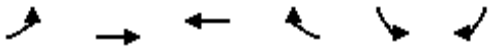
Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	717	459	68	31	59
Future Volume (Veh/h)	110	717	459	68	31	59
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	779	499	74	34	64
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	573				1166	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	573				1166	286
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				80	91
cM capacity (veh/h)	996				167	710

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	380	519	333	240	98
Volume Left	120	0	0	0	34
Volume Right	0	0	0	74	64
cSH	996	1700	1700	1700	334
Volume to Capacity	0.12	0.31	0.20	0.14	0.29
Queue Length 95th (m)	3.3	0.0	0.0	0.0	9.6
Control Delay (s)	3.8	0.0	0.0	0.0	20.2
Lane LOS	A				C
Approach Delay (s)	1.6		0.0		20.2
Approach LOS					C

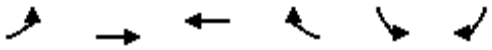
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	500	407	70	49	60
Future Volume (Veh/h)	44	500	407	70	49	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	543	442	76	53	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				848	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518				848	259
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				82	91
cM capacity (veh/h)	1037				290	746

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	229	362	295	223	118
Volume Left	48	0	0	0	53
Volume Right	0	0	0	76	65
cSH	1037	1700	1700	1700	438
Volume to Capacity	0.05	0.21	0.17	0.13	0.27
Queue Length 95th (m)	1.2	0.0	0.0	0.0	8.6
Control Delay (s)	2.2	0.0	0.0	0.0	16.2
Lane LOS	A				C
Approach Delay (s)	0.8		0.0		16.2
Approach LOS					C

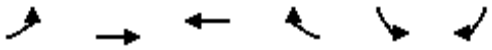
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	356	417	36	41	89
Future Volume (Veh/h)	50	356	417	36	41	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	387	453	39	45	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	492				774	246
vC1, stage 1 conf vol					472	
vC2, stage 2 conf vol					302	
vCu, unblocked vol	492				774	246
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				91	87
cM capacity (veh/h)	1082				520	760

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	54	194	194	302	190	142
Volume Left	54	0	0	0	0	45
Volume Right	0	0	0	0	39	97
cSH	1082	1700	1700	1700	1700	663
Volume to Capacity	0.05	0.11	0.11	0.18	0.11	0.21
Queue Length 95th (m)	1.3	0.0	0.0	0.0	0.0	6.5
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	11.9
Lane LOS	A					B
Approach Delay (s)	1.0			0.0		11.9
Approach LOS						B

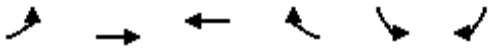
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	717	459	68	31	59
Future Volume (Veh/h)	110	717	459	68	31	59
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	779	499	74	34	64
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	573				1166	286
vC1, stage 1 conf vol					536	
vC2, stage 2 conf vol					630	
vCu, unblocked vol	573				1166	286
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	88				91	91
cM capacity (veh/h)	996				369	710

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	120	390	390	333	240	98
Volume Left	120	0	0	0	0	34
Volume Right	0	0	0	0	74	64
cSH	996	1700	1700	1700	1700	538
Volume to Capacity	0.12	0.23	0.23	0.20	0.14	0.18
Queue Length 95th (m)	3.3	0.0	0.0	0.0	0.0	5.3
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	13.2
Lane LOS	A					B
Approach Delay (s)	1.2			0.0		13.2
Approach LOS						B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	500	407	70	49	60
Future Volume (Veh/h)	44	500	407	70	49	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	543	442	76	53	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				848	259
vC1, stage 1 conf vol					480	
vC2, stage 2 conf vol					368	
vCu, unblocked vol	518				848	259
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				89	91
cM capacity (veh/h)	1037				496	746

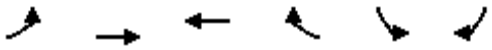
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	48	272	272	295	223	118
Volume Left	48	0	0	0	0	53
Volume Right	0	0	0	0	76	65
cSH	1037	1700	1700	1700	1700	608
Volume to Capacity	0.05	0.16	0.16	0.17	0.13	0.19
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	5.7
Control Delay (s)	8.6	0.0	0.0	0.0	0.0	12.3
Lane LOS	A					B
Approach Delay (s)	0.7			0.0		12.3
Approach LOS						B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX C

HCM REPORTS – MCKEOWN AVE. & CARTIER ST.

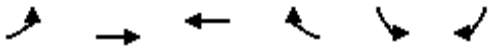
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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	277	283	30	35	56
Future Volume (Veh/h)	27	277	283	30	35	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	301	308	33	38	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	341				684	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341				684	170
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	98				90	93
cM capacity (veh/h)	1180				371	816

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	330	205	136	99
Volume Left	29	0	0	38
Volume Right	0	0	33	61
cSH	1180	1700	1700	559
Volume to Capacity	0.02	0.12	0.08	0.18
Queue Length 95th (m)	0.6	0.0	0.0	5.1
Control Delay (s)	0.9	0.0	0.0	12.8
Lane LOS	A			B
Approach Delay (s)	0.9	0.0		12.8
Approach LOS				B

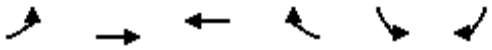
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	592	388	52	25	34
Future Volume (Veh/h)	49	592	388	52	25	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	643	422	57	27	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked	1.00				1.00	1.00
vC, conflicting volume	479				1200	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	470				1193	229
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				84	95
cM capacity (veh/h)	1099				173	767

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	696	281	198	64
Volume Left	53	0	0	27
Volume Right	0	0	57	37
cSH	1099	1700	1700	313
Volume to Capacity	0.05	0.17	0.12	0.20
Queue Length 95th (m)	1.2	0.0	0.0	6.0
Control Delay (s)	1.2	0.0	0.0	19.4
Lane LOS	A			C
Approach Delay (s)	1.2	0.0		19.4
Approach LOS				C

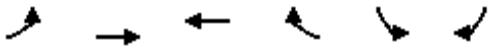
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	459	346	42	50	21
Future Volume (Veh/h)	35	459	346	42	50	21
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	499	376	46	54	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	422				974	211
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	422				974	211
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				78	97
cM capacity (veh/h)	1127				244	801

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	537	251	171	77
Volume Left	38	0	0	54
Volume Right	0	0	46	23
cSH	1127	1700	1700	308
Volume to Capacity	0.03	0.15	0.10	0.25
Queue Length 95th (m)	0.8	0.0	0.0	7.7
Control Delay (s)	1.0	0.0	0.0	20.5
Lane LOS	A			C
Approach Delay (s)	1.0	0.0		20.5
Approach LOS				C

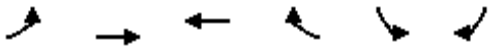
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	339	375	35	41	65
Future Volume (Veh/h)	31	339	375	35	41	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	368	408	38	45	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	446				863	223
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				863	223
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	97				84	91
cM capacity (veh/h)	1076				283	753

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	402	272	174	116
Volume Left	34	0	0	45
Volume Right	0	0	38	71
cSH	1076	1700	1700	458
Volume to Capacity	0.03	0.16	0.10	0.25
Queue Length 95th (m)	0.8	0.0	0.0	8.0
Control Delay (s)	1.0	0.0	0.0	15.5
Lane LOS	A			C
Approach Delay (s)	1.0	0.0		15.5
Approach LOS				C

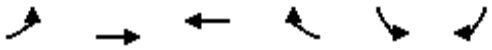
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	716	464	60	29	39
Future Volume (Veh/h)	57	716	464	60	29	39
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	778	504	65	32	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	569				1438	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	501				1395	209
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				74	95
cM capacity (veh/h)	1044				123	773

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	840	336	233	74
Volume Left	62	0	0	32
Volume Right	0	0	65	42
cSH	1044	1700	1700	236
Volume to Capacity	0.06	0.20	0.14	0.31
Queue Length 95th (m)	1.5	0.0	0.0	10.3
Control Delay (s)	1.5	0.0	0.0	27.1
Lane LOS	A			D
Approach Delay (s)	1.5	0.0		27.1
Approach LOS				D

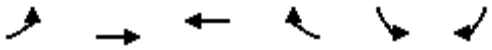
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	539	408	49	58	24
Future Volume (Veh/h)	41	539	408	49	58	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	586	443	53	63	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	496				1146	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496				1146	248
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				66	97
cM capacity (veh/h)	1057				188	758

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	631	295	201	89
Volume Left	45	0	0	63
Volume Right	0	0	53	26
cSH	1057	1700	1700	240
Volume to Capacity	0.04	0.17	0.12	0.37
Queue Length 95th (m)	1.1	0.0	0.0	13.0
Control Delay (s)	1.1	0.0	0.0	28.5
Lane LOS	A			D
Approach Delay (s)	1.1	0.0		28.5
Approach LOS				D

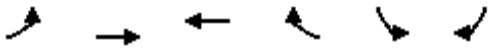
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	339	375	35	41	65
Future Volume (Veh/h)	31	339	375	35	41	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	368	408	38	45	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	446				863	223
vC1, stage 1 conf vol					427	
vC2, stage 2 conf vol					436	
vCu, unblocked vol	446				863	223
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)					5.9	
tF (s)	2.3				3.5	3.4
p0 queue free %	97				91	91
cM capacity (veh/h)	1076				488	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	34	368	272	174	116
Volume Left	34	0	0	0	45
Volume Right	0	0	0	38	71
cSH	1076	1700	1700	1700	622
Volume to Capacity	0.03	0.22	0.16	0.10	0.19
Queue Length 95th (m)	0.8	0.0	0.0	0.0	5.4
Control Delay (s)	8.5	0.0	0.0	0.0	12.1
Lane LOS	A				B
Approach Delay (s)	0.7		0.0		12.1
Approach LOS					B

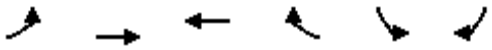
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	716	464	60	29	39
Future Volume (Veh/h)	57	716	464	60	29	39
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	778	504	65	32	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	569				1438	284
vC1, stage 1 conf vol					536	
vC2, stage 2 conf vol					902	
vCu, unblocked vol	501				1395	209
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				89	95
cM capacity (veh/h)	1044				304	773

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	62	778	336	233	74
Volume Left	62	0	0	0	32
Volume Right	0	0	0	65	42
cSH	1044	1700	1700	1700	464
Volume to Capacity	0.06	0.46	0.20	0.14	0.16
Queue Length 95th (m)	1.5	0.0	0.0	0.0	4.5
Control Delay (s)	8.7	0.0	0.0	0.0	14.2
Lane LOS	A				B
Approach Delay (s)	0.6		0.0		14.2
Approach LOS					B

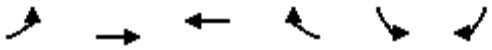
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	539	408	49	58	24
Future Volume (Veh/h)	41	539	408	49	58	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	586	443	53	63	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	496				1146	248
vC1, stage 1 conf vol					470	
vC2, stage 2 conf vol					676	
vCu, unblocked vol	496				1146	248
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	97
cM capacity (veh/h)	1057				390	758

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	45	586	295	201	89
Volume Left	45	0	0	0	63
Volume Right	0	0	0	53	26
cSH	1057	1700	1700	1700	454
Volume to Capacity	0.04	0.34	0.17	0.12	0.20
Queue Length 95th (m)	1.1	0.0	0.0	0.0	5.8
Control Delay (s)	8.6	0.0	0.0	0.0	14.8
Lane LOS	A				B
Approach Delay (s)	0.6		0.0		14.8
Approach LOS					B

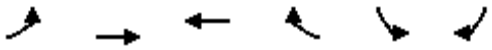
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	339	375	35	41	65
Future Volume (Veh/h)	31	339	375	35	41	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	368	408	38	45	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	446				679	223
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				679	223
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	97				88	91
cM capacity (veh/h)	1076				371	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	157	245	272	174	116
Volume Left	34	0	0	0	45
Volume Right	0	0	0	38	71
cSH	1076	1700	1700	1700	538
Volume to Capacity	0.03	0.14	0.16	0.10	0.22
Queue Length 95th (m)	0.8	0.0	0.0	0.0	6.5
Control Delay (s)	2.1	0.0	0.0	0.0	13.5
Lane LOS	A				B
Approach Delay (s)	0.8		0.0		13.5
Approach LOS					B

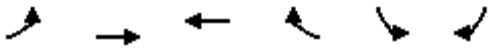
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	716	464	60	29	39
Future Volume (Veh/h)	57	716	464	60	29	39
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	778	504	65	32	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	569				1050	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	501				995	209
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				86	95
cM capacity (veh/h)	1044				224	773

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	321	519	336	233	74
Volume Left	62	0	0	0	32
Volume Right	0	0	0	65	42
cSH	1044	1700	1700	1700	375
Volume to Capacity	0.06	0.31	0.20	0.14	0.20
Queue Length 95th (m)	1.5	0.0	0.0	0.0	5.8
Control Delay (s)	2.2	0.0	0.0	0.0	16.9
Lane LOS	A				C
Approach Delay (s)	0.8		0.0		16.9
Approach LOS					C

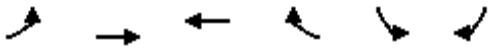
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	539	408	49	58	24
Future Volume (Veh/h)	41	539	408	49	58	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	586	443	53	63	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	496				852	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496				852	248
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				78	97
cM capacity (veh/h)	1057				289	758

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	240	391	295	201	89
Volume Left	45	0	0	0	63
Volume Right	0	0	0	53	26
cSH	1057	1700	1700	1700	353
Volume to Capacity	0.04	0.23	0.17	0.12	0.25
Queue Length 95th (m)	1.1	0.0	0.0	0.0	7.8
Control Delay (s)	1.9	0.0	0.0	0.0	18.6
Lane LOS	A				C
Approach Delay (s)	0.7		0.0		18.6
Approach LOS					C

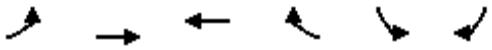
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	339	375	35	41	65
Future Volume (Veh/h)	31	339	375	35	41	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	368	408	38	45	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	446				679	223
vC1, stage 1 conf vol					427	
vC2, stage 2 conf vol					252	
vCu, unblocked vol	446				679	223
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)					5.9	
tF (s)	2.3				3.5	3.4
p0 queue free %	97				92	91
cM capacity (veh/h)	1076				555	753

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	34	184	184	272	174	116
Volume Left	34	0	0	0	0	45
Volume Right	0	0	0	0	38	71
cSH	1076	1700	1700	1700	1700	661
Volume to Capacity	0.03	0.11	0.11	0.16	0.10	0.18
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	5.1
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	11.6
Lane LOS	A					B
Approach Delay (s)	0.7			0.0		11.6
Approach LOS						B

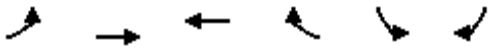
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	716	464	60	29	39
Future Volume (Veh/h)	57	716	464	60	29	39
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	778	504	65	32	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	569				1050	284
vC1, stage 1 conf vol					536	
vC2, stage 2 conf vol					513	
vCu, unblocked vol	501				995	209
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				93	95
cM capacity (veh/h)	1044				437	773

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	62	389	389	336	233	74
Volume Left	62	0	0	0	0	32
Volume Right	0	0	0	0	65	42
cSH	1044	1700	1700	1700	1700	580
Volume to Capacity	0.06	0.23	0.23	0.20	0.14	0.13
Queue Length 95th (m)	1.5	0.0	0.0	0.0	0.0	3.5
Control Delay (s)	8.7	0.0	0.0	0.0	0.0	12.1
Lane LOS	A					B
Approach Delay (s)	0.6			0.0		12.1
Approach LOS						B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	539	408	49	58	24
Future Volume (Veh/h)	41	539	408	49	58	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	586	443	53	63	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	None			
Median storage veh)		2				
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	496				852	248
vC1, stage 1 conf vol					470	
vC2, stage 2 conf vol					383	
vCu, unblocked vol	496				852	248
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	96				87	97
cM capacity (veh/h)	1057				496	758

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	45	293	293	295	201	89
Volume Left	45	0	0	0	0	63
Volume Right	0	0	0	0	53	26
cSH	1057	1700	1700	1700	1700	552
Volume to Capacity	0.04	0.17	0.17	0.17	0.12	0.16
Queue Length 95th (m)	1.1	0.0	0.0	0.0	0.0	4.6
Control Delay (s)	8.6	0.0	0.0	0.0	0.0	12.8
Lane LOS	A					B
Approach Delay (s)	0.6			0.0		12.8
Approach LOS						B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX 2-2

Transportation Study Addendum Memorandum

R.V. Anderson Associates Limited
436 Westmount Avenue, Suite 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 F 855 833 4022
rvanderson.com

TECHNICAL MEMORANDUM

To:	Reid Porter	**RVA:**	216166
From:	Jimmy Rathod, P.Eng. Matthew Di Maria, C.E.T., RSP$_1$, CAPM		
Date:	April 25, 2023		
Subject:	McKeown Avenue EA Amendment & Design – Transportation Needs & Justifications Study - Addendum Memorandum		

1.0 Introduction

R.V. Anderson Associates Inc. (RVA) was retained by the City of North Bay to undertake an Environmental Assessment (EA) Addendum for the McKeown Avenue corridor to identify and develop required corridor improvements in response to existing and future projected needs. As part of this study a Transportation Needs and Justification Report was completed in July 2022. Subsequent to the submission of this report a Public Information Package outlining the complete findings and recommendations of the EA study was uploaded to the City's website from October 25th, 2022, to November 11th, 2022, for feedback and comments from the public.

Based on the public's feedback there were several concerns raised in relation to transportation:

- Residents expressed a desire for operational improvements to the McNamara Street at McKeown Avenue including signalization of the intersection with a controlled pedestrian crossing.
- Residents expressed a desire for improvements to the McKeown Avenue and Cartier Street intersection due to concerns with safety for pedestrians and vehicular operations.
- Residents expressed a desire for improvements within the midblock section of McKeown Avenue between Cartier Street and Champlain Street due to concerns with safety for pedestrians and vehicular operations.
- Residents expressed desire for improvements to the McKeown Avenue and Champlain Street intersection including concerns with pedestrian safety, the ability to

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accommodate additional traffic from the Trussler School redevelopment, and operational concerns of the signal (left-turn queues, long wait times).

As a result of the comments received, the project study area was extended easterly from Cartier Street to Champlain Street and additional traffic operations and safety assessments were completed. The results of those assessments and recommended improvements are included in this Addendum Memorandum.

1.1 Addendum Scope of Work

The scope of work completed as part of this Addendum Memorandum to address the operational and safety comments received from the public included the following tasks:

Intersection Safety Assessment:

- Review historical collision data at the intersections of McKeown Avenue with Cartier Street and Champlain Street and identify and notable trends;
- Conduct in-field Conflict Studies at both intersections mentioned above;
- Review geometrics, lanes, sightlines, and pavement markings for the Cartier and Champlain intersections; and
- Develop and test alternatives to address operations/safety concerns.

Traffic Assessment:

- Prepare base year and horizon year traffic forecasts for the following intersections:
  - McKeown Avenue at Champlain Street;
  - McKeown Avenue at Cartier Street; and
  - McKeown Avenue at McNamara Street.
- Incorporate development site trips from the Trusler School Redevelopment and other potential development into future total traffic volumes;
- Conduct intersection operational analysis for the three intersections under existing, future do-nothing and future total with improvements traffic conditions. This includes the analysis of McKeown Avenue and McNamara Street under signalized traffic control; and
- Based on the operational analysis completed, confirm future intersection geometry and storage lane requirements.

1.2 Study Area

The study area for this Addendum traffic operations and safety assessment is presented in **Figure 1.1**. As shown in the figure, the study area extends along McKeown Avenue from McNamara Street to Champlain Street.

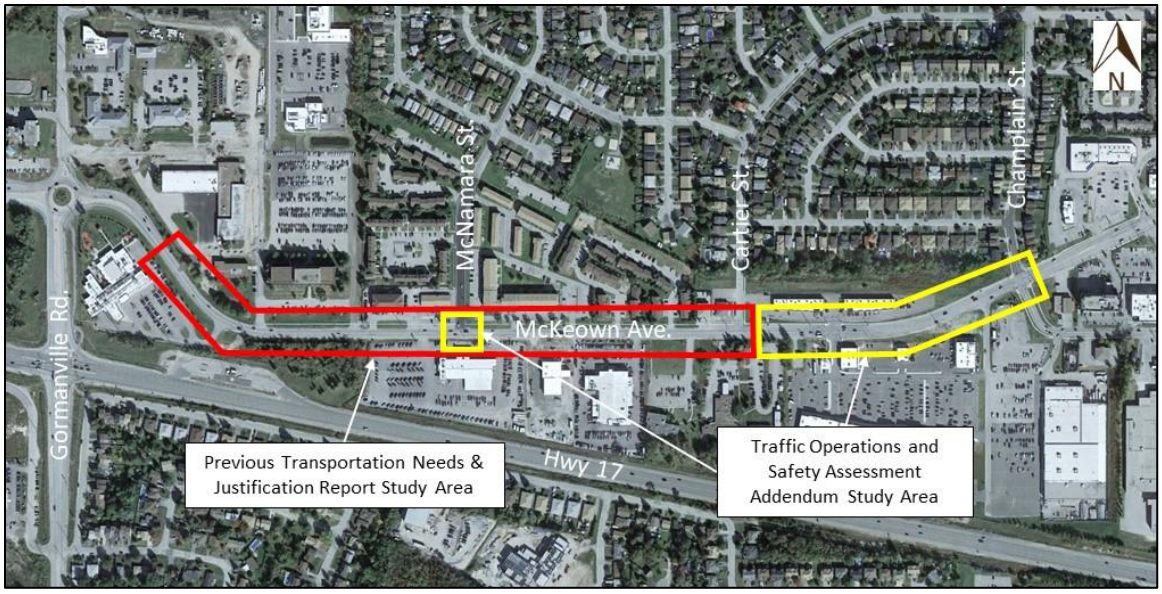


Figure 1.1 – Addendum Study Area

2.0 Intersection Safety Assessments

Safety Assessments were completed for the intersections of McKeown Avenue with both Cartier Street and Champlain Street. The assessments first included a review of historical collision data looking for trends which may require mitigation measures. Then, conflict studies were conducted at the intersections during peak hours to identify any safety concerns through observations of near misses or evasive maneuvers at the intersections. The following sections present the findings from these assessments.

2.1 Historical Collision Data Review

Historical collision data from 2018 to 2022 (5 years) for the intersection of McKeown Avenue and Champlain Street was provided by the City for review. The data included a summary of key characteristics of the reported collisions based on information recorded in Motor Vehicle Accident Reports (MVARs) as well as the corresponding accident reports themselves. Historical collision data for the intersection of McKeown Avenue and Cartier Street was extracted from the Trussler School Redevelopment TIS dated December 15th, 2021. The data reviewed as part of this study was from 2016 to 2018.

The data was reviewed to identify collision trends or patterns at the intersections that could be contributing to the collision history of each intersection. The raw collision data summary information as provided by the City can be found in Appendix A.

2.1.1. McKeown Avenue and Champlain Street

Overall, a total of thirty-three (33) collisions have been reported at the intersection of McKeown Avenue and Champlain Street over the five-years of historical data. As shown in **Figure 2.1**, 70% (23) of the total collisions recorded were classified as property damage only. 9% (3) were classified as non-fatal injury and the remaining 21% (7) were not given any classification. No fatal injury collisions were reported within the historical data provided.

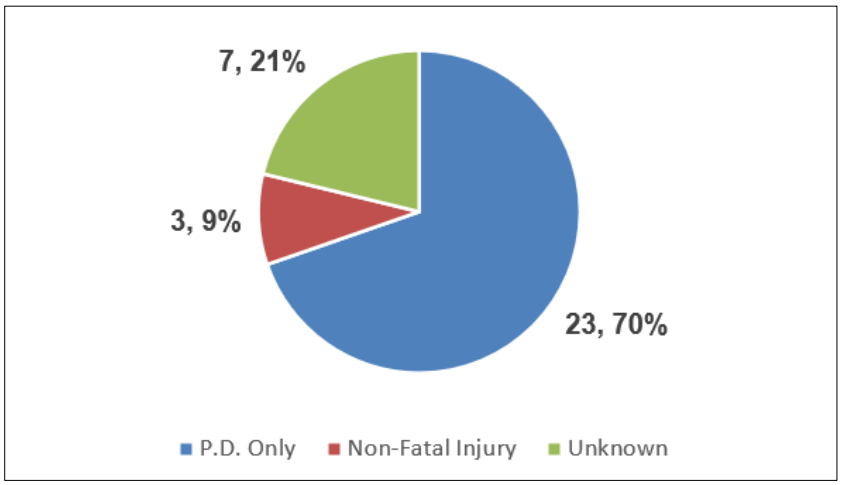


Figure 2.1 – Collisions by Classification

Figure 2.2 presents a breakdown of collisions at the intersection by impact type. The most prevalent collision type recorded was turning movement collisions, where a total of 16 were recorded over the 5 years of data, making up approximately 50% of the total collisions at the intersection. The second most prevalent collision type was rear end collisions, consisting of 8 recorded making up approximately 25% of total collisions. This was followed by 4 angle collisions (13%), 1 sideswipe (3%) and 3 SMV other (9%) collisions.

It should be noted that two of the SMV other collisions involved pedestrians and neither resulted in a fatality. The first collision involved a vehicle travelling southbound along Champlain Street and turning left onto McKeown Avenue. The driver failed to yield the right-of-way and struck the pedestrian. The second collision involved a vehicle travelling northbound on Champlain Street and turning right onto McKeown Avenue. The driver again failed to yield the right-of-way and struck the pedestrian causing a non-fatal injury. The third SMV other collision involved a single motorcyclist who lost control while progressing through the intersection travelling westbound along McKeown Avenue. The collision did not involve any other motorists or pedestrians and the extent of the motorcyclists' injuries are unknown.

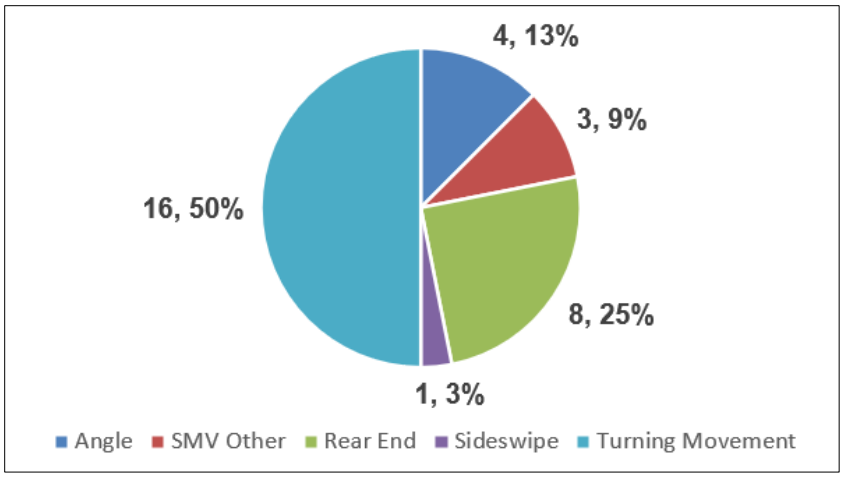
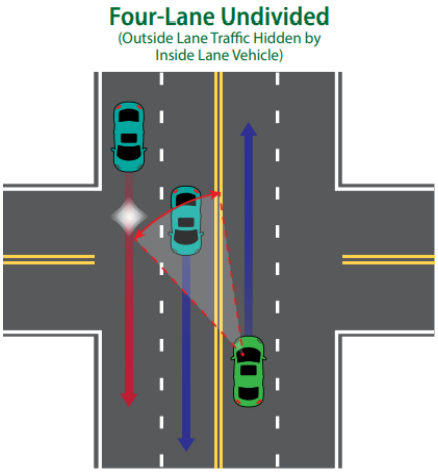


Figure 2.2 – Collisions by Impact Type

2.1.1.1. Review of Impact Type Collisions

As determined under the previous section, the most prevalent collision type occurring at the intersection of McKeown Avenue and Champlain Street were turning movement collisions.

Further investigation of these collision types within actual collision reports found that the majority of these collisions occurred when eastbound or westbound travelling drivers were trying to make left turns onto Champlain Street. In most cases, the drivers turning left had been struck by vehicles within the curb lane. This could be attributed to a driver's difficulty seeing past queued vehicles within the inside through lane of a four-lane roadway. Sightline issues like this are prevalent at intersections where dedicated offset left turn lanes are not provided.



Graphic Source: Road Diet Informational Guide, FHWA, November 2014.

Further investigation of rear end collisions found that the majority of these collisions occurred with vehicles travelling in the eastbound and westbound directions along McKeown Avenue hitting vehicles stopping at the intersection to turn left. Similarly, many of the sideswipe collisions involved drivers switching lanes to avoid drivers stopping to turn left or avoiding queues behind vehicles waiting to turn left at the intersection. Both issues could potentially be mitigated by the introduction of dedicated left turn lanes at the intersection.

According to information found on the Federal Highway Administration (FHWA) website, the introduction of dedicated left turn lanes at intersections can potentially reduce total collisions at by 28% to 48% and positive offset left turn lanes can reduce fatal and injury collisions by 36%[1].

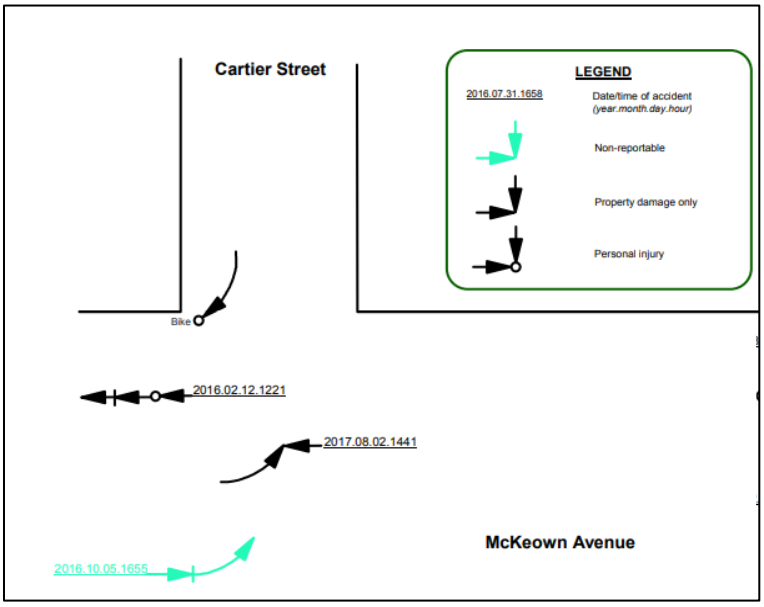
[1] https://highways.dot.gov/safety/proven-safety-countermeasures/dedicated-left-and-right-turn-lanes-intersections

2.1.2. McKeown Avenue and Cartier Street

As mentioned previously, historical collision data for the intersection of McKeown Avenue and Cartier Street was reviewed from the Trussler School Redevelopment TIS. Historical data reviewed as part of this study was from between 2016 and 2018 (2 years). There were a total of 4 collisions recorded as presented in **Figure 2.3** which was taken from Exhibit 3.2 of the report.

As presented in the figure, two of the four collisions resulted in personal injury with one of these collisions involving striking a cyclist. The remaining two collisions resulted in property damage only and no fatal injury collisions were recorded.

Based on the small amount of data reviewed, there does appear to be some issues involving turning movement collisions particularly in the eastbound direction. Similar to the Champlain Street intersection this may be attributed to the lack of a dedicated left turn lane at the intersection.



Source: Exhibit 3.2 – Trussler School Redevelopment TIS Report December 2021

Figure 2.3 – McKeown Ave. & Cartier St. Collision Summary 2016 – 2018

2.2 Conflict Review Study

The second part of the Safety Assessments for McKeown Avenue with Cartier Street and Champlain Street involved the completion of Traffic Conflict Studies at the intersections. The studies were conducted during peaks hours to observe interactions between drivers, pedestrians, and cyclists at the intersections. Near misses between the transportation modes or evasive actions were recorded and the findings are summarized in the following sections. The raw data collected during the conflict studies can be found in Appendix B.

2.2.1. Conflict Study Dates & Time Periods

Table 2.1 presents the dates and times that the conflict studies were undertaken at each intersection. Studies were conducted during the a.m., p.m. and Saturday Midday peak periods along with studies completed at night. The studies were conducted on Thursday February 16th, Friday February 17th, and Saturday February 18th, 2023.

Table 2.1 – Conflict Study Dates & Time Periods

Date	McKeown Ave. at Champlain St.	McKeown Ave. at Cartier St.
Thurs. Feb 16th, 2023	-	4:00 p.m. to 5:30 p.m. 6:00 p.m. to 7:00 p.m.
Fri. Feb 17th, 2023	8:00 a.m. to 9:30 a.m. 4:45 p.m. to 5:45 p.m. 6:45 p.m. to 7:45 p.m.	11:00 a.m. to 12:30 a.m.
Sat. Feb 18th, 2023	11:00 a.m. to 12:30 a.m.	1:00 p.m. to 2:30 p.m.

2.2.2. Conflict Study Methodology

According to the Institute of Transportation Engineers (ITE) Traffic Engineering Handbook, Seventh Edition, traffic conflicts are interactions between two or more vehicles or road users, where an action of braking or weaving is taken to avoid a collision. Conflict studies can be used to estimate the potential of various traffic collisions and help determine the safety problems and concerns at a given location.

RVA trained conflict observers were located at strategic locations at the intersections to observe driver behaviors and interactions and note when conflicts occurred. In particular, the following potential conflict events which occurred at the intersections by direction of travel were recorded as part of the study:

- Instances where hard braking occurred to avoid a potential rear end collision;
- Instances where a driver aggressively swerved to avoid a collision with another vehicle;
- Instances of near misses between vehicles during turning movements;
- Instances where sideswipe collisions almost occurred; and
- Instances where collisions involving pedestrians or cyclists occurred.

For the purpose of the study, the conflict types outlined above were examined for both the eastbound and westbound approaches at each intersection. For the north and south approaches, only the turning movement and pedestrian conflicts were examined.

2.2.3. McKeown Avenue & Champlain Street

Table 2.2 presents a breakdown of results from the conflict studies completed for the weekday a.m. and p.m., evening, and Saturday Midday time periods for the intersection of McKeown Avenue at Champlain Street.

Table 2.2 – McKeown Ave. at Champlain St. – Conflict Study Summary

Peak Period	Direction of Vehicle Travel	Potential Conflict or Maneuver Type				
		Rear End	Swerve	Turning Movement	Sideswipe	Pedestrian/ Cyclist
AM	Eastbound	0	0	0	0	0
	Westbound	0	4	0	0	0
	Southbound	-	-	2	-	0
	Northbound	-	-	1	-	2
PM	Eastbound	0	0	2	0	0
	Westbound	24	8	0	0	1
	Southbound	-	-	2	-	2
	Northbound	-	-	0	-	2
Weekday Evening	Eastbound	5	2	0	0	1
	Westbound	6	4	0	0	1
	Southbound	-	-	0	-	0
	Northbound	-	-	0	-	0
Saturday Midday	Eastbound	9	2	5	0	1
	Westbound	13	8	5	0	0
	Southbound	-	-	0	-	1
	Northbound	-	-	0	-	2

Based on the findings from the conflict study completed for McKeown Avenue and Champlain Street presented in **Table 2.2**, there are a significant number of potential rear end conflicts occurring with vehicles traveling in the westbound direction. A number of these potential conflicts were the result of drivers avoiding hitting vehicles stopped to turn left onto Champlain Street or queues behind vehicles waiting to turn left onto Champlain Street. Similarly, a number of swerve maneuvers were recorded occurring as a result of this same issue.

In addition, there were also several potential turning movement conflicts noted in the eastbound and westbound directions particularly during the Saturday Midday peak period. These results are consistent with historical collision data findings presented under Section 2.1.1 which indicate a trend of turning movement collisions at the intersection.

There were also several potential conflicts noted during the studies involving vehicles and pedestrians. In particular, vehicles travelling in the northbound and southbound directions had a greater number of conflicts recorded. These conflicts mainly involved vehicles turning left or right at the intersection and conflicting with pedestrians crossing McKeown Avenue. No particular turn movement saw a greater number of conflicts than the other.

As with the findings from the collision data review, the potential rear end, swerve and turning movement conflicts noted could also be remedied by the introduction of dedicated left turn lanes at the intersection.

2.2.4. McKeown Avenue at Cartier Street

Table 2.3 presents a breakdown of results from the conflict studies completed for the weekday a.m. and p.m., evening, and Saturday Midday time periods for the intersection of McKeown Avenue at Champlain Street.

Table 2.3 – McKeown Ave. at Cartier St. - Conflict Study Summary

Peak Period	Direction of Travel	Potential Conflict Type				
		Rear End	Swerve	Turning Movement	Sideswipe	Pedestrian/ Cyclist
AM	Eastbound	23	9	2	0	0
	Westbound	9	0	1	16	0
	Southbound	-	-	5	-	-
PM	Eastbound	29	30	0	3	3
	Westbound	2	1	0	8	0
	Southbound	-	-	4	-	-
Weekday Evening	Eastbound	12	1	1	0	0
	Westbound	1	0	0	1	0
	Southbound	-	-	0	-	0
Saturday Midday	Eastbound	20	4	4	0	0
	Westbound	1	1	1	5	0
	Southbound	-	-	10	-	-

Similar to the conflict findings at Champlain Street, there are a significant number of potential rear end conflicts occurring however with vehicles traveling in the eastbound direction as presented in **Table 2.3**. In addition, there were also a significant number of swerve maneuvers recorded in the eastbound direction. These issues can be attributed to a number of vehicles noted turning left onto Cartier Street. With the absence of a dedicated left turn lane at the intersection, these conflicts involved drivers avoiding hitting vehicles stopped to turn left onto Cartier Street or queues behind vehicles waiting to turn left onto Cartier Street. It should be noted that a dedicated eastbound left turn lane was also recommended in the Trussler School Redevelopment TIS at this intersection.

In the westbound direction there were several potential sideswipe collisions documented. This conflict type is a result of the westbound approach to the intersection in which the roadway reduces from two through lanes to one just beyond the intersection. Drivers within the curb lane are leaving their lane change decision to the last minute or performing it within or beyond the intersection and swerving into the inside lane creating potential sideswipe conflicts with through travelling drivers. This potential conflict issue will be mitigated with the proposed widening of McKeown Avenue from two to four lanes west of Cartier Street.

There were also a number of turning movement conflicts noted for all directions at the intersection. Several in particular were documented for drivers turning out of Cartier Street (southbound) onto McKeown Avenue. This can be attributed to the difficulty of drivers finding a suitable gap in traffic along the roadway to enter the flow of traffic safely. The introduction of traffic signal control at the McNamara Street intersection should help in alleviating this issue by stopping the flow of traffic along McKeown Avenue and creating more gaps.

Only three conflicts were noted with pedestrians at the intersection and occurred between vehicles traveling eastbound and turning left onto Cartier Street. These conflicts only occurred during the p.m. peak period survey undertaken and not during any other time periods.

2.3 McKeown Avenue & Cartier Plaza Intersection

The existing lane configurations of the eastbound and westbound approaches to McKeown Avenue and the Cartier Plaza are similar to the Champlain Street intersection as in no dedicated left turn lanes for these directions are provided and drivers turning left have to do so from the inside through lane.

Although not reviewed as part of this study Addendum, it can be reasonably assumed that a lot of the turning movement, rear end, sideswipe, and swerve maneuvers issues present at the Champlain Street intersection and found during the safety assessment would be present at the Cartier Plaza intersection. Therefore, the introduction of dedicated left turn lanes at this intersection would offer the same safety benefits.

2.4 Recommended Mitigation Measures

Based on the findings from the historical collision data review and conflict studies completed for the intersections of McKeown Avenue with Champlain Street and Cartier Street, the following geometric improvements are recommended to mitigate the intersection safety issues:

- Introduce dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at Champlain Street;
- Introduce dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at Cartier Plaza.

- Introduce a dedicated left turn lane for the westbound approach at the intersection of McKeown Avenue at Cartier Street.

3.0 Intersection Operations Analysis

3.1 Traffic Data

Existing intersection turning movement count (TMC) data for the Addendum study area intersections was provided by the City. **Table 3.1** presents the dates of the counts provided.

Table 3.1 – Traffic Volume Data Summary

Intersection	Count Date
McKeown Ave. at McNamara St.	Tuesday November 30th, 2021 Saturday November 27th, 2021
McKeown Ave. at Cartier St.	Tuesday October 25th, 2022 Saturday October 22nd, 2022
McKeown Ave. at Cartier Plaza	Tuesday November 23rd, 2021
McKeown Ave. at Champlain St.	Tuesday October 25th, 2022 Saturday October 22nd, 2022

It should be noted that no Saturday traffic data is available for the intersection of McKeown Avenue and the Cartier Plaza intersection.

3.1.1. Existing (2022) Traffic Volumes

In order to establish the existing (2022) traffic volumes for the study area intersections, a 1% growth rate was applied to the 2021 traffic data to grow it to 2022 traffic conditions and volumes were then adjusted where necessary to account for significant volume imbalances between intersections.

The resulting existing 2023 intersection volumes for the weekday a.m. and p.m. and Saturday Midday peak hours can be found in Appendix C. The raw count data is provided in Appendix D.

3.1.2. Future Total (2041) Traffic Volumes

The future total (2041) traffic volumes were established by first applying a 0.75% per annum growth rate to the existing 2022 traffic volumes as utilized in the July 12, 2022, Draft Transportation Needs & Justification Report. Background development trips for 789 Cartier Street and expansion of the Provincial Government (MTO) building were also added as in the Draft July 2022 report. In addition, site trips from the proposed Trussler School redevelopment were also added to the study intersections based on Exhibit 4.3 found in the December 2021 Traffic Impact Study completed by Tranplan Associates. All site trip figures can be found in Appendix E.

The resulting future total (2041) traffic volumes for the study intersection during the weekday a.m., p.m. and Saturday Midday peak hours can be found in Appendix F.

3.2 Existing (2022) Traffic Conditions

Intersection operational analysis was completed using the existing (2022) traffic volumes presented in Appendix C to establish base operational conditions. The analysis was completed using Synchro 11 analysis software which utilizes methodology from the Highway Capacity Manual (HCM) 2000 edition. Existing intersection lane configurations were also utilized as presented in

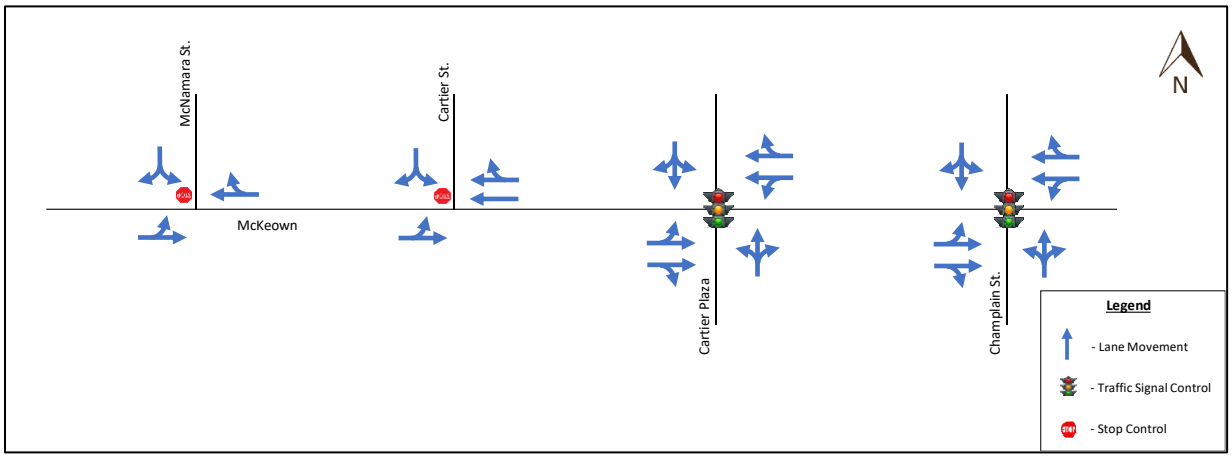


Figure 3.1.

Figure 3.1 – Existing Intersection Lane Configurations

Table 3.2 presents the results of the completed Synchro intersection operational analysis under existing (2022) traffic conditions for the study area intersections. Detailed Highway Capacity Manual (HCM) output reports from the capacity analysis are provided in Appendix G.

Table 3.2 – Existing (2022) Traffic Conditions - Intersection Operational Analysis

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95% tile Queue (m)	V/C	LOS	Delay (s)	95% tile Queue (m)	V/C	LOS	Delay (s)	95% tile Queue (m)	
McKeown Ave. at Champlain St. *(Signalized)*	EBLTTR	0.12	A	5	10	0.32	A	5	27	0.31	A	6	21	-
	WBLTTR	0.23	A	5	21	0.34	A	5	25	0.48	A	6	27	-
	NBLTR	0.17	C	20	12	0.51	C	24	26	0.41	C	22	24	-
	SBLTR	0.54	C	24	31	0.55	C	25	26	0.44	C	22	20	-
	Overall	**0.33**	**A**	**9**	**-**	**0.41**	**A**	**8**	**-**	**0.42**	**A**	**9**	**-**	**-**
	EBLTTR	0.12	A	2	9	0.34	A	6	30	-	-	-	-	-

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	
McKeown Ave. at Cartier Plaza *(Signalized)*	WBLTTR	0.16	A	2	13	0.24	A	5	19					-
	NBLTR	0.01	C	28	0	0.47	C	23	27					-
	SBLTR	0.06	C	29	3	0.15	C	20	11					-
	Overall	**0.17**	**A**	**3**	**-**	**0.40**	**A**	**8**	**-**	-	-	-	-	-
McKeown Ave. at Cartier St. *(Unsignalized)*	EBLT	0.03	A	1	1	0.07	A	2	2	0.04	A	1	1	-
	WBT	0.15	A	0	0	0.17	A	0	0	0.15	A	0	0	-
	WBTR	0.10	A	0	0	0.11	A	0	0	0.11	A	0	0	-
	SBLR	0.20	B	13	6	0.21	C	18	6	0.23	C	18	7	-
	Overall	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	-
McKeown Ave. at McNamara St. *(Unsignalized)*	EBLT	0.04	A	1	1	0.10	A	2	3	0.04	A	1	1	-
	WBRT	0.26	A	0	0	0.29	A	0	0	0.26	A	0	0	-
	SBLR	0.25	B	15	8	0.28	C	22	9	0.25	C	17	8	-
	Overall	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**2**	**-**	-

As presented in **Table 3.2** above, the intersections within the study area under existing (2022) traffic conditions operate well, with v/c ratios not exceeding 0.55, and individual movements operating at LOS "C" or better with ample reserve capacity and no queuing concerns.

3.3 Future Total (2041) Do-nothing Traffic Conditions

Table 3.3 presents the results of the completed Synchro intersection operational analysis under future total (2041) traffic conditions, with the intersection operating as it does currently. for the study area intersections. Detailed Highway Capacity Manual (HCM) output reports from the capacity analysis are provided in Appendix H.

Table 3.3 – Future Total (2041) Do-Nothing Intersection Operational Analysis

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	
McKeown Ave. at Champlain St. *(Signalized)*	EBLTTR	0.16	A	6	15	0.43	A	7	42	0.38	A	6	33	-
	WBLTTR	0.32	A	6	31	0.48	A	7	40	0.61	A	8	49	-
	NBLTR	0.18	B	19	14	0.45	C	21	29	0.47	C	21	29	-
	SBLTR	0.61	C	24	38	0.57	C	23	35	0.49	C	21	28	-

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	
	Overall	**0.42**	**A**	**10**	**-**	**0.54**	**B**	**10**	**-**	**0.62**	**A**	**10**	**-**	**-**
McKeown Ave. at Cartier Plaza *(Signalized)*	EBLTTR	0.14	A	2	12	0.42	A	7	42	-	-	-	-	-
	WBLTTR	0.20	A	2	17	0.30	A	6	26					
	NBLTR	0.01	C	28	0	0.53	C	23	32					
	SBLTR	0.05	C	28	3	0.16	B	20	12					
	Overall	**0.21**	**A**	**3**	**-**	**0.48**	**A**	**9**	**-**	-	-	-	-	-
McKeown Ave. at Cartier St. *(Unsignalized)*	EBLT	0.05	A	1	1	0.08	A	2	2	0.05	A	1	1	-
	WBT	0.19	A	0	0	0.20	A	0	0	0.19	A	0	0	-
	WBRT	0.12	A	0	0	0.13	A	0	0	0.14	A	0	0	-
	SBLR	0.29	C	16	9	0.47	D	29	19	0.37	C	25	13	-
	Overall	**-**	**-**	**3**	**-**	**-**	**-**	**4**	**-**	**-**	**-**	**3**	**-**	-
McKeown Ave. at McNamara St. *(Unsignalized)*	EBLT	0.05	A	2	1	0.12	A	3	3	0.05	A	1	1	-
	WBRT	0.33	A	0	0	0.34	A	0	0	0.30	A	0	0	-
	SBLR	0.35	C	19	12	0.45	D	34	17	0.33	C	20	11	-
	Overall	**-**	**-**	**3.0**	**-**	**-**	**-**	**4**	**-**	**-**	**-**	**3**	**-**	-

As presented in **Table 3.3** above, the intersections within the study area are forecast to operate satisfactory under future total (2041) do-nothing traffic conditions. V/c ratios are forecast to not exceed 0.61, and individual movements would operate at LOS "D" or better with ample reserve capacity and no queuing concerns.

3.4 Future Total (2041) With Improvements Traffic Conditions

Intersection operational analysis was again completed under future total (2041) traffic conditions however with the intersection geometric improvements recommended under Section 1 and Section 2.3 along with the proposed widening of McKeown Avenue from 2 to 4 lanes. In summary the proposed roadway and intersection improvements were as follows:

- Dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at Champlain Street;
- Dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at the Cartier Plaza;
- Introduction of traffic signal control at the intersection of McKeown Avenue at McNamara Street including:
  - Introduction of a dedicated eastbound left turn lane.

- Widening of McKeown Avenue 2 lanes (one lane in each direction) to 4 lanes (two lanes in each direction.

The resulting lane configurations utilized for the intersection operational analysis based on the improvements noted above are presented in

Figure 3.2.

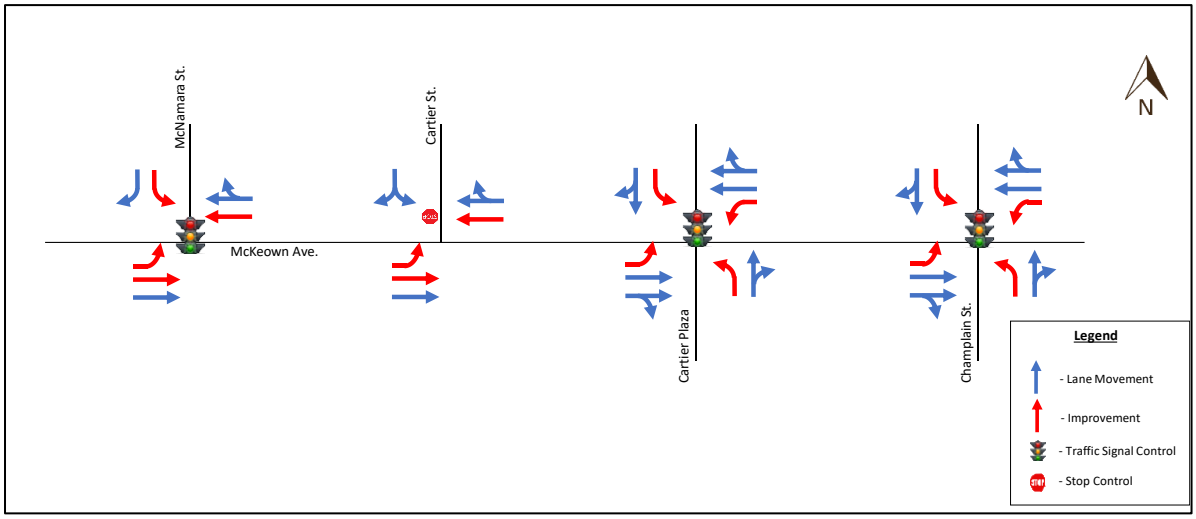


Figure 3.2 – Proposed Intersection Lane Configurations

The results of the intersection operational analysis completed with the proposed improvements under future total (2041) traffic conditions are presented in **Table 3.4**. Detailed Highway Capacity Manual (HCM) output reports from the capacity analysis are provided in Appendix I.

Table 3.4 – Future Total (2041) With Improvements Intersection Operational Analysis

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95% tile Queue (m)	V/C	LOS	Delay (s)	95% tile Queue (m)	V/C	LOS	Delay (s)	95% tile Queue (m)	
McKeown Ave. at Champlain St. *(Signalized)*	EBL	0.01	A	5	1	0.03	A	7	4	0.02	A	7	3	-
	EBTTR	0.15	A	5	18	0.42	A	9	50	0.39	A	9	43	-
	WBL	0.03	A	3	3	0.23	A	4	9	0.34	A	4	13	-
	WBTTR	0.25	A	4	25	0.26	A	4	22	0.27	A	4	24	-
	NBL	0.21	C	24	12	0.36	C	26	17	0.42	C	27	19	-
	NBLTR	0.06	C	23	8	0.23	C	25	17	0.16	C	25	14	-
	SBL	0.57	C	29	29	0.55	C	29	24	0.48	C	28	21	-

Intersection *(Traffic Control)*	Movement	Peak Hour												Existing Storage Length (m)
		Weekday AM				Weekday PM				Saturday Midday				
		V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	V/C	LOS	Delay (s)	95%^{tile} Queue (m)	
	SBLTR	0.28	C	24	19	0.30	C	25	19	0.20	C	25	14	-
	Overall	**0.33**	**A**	**9**	**-**	**0.43**	**B**	**10**	**-**	**0.40**	**A**	**10**	**-**	**-**
McKeown Ave. at Cartier Plaza *(Signalized)*	EBL	0.00	A	2	1	0.02	A	5	3	-	-	-	-	-
	EBTTR	0.14	A	3	16	0.39	A	7	45					-
	WBL	0.02	A	1	1	0.13	A	4	5					-
	WBTTR	0.19	A	2	16	0.20	A	4	19					-
	NBL	0.19	C	31	5	0.54	C	28	25					-
	NBTR	0.01	C	29	0	0.06	C	23	10					-
	SBL	0.04	C	29	2	0.19	C	24	11					-
	SBTR	0.02	C	29	2	0.04	C	23	6					-
	Overall	**0.20**	**A**	**3**	**-**	**0.42**	**A**	**9**	**-**	-	-	-	-	-
McKeown Ave. at Cartier St. *(Unsignalized)*	EBL	0.05	A	9	1	0.08	A	9	2	0.05	A	9	1	-
	EBTT	0.10	A	0	0	0.23	A	0	0	0.16	A	0	0	-
	WBT	0.19	A	0	0	0.20	A	0	0	0.19	A	0	0	-
	WBTR	0.12	A	0	0	0.13	A	0	0	0.14	A	0	0	-
	SBLR	0.25	B	14	8	0.20	B	14	5	0.28	C	18	9	-
	Overall	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**
McKeown Ave. at McNamara St. *(Signalized)*	EBLT	0.28	B	14	11	0.47	B	13	20	0.23	B	14	10	-
	EBTT	0.39	B	14	22	0.64	B	14	44	0.55	B	15	30	-
	WBTTR	0.59	B	16	33	0.45	B	12	29	0.54	B	15	29	-
	SBL	0.04	A	5	6	0.04	A	7	6	0.06	A	6	7	-
	SBR	0.00	C	23	24	0.00	C	24	20	0.00	C	23	19	
	Overall	**0.23**	**B**	**15**	**-**	**0.30**	**B**	**13**	**-**	**0.22**	**B**	**15**	**-**	**-**

As presented in **Table 3.4** above, the intersections within the study area are forecast to provide ample reserve capacity for all movements, with v/c ratios not exceeding 0.64, delays not exceeding 30 seconds and no queuing concerns for all movements.

The enhancements to the intersections of McKeown Avenue at Champlain Street and McKeown Avenue at McNamara Street operate at an LOS “C” or better, rather than operating at an LOS “D” or better under existing operations. Therefore, it is anticipated that the study area road network can accommodate the demands resulting from background corridor growth through the ultimate 2041 horizon year.

4.0 Left Turn Storage Lane Requirements

Table 4.1 presents the required storage lengths for the left turn lanes recommended along McKeown Avenue with its intersections at McNamara Street, Cartier Street, Cartier Plaza and Champlain Street. The storage lengths were determined based on the 95th percentile

queue lengths presented in **Table 3.4** under the future total (2041) with improvements traffic conditions.

Table 4.1 – Left Turn Storage Lane Requirements

Intersection	Movement	Required Storage Length
McKeown Ave. at McNamara St.	Eastbound Left	20 metres
McKeown Ave. at Cartier St.	Eastbound Left	15 metres
McKeown Ave. at Cartier Plaza	Eastbound Left Westbound Left	15 metres 15 metres
McKeown Ave. at Champlain St.	Eastbound Left Westbound Left	15 metres 20 metres

5.0 Findings & Recommendations

The conclusions and recommendations from the completed Transportation Needs & Justification Study Addendum which included a Safety Review and additional intersection operational analysis are summarized in the following sections.

5.1 Findings

Historical Collision Data Review Findings

- A total of 33 collisions were recorded at the intersection of McKeown Avenue and Champlain Street between 2018 and 2022 (7 years).
  - 70% (23) of the total collisions were classified as property damage only. 9% (3) were classified as non-fatal injury and the remaining 21% (7) were not given any classification. No fatal injury collisions were recorded at the intersection;
  - 50% (16) of the total collisions were recorded as turning movement collisions. The remaining 50% of collision were broken down by rear ends (25% or 8), angle collisions (13% or 4), sideswipe (3% or 1) and SMV other with (9% or 3);
  - Two of the SMV other collisions recorded involved pedestrians. Both involved turning vehicles failing to yield the right of way to the pedestrian within the cross walk and striking them. The third involved a single motorcyclist within the intersection.
  - Further investigation into turning movement collisions found the majority occurred when eastbound or westbound travelling drivers were trying to make left turns onto Champlain Street. In most cases, the drivers turning left had been struck by vehicles

within the curb lane and could be potentially be attributed to difficulty seeing past queued vehicles within the inside through lane.

- A total of 4 collisions were recorded at the intersection of McKeown Avenue and Cartier Street between 201 and 2018 (2 years) as presented in the Trussler School redevelopment TIS.
  - Two of the four collisions resulted in personal injury with one of these collisions involving striking a cyclist. The remaining two collisions resulted in property damage only and no fatal injury collisions were recorded;
  - There does appear to be some issues involving turning movement collisions particularly in the eastbound direction. Similar to the Champlain Street intersection this may be attributed to the lack of a dedicated left turn lane at the intersection.

Conflict Review Study Findings – McKeown Ave. & Champlain St.

- A significant number of potential rear end conflicts were recorded occurring with vehicles traveling in the westbound direction. These conflicts were the result of drivers avoiding hitting vehicles stopped to turn left onto Champlain Street or queues behind vehicles waiting to turn left onto Champlain Street;
- A number of swerve maneuvers were recorded in the westbound direction also a result of vehicles avoiding left turn vehicles or queues due to stopped left turn vehicles;
- Several potential turning movement conflicts were noted in the eastbound and westbound directions particularly during the Saturday Midday peak period. These results are consistent with historical collision data findings at the intersection which indicate a trend of turning movement collisions at the intersection.
- Several potential conflicts noted during the studies involving vehicles and pedestrians. In particular, vehicles travelling in the northbound and southbound directions had a greater number of conflicts recorded. These conflicts mainly involved vehicles turning left or right at the intersection and conflicting with pedestrians crossing McKeown Avenue. No particular turn movement saw a greater number of conflicts than the other.

Conflict Review Study Findings – McKeown Ave. & Cartier St.

- A number of potential rear end conflicts and swerve maneuvers were recorded occurring with vehicles traveling in the eastbound direction. These issues can be attributed to a number of vehicles noted turning left onto Cartier Street. With the absence of a dedicated left turn lane at the intersection, these conflicts involved drivers avoiding hitting vehicles stopped to turn left onto Cartier Street or queues behind vehicles waiting to turn left onto Cartier Street.

- In the westbound direction several potential sideswipe collisions were documented. This conflict type is a result of the westbound approach to the intersection in which the roadway reduces from two through lanes to one just beyond the intersection.
- A number of turning movement conflicts were noted for all directions at the intersection. Several in particular were documented for drivers turning out of Cartier Street (southbound) onto McKeown Avenue. This can be attributed to the difficulty of drivers finding a suitable gap in traffic along the roadway to enter the flow of traffic safely.
- Only three conflicts were noted with pedestrians at the intersection and occurred between vehicles traveling eastbound and turning left onto Cartier Street. These conflicts only occurred during the p.m. peak period survey undertaken and not during any other time periods.

5.2 Recommendations

Based on the findings from the completed Safety Assessment, the following intersection and roadway improvements are recommended:

- Dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at Champlain Street;
- Dedicated left turn lanes for both the eastbound and westbound approaches at the intersection of McKeown Avenue at the Cartier Plaza;
- Introduction of traffic signal control at the intersection of McKeown Avenue at McNamara Street including:
  - Introduction of a dedicated eastbound left turn lane.
- Widening of McKeown Avenue 2 lanes (one lane in each direction) to 4 lanes (two lanes in each direction.

<u>Intersection Operational Analysis – With Recommended Improvements</u>

With the introduction of the recommended intersection and roadway improvements, all study area intersection are forecast to operate satisfactorily under future total (2041) traffic conditions. There are no critical movements forecast and levels of service are forecast to be “C” or better with no significant delay or queuing issues.

APPENDIX A

HISTORICAL COLLISION DATA

DriverNumber	Local Incident Number	Collision Date	Collision Location	Impact Location	Initial Impact Type	Driver Action	Driver Condition	Vehicle Manoeuver	Road Surface Condition (R1)	Environment Condition (1)	Sequence of Events 1	Classification of Collision
D1	NB22021444	08-23-2022 01:46 PM	02 intersection related	03 left turn lane	07 single motor vehicle(other)	08 failed to yield right-of-way	01 normal	05 turning right	01 dry	01 clear	03 pedestrian	03 P.D. only
D1	NB22021444	08-23-2022 01:46 PM	02 intersection related	03 left turn lane	07 single motor vehicle(other)	08 failed to yield right-of-way	01 normal	05 turning right	01 dry	01 clear	03 pedestrian	03 P.D. only
D1	NB22006314	03-17-2022 11:10 AM	02 intersection related	01 within intersection	02 angle	07 disobeyed traffic control	08 inattentive	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D2	NB22006314	03-17-2022 11:10 AM	02 intersection related	01 within intersection	02 angle	01 driving properly	01 normal	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D1	NB22004043	02-18-2022 04:57 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	01 normal	04 turning left	06 ice	01 clear	01 other motor vehicle	03 P.D. only
D2	NB22004043	02-18-2022 04:57 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	06 ice	01 clear	01 other motor vehicle	03 P.D. only
D3	NB22004043	02-18-2022 04:57 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	10 stopped	06 ice	01 clear	01 other motor vehicle	03 P.D. only
D1	NB21035133	12-22-2021 12:00 PM	02 intersection related	03 left turn lane	03 rear end	99 other	99 other	02 slowing/stopping	03 loose snow	01 clear	01 other motor vehicle	03 P.D. only
D2	NB21035133	12-22-2021 12:00 PM	02 intersection related	03 left turn lane	03 rear end	01 driving properly	01 normal	10 stopped	03 loose snow	01 clear	01 other motor vehicle	03 P.D. only
D1	NB21032352	11-22-2021 03:25 PM	03 at intersection	01 within intersection	02 angle	08 failed to yield right-of-way	08 inattentive	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D2	NB21032352	11-22-2021 03:25 PM	03 at intersection	01 within intersection	02 angle	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D1	NB21021637	08-03-2021 03:20 PM	03 at intersection	02 thru lane	03 rear end	99 other	08 inattentive	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D2	NB21021637	08-03-2021 03:20 PM	03 at intersection	02 thru lane	03 rear end	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20026685	10-07-2020 10:15 AM	03 at intersection	01 within intersection	05 turning movement	08 failed to yield right-of-way	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20026685	10-07-2020 10:15 AM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D1	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D2	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D2	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D2	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D2	NB20024922	09-19-2020 01:27 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D1	NB20016124	06-19-2020 06:25 PM	02 intersection related	01 within intersection	05 turning movement	07 disobeyed traffic control	08 inattentive	01 going ahead	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D1	NB20016124	06-19-2020 06:25 PM	02 intersection related	01 within intersection	05 turning movement	07 disobeyed traffic control	08 inattentive	01 going ahead	01 dry	01 clear	01 other motor vehicle	02 non-fatal injury
D1	NB20006378	03-13-2020 11:08 AM	03 at intersection	03 left turn lane	03 rear end	12 improper lane change	01 normal	07 changing lanes	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20006378	03-13-2020 11:08 AM	03 at intersection	03 left turn lane	03 rear end	12 improper lane change	01 normal	07 changing lanes	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20006378	03-13-2020 11:08 AM	03 at intersection	03 left turn lane	03 rear end	01 driving properly	01 normal	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20006378	03-13-2020 11:08 AM	03 at intersection	03 left turn lane	03 rear end	01 driving properly	01 normal	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20002728	01-31-2020 10:48 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20002728	01-31-2020 10:48 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20002728	01-31-2020 10:48 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20002728	01-31-2020 10:48 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	03 P.D. only
D1	NB20003554	02-10-2020 11:26 AM	02 intersection related	02 thru lane	04 sideswipe	01 driving properly	00 unknown	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D2	NB20003554	02-10-2020 11:26 AM	02 intersection related	02 thru lane	04 sideswipe	01 driving properly	01 normal	01 going ahead	02 wet	01 clear	01 other motor vehicle	03 P.D. only
D1	NB19023688	09-13-2019 03:53 PM	02 intersection related	01 within intersection	05 turning movement	08 failed to yield right-of-way	01 normal	04 turning left	02 wet	02 rain	01 other motor vehicle	03 P.D. only
D1	NB19023688	09-13-2019 03:53 PM	02 intersection related	01 within intersection	05 turning movement	08 failed to yield right-of-way	01 normal	04 turning left	02 wet	02 rain	01 other motor vehicle	03 P.D. only
D2	NB19023688	09-13-2019 03:53 PM	02 intersection related	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	02 wet	02 rain	01 other motor vehicle	03 P.D. only
D2	NB19023688	09-13-2019 03:53 PM	02 intersection related	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	02 wet	02 rain	01 other motor vehicle	03 P.D. only
D1	NB19003646	02-14-2019 08:48 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	08 inattentive	05 turning right	03 loose snow	05 drifting snow	01 other motor vehicle	03 P.D. only
D1	NB19003646	02-14-2019 08:48 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	08 inattentive	05 turning right	03 loose snow	05 drifting snow	01 other motor vehicle	03 P.D. only
D2	NB19003646	02-14-2019 08:48 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	08 inattentive	01 going ahead	03 loose snow	05 drifting snow	01 other motor vehicle	03 P.D. only
D1	NB18020106	08-24-2018 11:30 AM	03 at intersection	01 within intersection	07 single motor vehicle(other)	08 failed to yield right-of-way	01 normal	01 going ahead	01 dry	01 clear	03 pedestrian	02 non-fatal injury
D1	NB18020106	08-24-2018 11:30 AM	03 at intersection	01 within intersection	07 single motor vehicle(other)	08 failed to yield right-of-way	01 normal	01 going ahead	01 dry	01 clear	03 pedestrian	02 non-fatal injury

DriverNumber	Local Incident Number	Collision Date	Collision Location	Impact Location	Initial Impact Type	Driver Action	Driver Condition	Vehicle Manoeuver	Road Surface Condition (R1)	Environment Condition (1)	Sequence of Events 1	PD?
D1	NB22023456	09-09-2022 05:00 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	False
D2	NB22014840	06-17-2022 11:50 AM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	08 inattentive	05 turning right	01 dry	01 clear	01 other motor vehicle	True
D1	NB21034993	12-20-2021 07:00 PM	02 intersection related	02 thru lane	05 turning movement	01 driving properly	01 normal	05 turning right	04 slush	03 snow	01 other motor vehicle	True
D2	NB21034993	12-20-2021 07:00 PM	02 intersection related	02 thru lane	05 turning movement	01 driving properly	01 normal	10 stopped	04 slush	03 snow	01 other motor vehicle	True
D1	NB21032339	11-22-2021 01:10 PM	03 at intersection	01 within intersection	05 turning movement	08 failed to yield right-of-way	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	True
D2	NB21032339	11-22-2021 01:10 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	True
D1	NB21027329	09-30-2021 12:00 PM	03 at intersection	01 within intersection	05 turning movement	07 disobeyed traffic control	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	True
D2	NB21027329	09-30-2021 11:30 AM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	True
D1	NB21021491	08-05-2021 11:45 AM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	True
D2	NB21021491	08-05-2021 11:45 AM	03 at intersection	01 within intersection	05 turning movement	08 failed to yield right-of-way	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	True
D1	NB20016399	06-22-2020 05:15 PM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	True
D2	NB20016399	06-22-2020 05:15 PM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	08 inattentive	04 turning left	01 dry	01 clear	01 other motor vehicle	True
D1	RM19000465	04-23-2019 10:55 AM	03 at intersection	01 within intersection	05 turning movement	06 improper turn	01 normal	04 turning left	01 dry	01 clear	01 other motor vehicle	True
D2	RM19000465	04-23-2019 10:55 AM	03 at intersection	01 within intersection	05 turning movement	01 driving properly	01 normal	01 going ahead	01 dry	01 clear	01 other motor vehicle	True

Local Incident Number	Collision Date	Collision Location	Driver Action	Driver Condition	Environment Condition (1)	Impact Location	Initial Impact Type	Road Surface Condition (R1)	Road Surface Condition (R2)	Sequence of Events 1
NB23002421	01-26-2023 11:02 AM	02 intersection related	08 failed to yield right-of-way	08 inattentive	03 snow	01 within intersection	05 turning movement	02 wet	02 wet	01 other motor vehicle
NB23002421	01-26-2023 11:02 AM	02 intersection related	01 driving properly	01 normal	03 snow	01 within intersection	05 turning movement	02 wet	02 wet	01 other motor vehicle
NB22017263	07-13-2022 09:30 PM	03 at intersection	10 lost control	01 normal	01 clear	01 within intersection	07 single motor vehicle(other)	01 dry	01 dry	98 other (other events)

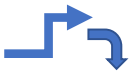
Local Incident Number	Collision Date	Collision Location	Driver Action	Driver Condition	Environment Condition (1	Impact Location	Initial Impact Type	Road Surface Condition (F	Road Surface Condition (F	Sequence of Events 1
NB22016995	07-09-2022 08:00 PM	02 intersection related	01 driving properly	01 normal	02 rain	02 thru lane	03 rear end	02 wet	02 wet	01 other motor vehicle
NB22016995	07-09-2022 08:00 PM	02 intersection related	02 following too close	01 normal	02 rain	02 thru lane	03 rear end	02 wet	02 wet	01 other motor vehicle
NB20024450	09-07-2020 08:00 PM	02 intersection related	01 driving properly	01 normal	01 clear	02 thru lane	03 rear end	01 dry	01 dry	01 other motor vehicle

APPENDIX B

CONFLICT STUDY SUMMARY

McKeown Avenue at Cartier Street

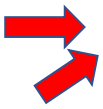
Time: 4:00 P.M to 5:30 P.M. ***Date: Februrary 16, 2023***

	Westbound/Southbound Right				
Time					
4:00 P.M - 4:15 P.M.			**1**		**3**
4:16 P.M - 4:30 P.M.					**1**
4:31 P.M - 4:45 P.M.				**1**	**1**
4:46 P.M - 5:00 P.M.		**1**			**2**
5:01 P.M - 5:15 P.M.					**1**
5:16 P.M - 5:30 P.M.	**1**			**1**	

NOTES:

McKeown Avenue at Cartier Street

Time: 6:00 P.M to 7:00 P.M. ***Date: Februrary 16, 2023***

	Westbound/Southbound Right				
Time					
6:00 P.M - 6:15 P.M.					
6:16 P.M - 6:30 P.M.					**1**
6:31 P.M - 6:45 P.M.					
6:46 P.M - 7:00 P.M.		**1**			

NOTES:

McKeown Avenue at Cartier Street

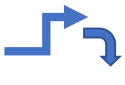
Time: 11:00 A.M to 12:30 P.M. ***Date: Februrary 17, 2023***

	Westbound/Southbound Right					
Time						
11:00 A.M - 11:15 A.M.						**2**
11:16 A.M - 11:30 A.M.						**1**
11:31 A.M - 11:45 A.M.		**2**		**2**		**4**
11:46 A.M - 12:00 P.M.	**1**	**1**				**1**
12:01 P.M - 12:15 P.M.	**2**	**1**			**1**	**1**
12:16 P.M - 12:30 P.M.	**2**					**7**

NOTES: **Three (3) Vehicles using the sidewalk ramp at the northwest corner of McKeown Avenue at Cartier Street to enter/exit coffee shop parking lot.**

McKeown Avenue at Cartier Street

Time: 1:00 P.M to 2:30 P.M. ***Date: Februrary 18, 2023***

	Westbound/Southbound Right					
Time						
1:00 P.M - 1:15 P.M.		**1**				
1:16 P.M - 1:30 P.M.				**1**		
1:31 P.M - 1:45 P.M.					**1**	**2**
1:46 P.M - 2:00 P.M.						**2**
2:01 P.M - 2:15 P.M.				**1**		
2:16 P.M - 2:30 P.M.			**1**			

NOTES: **Four (4) Vehicles using the sidewalk ramp at the northwest corner of McKeown Avenue at Cartier Street to enter/exit coffee shop parking lot.**

McKeown Avenue at Cartier Street

Time: 4:00 P.M to 5:30 P.M. ***Date: Februrary 16, 2023***

	Eastbound/Southbound Left					
Time						
4:00 P.M - 4:15 P.M.	**2**		**5**			
4:16 P.M - 4:30 P.M.	**4**	**1**	**4**		**2**	**3**
4:31 P.M - 4:45 P.M.	**4**	**1**	**4**	**2**		
4:46 P.M - 5:00 P.M.	**7**		**7**		**1**	
5:01 P.M - 5:15 P.M.	**3**	**1**	**5**			
5:16 P.M - 5:30 P.M.	**4**	**2**	**5**			

NOTES: Vehicle making left onto Cartier Street using middle of the roadway as left-turn lane. Vehicles continuing EB squeeze by stiring around. WB traffic making left into driveways near conflict and drivers from driveway pulling out making left WB and right EB.

McKeown Avenue at Cartier Street

Time: 6:00 P.M to 7:00 P.M. ***Date: Februrary 16, 2023***

	Eastbound/Southbound Left					
Time						
6:00 P.M - 6:15 P.M.						
6:16 P.M - 6:30 P.M.		**2**				
6:31 P.M - 6:45 P.M.	**4**	**3**	**1**		**1**	
6:46 P.M - 7:00 P.M.	**3**					

NOTES: Snowy and dark. Vehicles driving slower and not much volumes. Vehicles were waiting behind vehicles turning left instead of squeezing by. No pedestrian lighting on north side of the road - very difficult to see peds.

McKeown Avenue at Cartier Street

Time: 11:00 A.M to 12:30 P.M. ***Date: Februrary 17, 2023***

	Eastbound/Southbound Left						
Time						 Making Left into Coffee Shop	 Making Left from Coffee Shop
11:00 A.M - 11:15 A.M.		**3**					**1**
11:16 A.M - 11:30 A.M.	**1**	**3**	**1**				
11:31 A.M - 11:45 A.M.	**1**	**1**	**1**		**1**		
11:46 A.M - 12:00 P.M.	**2**	**3**	**2**				
12:01 P.M - 12:15 P.M.	**2**		**3**	**1**	**1**	**1**	
12:16 P.M - 12:30 P.M.	**7**		**2**				

NOTES: Sunny and clear skies. Road covered in packed snow. Sidewalks covered in loose snow. Fewer vehicles squeezing past vehicles turning left onto Cartier due to snow piled at curb. Northern sidewalk plowed at 11:57 A.M. Difficult for pedestrians crossing north/south.

McKeown Avenue at Cartier Street

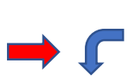
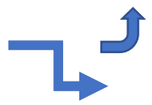
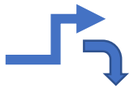
Time: 1:00 P.M to 2:30 P.M. ***Date: Februrary 18, 2023***

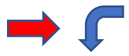
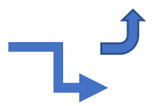
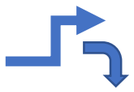
	Eastbound/Southbound Left						
Time							
1:00 P.M - 1:15 P.M.	**2**	**3**				**2**	**1**
1:16 P.M - 1:30 P.M.	**2**	**1**	**2**	**1**	**1**	**2**	
1:31 P.M - 1:45 P.M.	**2**				**1**		
1:46 P.M - 2:00 P.M.	**1**	**4**		**1**			**1**
2:01 P.M - 2:15 P.M.	**1**	**2**					
2:16 P.M - 2:30 P.M.	**1**	**1**					

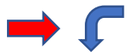
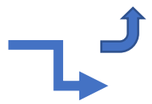
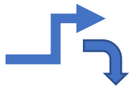
NOTES: Overcast, loose snow/sand - 50% of lanes.

McKeown Avenue at Champlain Street

Time: 8:00 A.M. to 9:30 A.M. **Date: February 17, 2023**

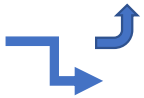
	Westbound/Southbound						
Time							
8:00 A.M. to 8:15 A.M.					**1**		
8:16 A.M. to 8:30 A.M.							
							
8:00 A.M. to 8:15 A.M.							
8:16 A.M. to 8:30 A.M.							

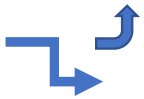
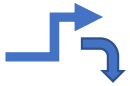
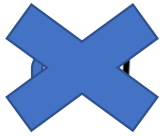
Time							
8:31 A.M. to 8:45 A.M.							
8:46 A.M. to 9:00 A.M.					1		
							
8:31 A.M. to 8:45 A.M.			1				
8:46 A.M. to 9:00 A.M.			1				

Time							
9:01 A.M. to 9:15 A.M.							1
9:16 A.M. to 9:30 A.M.							1
							
9:01 A.M. to 9:15 A.M.							
9:16 A.M. to 9:30 A.M.							

NOTES: -25 degrees celcius. Lots of snow on the roadway. Vehicle volumes low. One (1) car ran red.

McKeown Avenue at Champlain Street
Time: 4:45 P.M. to 5:45 P.M. **Date: February 17, 2023**

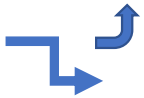
	Westbound/Southbound						
Time							
4:45 P.M. to 5:00 P.M.			**3**	**1**	**1**	**1**	
5:01 P.M. to 5:15 P.M.			**4**	**4**	**3**		
							
4:45 P.M. to 5:00 P.M.			**1**			**2**	

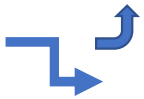
5:01 P.M. to 5:15 P.M.			1				
Time							
5:16 P.M. to 5:30 P.M.	2		1	5		1	1
5:31 P.M. to 5:45 P.M.			1	2	1	1	2
							
5:16 P.M. to 5:30 P.M.	1						

5:31 P.M. to 5:45 P.M.							

NOTES: Sun was low and bright - was a conflict for drivers travelling westbound. This caused more "near" rear-end collisions. Lots of snow still covering roadway. Due to cold weather conditions, completed a one hour count.

McKeown Avenue at Champlain Street
Time: 6:45 P.M. to 7:45 P.M. **Date: February 17, 2023**

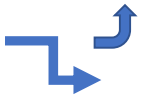
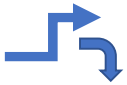
	Westbound/Southbound						
Time							
6:45 P.M. to 7:00 P.M.			1	2			1
7:01 P.M. to 7:15 P.M.				1	1		
							
6:45 P.M. to 7:00 P.M.	1						

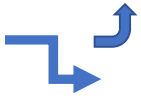
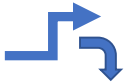
7:01 P.M. to 7:15 P.M.							
Time							
7:16 P.M. to 7:30 P.M.					1	1	
7:31 P.M. to 7:45 P.M.				1	1		
							
7:16 P.M. to 7:30 P.M.							

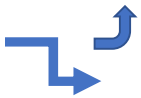
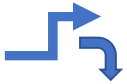
7:31 P.M. to 7:45 P.M.							

NOTES: Sun was low and bright - was a conflict for drivers travelling westbound. This caused more "near" rear-end collisions. Lots of snow still covering roadway. Due to cold weather conditions, completed a one hour count.

McKeown Avenue at Champlain Street
Time: 11:00 A.M. to 12:30 P.M. **Date: February 18, 2023**

	Westbound/Southbound						
Time							
11:00 A.M to 11:15 A.M.	**2**		**1**	**1**	**2**		
11:16 A.M to 11:30 A.M.				**3**	**1**	**1**	
							
11:00 A.M to 11:15 A.M.							

11:16 A.M to 11:30 A.M.							
Time							
11:31 A.M to 11:45 A.M.	1			1	2	1	
11:46 A.M to 12:00 P.M.				1	1	1	
							
11:31 A.M to 11:45 A.M.						1	

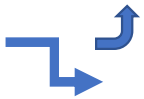
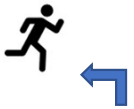
11:46 A.M to 12:00 P.M.							
Time							
12:01 P.M to 12:15 P.M.	1				1		1
12:16 P.M to 12:30 P.M.	1			1		2	
							
12:01 P.M to 12:15 P.M.							

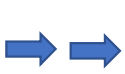
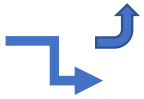
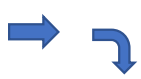
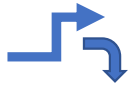
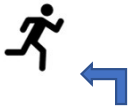
12:16 P.M to 12:30 P.M.							

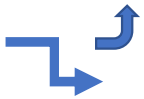
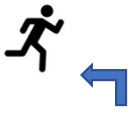
NOTES: Sun was low and bright - was a conflict for drivers travelling westbound. This caused more "near" rear-end collisions. Lots of snow still covering roadway. Due to cold weather conditions, completed a one hour count.

McKeown Avenue at Champlain Street

Time: 8:00 A.M. to 9:30 A.M. **Date: February 17, 2023**

	Eastbound/Northbound						
Time							
8:00 A.M. to 8:15 A.M.							
8:16 A.M. to 8:30 A.M.							
							
8:00 A.M. to 8:15 A.M.							

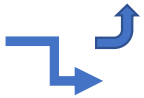
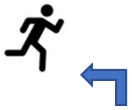
8:16 A.M. to 8:30 A.M.							
Time							
8:31 A.M. to 8:45 A.M.							
8:46 A.M. to 9:00 A.M.							
							
8:31 A.M. to 8:45 A.M.			1				

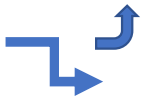
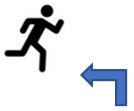
8:46 A.M. to 9:00 A.M.							1
Time							
9:01 A.M. to 9:15 A.M.							
9:16 A.M. to 9:30 A.M.							
							
9:01 A.M. to 9:15 A.M.							

9:16 A.M. to 9:30 A.M.					**1**		

NOTES: Ground is completely snow covered. Sidwalks unplowed. NB approach obstructed by large snowpile + unplowed parking lots.

McKeown Avenue at Champlain Street
Time: 4:45 P.M. to 5:45 P.M. **Date: February 17, 2023**

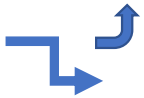
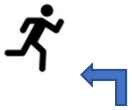
	Eastbound/Northbound						
Time							
4:45 P.M. to 5:00 P.M.	1						
5:01 P.M. to 5:15 P.M.							
							
4:45 P.M. to 5:00 P.M.					1		

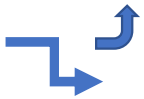
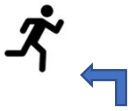
5:01 P.M. to 5:15 P.M.							
Time							
5:16 P.M. to 5:30 P.M.							1
5:31 P.M. to 5:45 P.M.							
							
5:16 P.M. to 5:30 P.M.					1		

5:31 P.M. to 5:45 P.M.							

NOTES: Clear skies, packed snow on road. Vehicle ran off the road and hit snow bank (west of intersection) at approximately 5:20 P.M.

McKeown Avenue at Champlain Street
Time: 6:45 P.M. to 7:45 P.M. **Date: February 17, 2023**

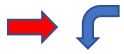
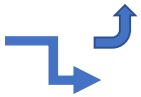
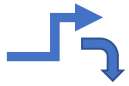
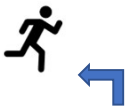
	Eastbound/Northbound						
Time							
6:45 P.M. to 7:00 P.M.			1			1	
7:01 P.M. to 7:15 P.M.			1		1	1	
							
6:45 P.M. to 7:00 P.M.							

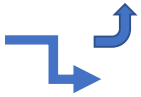
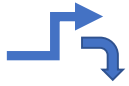
7:01 P.M. to 7:15 P.M.							
Time							
7:16 P.M. to 7:30 P.M.					1		
7:31 P.M. to 7:45 P.M.			1				
							
7:16 P.M. to 7:30 P.M.	1						

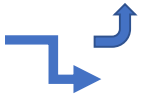
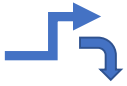
7:31 P.M. to 7:45 P.M.							

NOTES: Dark, but clear sky. Snow packed road. Approxmately -15 degree celsius.

McKeown Avenue at Champlain Street
Time: 11:00 A.M. to 12:30 P.M. **Date: February 18, 2023**

	Eastbound/Northbound						
Time							
11:00 A.M to 11:15 A.M.	**2**						
11:16 A.M to 11:30 A.M.				**1**		**2**	
							
11:00 A.M to 11:15 A.M.		**2**					

11:16 A.M to 11:30 A.M.							
Time							
11:31 A.M to 11:45 A.M.					1	1	1
11:46 A.M to 12:00 P.M.			1			2	
							
11:31 A.M to 11:45 A.M.	1	1			2		

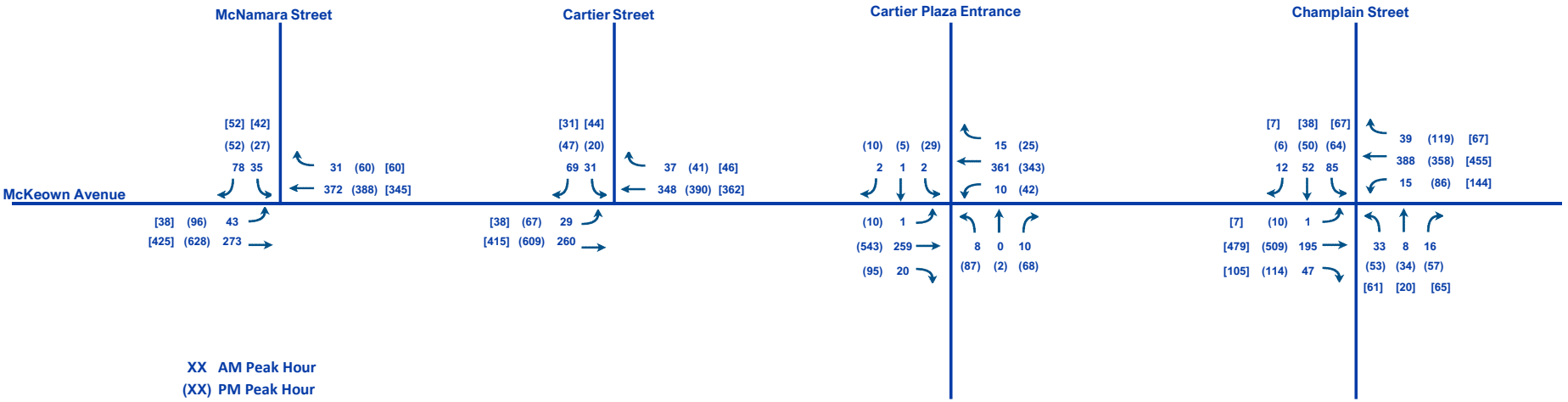
11:46 A.M to 12:00 P.M.							
Time							
12:01 P.M to 12:15 P.M.			1			1	
12:16 P.M to 12:30 P.M.							
							
12:01 P.M to 12:15 P.M.							

12:16 P.M to 12:30 P.M.							

NOTES: Overcast with 50% of road packed snow. Light snowfall , -10 degrees. WB vehicles turning left into Canadian Tire plaza causing issues west of intersection. Close call with WB ped on south of street at Canadian Tire entrance . Cut off by WB vehicle making left into plaza.

APPENDIX C

2023 TRAFFIC VOLUMES



XX AM Peak Hour
(XX) PM Peak Hour
[XX] Weekend Peak Hour

APPENDIX D

TRAFFIC VOLUMES (RAW TRAFFIC DATA)

Leg	McNamara				McKeown Street				McKeown Street				
Direction	Southbound				Westbound				Eastbound				
Start Time	Right	Left	U-Turn	**App Total**	Right	Thru	U-Turn	**App Total**	Thru	Left	U-Turn	**App Total**	**Int Total**
2021-11-27 07:00:00	3	8	0	**11**	5	19	0	**24**	30	10	0	**40**	**75**
2021-11-27 07:30:00	10	7	0	**17**	3	34	0	**37**	45	5	0	**50**	**104**
2021-11-27 08:00:00	14	9	0	**23**	11	39	0	**50**	44	7	0	**51**	**124**
2021-11-27 08:30:00	14	13	0	**27**	4	58	0	**62**	94	8	0	**102**	**191**
2021-11-27 09:00:00	11	9	0	**20**	9	60	0	**69**	106	4	0	**110**	**199**
2021-11-27 09:30:00	16	21	0	**37**	11	77	0	**88**	112	6	0	**118**	**243**
2021-11-27 10:00:00	14	17	0	**31**	14	102	0	**116**	156	8	0	**164**	**311**
2021-11-27 10:30:00	15	31	0	**46**	29	126	0	**155**	149	16	0	**165**	**366**
2021-11-27 11:00:00	15	22	0	**37**	23	149	0	**172**	200	8	0	**208**	**417**
2021-11-27 11:30:00	24	36	0	**60**	27	148	0	**175**	196	18	0	**214**	**449**
2021-11-27 12:00:00	13	17	0	**30**	22	167	0	**189**	208	21	0	**229**	**448**
2021-11-27 12:30:00	18	19	0	**37**	25	171	0	**196**	196	23	0	**219**	**452**
2021-11-27 13:00:00	34	23	0	**57**	35	174	0	**209**	199	15	0	**214**	**480**
2021-11-27 13:30:00	18	23	0	**41**	16	172	0	**188**	185	15	0	**200**	**429**
2021-11-27 14:00:00	15	27	0	**42**	30	181	0	**211**	191	29	0	**220**	**473**
2021-11-27 14:30:00	22	19	0	**41**	34	175	0	**209**	175	19	0	**194**	**444**
2021-11-27 15:00:00	26	18	0	**44**	18	160	0	**178**	205	36	0	**241**	**463**
2021-11-27 15:30:00	24	32	0	**56**	34	158	0	**192**	160	22	0	**182**	**430**
2021-11-27 16:00:00	12	24	0	**36**	24	154	0	**178**	161	18	0	**179**	**393**
2021-11-27 16:30:00	14	19	0	**33**	25	152	0	**177**	157	17	0	**174**	**384**
2021-11-27 17:00:00	21	17	0	**38**	23	118	0	**141**	138	23	0	**161**	**340**
2021-11-27 17:30:00	16	14	0	**30**	23	111	0	**134**	99	17	0	**116**	**280**
2021-11-27 18:00:00	14	27	0	**41**	30	129	0	**159**	137	28	0	**165**	**365**
2021-11-27 18:30:00	11	19	0	**30**	24	111	0	**135**	93	28	0	**121**	**286**
2021-11-30 07:00:00	18	12	0	**30**	1	78	0	**79**	71	8	0	**79**	**188**
2021-11-30 07:30:00	41	16	0	**57**	18	155	0	**173**	122	12	0	**134**	**364**
2021-11-30 08:00:00	41	20	0	**61**	13	174	0	**187**	103	23	0	**126**	**374**
2021-11-30 08:30:00	36	15	0	**51**	18	145	0	**163**	138	20	0	**158**	**372**
2021-11-30 09:00:00	23	17	0	**40**	18	138	0	**156**	151	23	0	**174**	**370**
2021-11-30 09:30:00	21	12	0	**33**	21	116	0	**137**	160	11	0	**171**	**341**
2021-11-30 10:00:00	22	23	0	**45**	17	157	0	**174**	210	21	0	**231**	**450**
2021-11-30 10:30:00	17	12	0	**29**	20	187	0	**207**	200	15	0	**215**	**451**
2021-11-30 11:00:00	19	13	0	**32**	10	164	0	**174**	215	21	0	**236**	**442**
2021-11-30 11:30:00	24	18	0	**42**	24	211	0	**235**	243	16	0	**259**	**536**
2021-11-30 12:00:00	22	14	0	**36**	22	228	0	**250**	312	30	0	**342**	**628**
2021-11-30 12:30:00	31	15	0	**46**	20	270	0	**290**	284	22	0	**306**	**642**
2021-11-30 13:00:00	32	24	0	**56**	18	200	0	**218**	248	26	0	**274**	**548**
2021-11-30 13:30:00	20	16	0	**36**	14	193	0	**207**	229	29	0	**258**	**501**
2021-11-30 14:00:00	17	18	0	**35**	29	169	0	**198**	198	19	0	**217**	**450**
2021-11-30 14:30:00	23	20	0	**43**	28	163	0	**191**	203	24	0	**227**	**461**
2021-11-30 15:00:00	26	14	0	**40**	19	151	0	**170**	242	40	0	**282**	**492**
2021-11-30 15:30:00	25	13	0	**38**	21	175	0	**196**	209	29	0	**238**	**472**
2021-11-30 16:00:00	28	11	0	**39**	22	205	0	**227**	281	48	0	**329**	**595**
2021-11-30 16:30:00	23	16	0	**39**	37	179	0	**216**	242	47	0	**289**	**544**
2021-11-30 17:00:00	22	20	0	**42**	26	155	0	**181**	209	39	0	**248**	**471**
2021-11-30 17:30:00	23	17	0	**40**	21	144	0	**165**	146	31	0	**177**	**382**

2021-11-30 18:00:00	18	16	0	**34**	24	128	0	**152**	164	18	0	**182**	**368**
2021-11-30 18:30:00	12	21	0	**33**	18	84	0	**102**	126	22	0	**148**	**283**
2021-12-02 07:00:00	19	13	0	**32**	3	84	0	**87**	75	9	0	**84**	**203**
2021-12-02 07:30:00	40	19	0	**59**	13	149	0	**162**	121	8	0	**129**	**350**
2021-12-02 08:00:00	32	20	0	**52**	9	148	0	**157**	126	16	0	**142**	**351**
2021-12-02 08:30:00	28	19	0	**47**	12	146	0	**158**	142	11	0	**153**	**358**
2021-12-02 09:00:00	9	25	0	**34**	19	130	0	**149**	151	10	0	**161**	**344**
2021-12-02 09:30:00	21	12	0	**33**	14	132	0	**146**	158	12	0	**170**	**349**
2021-12-02 10:00:00	15	11	0	**26**	20	125	0	**145**	197	6	0	**203**	**374**
2021-12-02 10:30:00	16	17	0	**33**	19	119	0	**138**	187	16	0	**203**	**374**
2021-12-02 11:00:00	16	12	0	**28**	20	157	0	**177**	180	13	0	**193**	**398**
2021-12-02 11:30:00	21	13	0	**34**	27	207	0	**234**	231	18	0	**249**	**517**
2021-12-02 12:00:00	25	16	0	**41**	25	225	0	**250**	290	26	0	**316**	**607**
2021-12-02 12:30:00	29	17	0	**46**	16	210	0	**226**	274	29	0	**303**	**575**
2021-12-02 13:00:00	29	21	0	**50**	22	224	0	**246**	227	26	0	**253**	**549**
2021-12-02 13:30:00	30	26	0	**56**	40	209	0	**249**	225	25	0	**250**	**555**
2021-12-02 14:00:00	21	12	0	**33**	18	161	0	**179**	216	22	0	**238**	**450**
2021-12-02 14:30:00	32	18	0	**50**	14	199	0	**213**	216	26	0	**242**	**505**
2021-12-02 15:00:00	23	23	0	**46**	28	183	0	**211**	251	49	0	**300**	**557**
2021-12-02 15:30:00	22	22	0	**44**	26	186	0	**212**	250	28	0	**278**	**534**
2021-12-02 16:00:00	20	18	0	**38**	29	180	0	**209**	278	31	0	**309**	**556**
2021-12-02 16:30:00	24	16	0	**40**	24	162	0	**186**	237	46	0	**283**	**509**
2021-12-02 17:00:00	17	18	0	**35**	31	170	0	**201**	201	28	0	**229**	**465**
2021-12-02 17:30:00	20	22	0	**42**	28	158	0	**186**	165	29	0	**194**	**422**
2021-12-02 18:00:00	16	17	0	**33**	23	140	0	**163**	153	28	0	**181**	**377**
2021-12-02 18:30:00	10	22	0	**32**	16	115	0	**131**	113	24	0	**137**	**300**
Grand Total	1513	1293	0	**2806**	1474	10833	0	**12307**	12806	1531	0	**14337**	**29450**
% Approach	53.9%	46.1%	0.0%		12.0%	88.0%	0.0%		89.3%	10.7%	0.0%		
% Total	5.1%	4.4%	0.0%	**9.5%**	5.0%	36.8%	0.0%	**41.8%**	43.5%	5.2%	0.0%	**48.7%**	
Lights	1494	1277	0	**2771**	1452	10581	0	**12033**	12588	1506	0	**14094**	**28898**
% Lights	98.7%	98.8%	0.0%	**98.8%**	98.5%	97.7%	0.0%	**97.8%**	98.3%	98.4%	0.0%	**98.3%**	**98.1%**
Single-Unit Trucks	10	10	0	**20**	9	158	0	**167**	94	10	0	**104**	**291**
% Single-Unit Trucks	0.7%	0.8%	0.0%	**0.7%**	0.6%	1.5%	0.0%	**1.4%**	0.7%	0.7%	0.0%	**0.7%**	**1.0%**
Articulated Trucks	0	1	0	**1**	2	24	0	**26**	17	0	0	**17**	**44**
% Articulated Trucks	0.0%	0.1%	0.0%	**0.0%**	0.1%	0.2%	0.0%	**0.2%**	0.1%	0.0%	0.0%	**0.1%**	**0.1%**
Buses	9	5	0	**14**	11	70	0	**81**	107	15	0	**122**	**217**
% Buses	0.6%	0.4%	0.0%	**0.5%**	0.7%	0.6%	0.0%	**0.7%**	0.8%	1.0%	0.0%	**0.9%**	**0.7%**

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022

Turning Movement Data

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
7:00 AM	0	1	0	4	1	3	9	0	0	12	19	1	0	0	20	33
7:15 AM	3	0	0	3	3	2	15	0	0	17	21	2	0	0	23	43
7:30 AM	1	1	0	3	2	2	14	0	0	16	28	2	0	0	30	48
7:45 AM	6	4	0	5	10	0	17	0	0	17	29	3	0	0	32	59
Hourly Total	10	6	0	15	16	7	55	0	0	62	97	8	0	0	105	183
8:00 AM	6	2	0	1	8	7	30	0	0	37	33	2	0	0	35	80
8:15 AM	4	4	0	6	8	3	26	0	0	29	27	0	0	0	27	64
8:30 AM	4	4	0	3	8	7	32	0	0	39	46	2	0	0	48	95
8:45 AM	4	6	0	3	10	11	41	0	0	52	49	7	0	0	56	118
Hourly Total	18	16	0	13	34	28	129	0	0	157	155	11	0	0	166	357
9:00 AM	4	11	0	2	15	8	32	0	0	40	58	4	0	0	62	117
9:15 AM	6	8	0	4	14	9	37	0	0	46	43	3	0	0	46	106
9:30 AM	9	11	0	4	20	7	54	0	0	61	65	4	0	0	69	150
9:45 AM	5	12	0	3	17	8	60	0	2	68	75	7	0	0	82	167
Hourly Total	24	42	0	13	66	32	183	0	2	215	241	18	0	0	259	540
10:00 AM	7	10	0	10	17	10	61	0	0	71	74	4	0	0	78	166
10:15 AM	6	7	0	8	13	10	59	0	0	69	88	8	0	0	96	178
10:30 AM	2	4	0	12	6	12	61	0	0	73	81	4	0	0	85	164
10:45 AM	8	14	0	3	22	14	62	0	0	76	79	1	0	0	80	178
Hourly Total	23	35	0	33	58	46	243	0	0	289	322	17	0	0	339	686
11:00 AM	6	9	0	7	15	13	56	0	0	69	96	7	0	0	103	187
11:15 AM	9	11	0	7	20	14	73	0	1	87	118	12	0	0	130	237
11:30 AM	7	11	0	10	18	12	81	0	0	93	90	8	0	0	98	209
11:45 AM	9	13	0	3	22	7	92	0	0	99	91	11	0	0	102	223
Hourly Total	31	44	0	27	75	46	302	0	1	348	395	38	0	0	433	856
12:00 PM	7	8	0	2	15	16	84	0	0	100	105	10	0	1	115	230
12:15 PM	12	12	0	4	24	12	107	0	0	119	106	13	0	0	119	262
12:30 PM	8	14	0	4	22	20	99	0	0	119	102	8	0	1	110	251
12:45 PM	15	7	0	2	22	16	86	0	0	102	103	8	0	0	111	235
Hourly Total	42	41	0	12	83	64	376	0	0	440	416	39	0	2	455	978
1:00 PM	7	11	0	11	18	12	104	0	1	116	112	8	0	0	120	254
1:15 PM	9	9	0	10	18	20	95	0	0	115	110	11	0	0	121	254
1:30 PM	6	8	0	15	14	10	97	0	1	107	92	16	0	0	108	229
1:45 PM	11	15	0	10	26	9	73	0	1	82	89	13	0	1	102	210
Hourly Total	33	43	0	46	76	51	369	0	3	420	403	48	0	1	451	947
2:00 PM	10	8	0	12	18	11	79	0	0	90	96	10	0	0	106	214
2:15 PM	5	20	0	8	25	17	94	0	0	111	91	4	0	0	95	231
2:30 PM	9	12	0	7	21	13	75	0	0	88	111	8	0	0	119	228
2:45 PM	8	9	0	7	17	19	85	0	2	104	110	12	0	2	122	243

Hourly Total	32	49	0	34	81	60	333	0	2	393	408	34	0	2	442	916
3:00 PM	11	7	0	5	18	11	87	0	0	98	94	11	0	2	105	221
3:15 PM	4	6	0	14	10	15	87	0	0	102	85	6	0	1	91	203
3:30 PM	11	10	0	4	21	8	69	1	0	78	78	9	0	3	87	186
3:45 PM	10	13	0	12	23	14	69	0	2	83	89	9	0	3	98	204
Hourly Total	36	36	0	35	72	48	312	1	2	361	346	35	0	9	381	814
4:00 PM	7	9	0	6	16	10	63	0	1	73	88	3	0	0	91	180
4:15 PM	13	6	0	10	19	11	71	0	0	82	78	8	0	0	86	187
4:30 PM	7	14	0	10	21	11	76	0	0	87	87	11	0	0	98	206
4:45 PM	5	12	0	18	17	14	69	0	0	83	98	12	0	0	110	210
Hourly Total	32	41	0	44	73	46	279	0	1	325	351	34	0	0	385	783
5:00 PM	6	8	0	13	14	21	89	0	0	110	100	6	0	1	106	230
5:15 PM	15	12	0	15	27	5	75	0	0	80	73	9	0	0	82	189
5:30 PM	5	11	0	15	16	3	69	0	1	72	92	11	0	1	103	191
5:45 PM	7	12	0	12	19	8	76	0	0	84	81	4	0	0	85	188
Hourly Total	33	43	0	55	76	37	309	0	1	346	346	30	0	2	376	798
6:00 PM	7	8	0	13	15	8	63	0	3	71	76	8	0	1	84	170
6:15 PM	6	9	0	7	15	12	83	0	0	95	50	13	0	0	63	173
6:30 PM	7	9	0	16	16	8	64	0	0	72	73	11	0	0	84	172
6:45 PM	10	13	0	13	23	10	66	0	0	76	58	8	0	0	66	165
Hourly Total	30	39	0	49	69	38	276	0	3	314	257	40	0	1	297	680
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	1	1	0	0	2	6	7	0	0	13	23	2	0	0	25	40
7:15 AM	2	2	0	3	4	3	9	0	0	12	14	3	0	0	17	33
7:30 AM	1	0	0	3	1	0	13	0	0	13	17	2	0	0	19	33
7:45 AM	4	4	0	4	8	4	17	0	0	21	19	4	0	0	23	52
Hourly Total	8	7	0	10	15	13	46	0	0	59	73	11	0	0	84	158
8:00 AM	1	4	0	0	5	3	12	0	0	15	21	2	0	0	23	43
8:15 AM	2	4	0	4	6	4	20	0	0	24	23	3	0	0	26	56
8:30 AM	4	4	0	3	8	4	19	0	0	23	35	0	0	0	35	66
8:45 AM	5	10	0	0	15	8	19	0	0	27	40	4	0	0	44	86
Hourly Total	12	22	0	7	34	19	70	0	0	89	119	9	0	0	128	251
9:00 AM	5	8	0	1	13	8	36	0	0	44	52	5	0	0	57	114
9:15 AM	1	6	0	2	7	10	35	0	0	45	35	3	0	0	38	90
9:30 AM	6	7	0	4	13	7	36	0	0	43	34	5	0	0	39	95
9:45 AM	7	8	0	9	15	13	55	0	0	68	56	8	0	0	64	147
Hourly Total	19	29	0	16	48	38	162	0	0	200	177	21	0	0	198	446
10:00 AM	5	7	0	1	12	12	42	0	1	54	78	6	0	0	84	150
10:15 AM	1	5	0	2	6	7	59	0	0	66	70	9	0	1	79	151
10:30 AM	4	9	0	9	13	5	58	0	0	63	70	3	0	0	73	149
10:45 AM	10	8	0	8	18	6	59	0	0	65	93	11	0	0	104	187
Hourly Total	20	29	0	20	49	30	218	0	1	248	311	29	0	1	340	637
11:00 AM	7	10	0	4	17	6	60	0	0	66	79	10	0	0	89	172
11:15 AM	8	5	0	10	13	8	80	0	1	88	69	8	0	0	77	178
11:30 AM	8	11	0	7	19	14	68	0	0	82	95	8	0	0	103	204
11:45 AM	10	9	0	10	19	7	62	0	0	69	80	9	0	0	89	177
Hourly Total	33	35	0	31	68	35	270	0	1	305	323	35	0	0	358	731
12:00 PM	9	9	0	7	18	6	74	0	0	80	83	9	0	0	92	190
12:15 PM	14	12	0	9	26	17	81	0	0	98	97	18	0	0	115	239
12:30 PM	11	10	0	11	21	8	86	0	0	94	96	12	0	2	108	223
12:45 PM	12	19	0	7	31	13	98	0	0	111	94	9	0	0	103	245
Hourly Total	46	50	0	34	96	44	339	0	0	383	370	48	0	2	418	897

1:00 PM	8	12	0	6	20	13	66	0	0	79	142	16	0	0	158	257
1:15 PM	11	11	0	10	22	9	85	0	0	94	76	13	0	2	89	205
1:30 PM	8	7	0	10	15	11	78	0	0	89	84	10	0	1	94	198
1:45 PM	7	10	0	12	17	13	70	0	0	83	101	11	0	0	112	212
Hourly Total	34	40	0	38	74	46	299	0	0	345	403	50	0	3	453	872
2:00 PM	6	18	0	9	24	10	79	0	0	89	83	5	0	0	88	201
2:15 PM	4	8	0	14	12	19	75	0	0	94	99	7	0	1	106	212
2:30 PM	6	19	0	9	25	12	67	0	0	79	82	8	0	0	90	194
2:45 PM	14	3	0	14	17	7	118	0	0	125	92	10	0	0	102	244
Hourly Total	30	48	0	46	78	48	339	0	0	387	356	30	0	1	386	851
3:00 PM	6	6	0	9	12	16	74	0	0	90	101	13	0	2	114	216
3:15 PM	6	7	0	5	13	12	79	0	1	91	79	8	0	3	87	191
3:30 PM	10	8	0	11	18	13	74	0	0	87	77	18	0	1	95	200
3:45 PM	13	8	0	8	21	12	61	0	0	73	77	12	0	2	89	183
Hourly Total	35	29	0	33	64	53	288	0	1	341	334	51	0	8	385	790
4:00 PM	8	10	0	5	18	11	63	0	0	74	78	10	0	0	88	180
4:15 PM	3	13	0	12	16	15	63	0	0	78	61	10	0	1	71	165
4:30 PM	8	16	0	9	24	10	61	0	0	71	55	8	0	5	63	158
4:45 PM	7	9	0	11	16	8	66	0	1	74	78	18	0	3	96	186
Hourly Total	26	48	0	37	74	44	253	0	1	297	272	46	0	9	318	689
5:00 PM	7	8	0	10	15	12	84	0	0	96	79	11	0	0	90	201
5:15 PM	7	8	0	6	15	12	81	0	0	93	49	9	0	0	58	166
5:30 PM	4	9	0	5	13	4	59	0	0	63	64	8	0	0	72	148
5:45 PM	3	13	0	6	16	14	56	0	0	70	62	8	0	0	70	156
Hourly Total	21	38	0	27	59	42	280	0	0	322	254	36	0	0	290	671
6:00 PM	8	13	0	9	21	8	61	0	0	69	68	9	0	0	77	167
6:15 PM	5	9	0	20	14	8	78	0	0	86	62	10	0	1	72	172
6:30 PM	5	6	0	8	11	10	60	0	0	70	76	3	0	0	79	160
6:45 PM	8	7	0	8	15	3	50	0	0	53	69	6	0	1	75	143
Hourly Total	26	35	0	45	61	29	249	0	0	278	275	28	0	2	303	642
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	3	6	0	1	9	4	38	0	0	42	34	2	0	1	36	87
7:15 AM	5	0	0	5	5	2	48	0	0	50	40	1	0	0	41	96
7:30 AM	7	5	0	4	12	4	70	0	0	74	44	7	0	0	51	137
7:45 AM	9	10	0	5	19	6	93	0	1	99	55	8	0	1	63	181
Hourly Total	24	21	0	15	45	16	249	0	1	265	173	18	0	2	191	501
8:00 AM	16	2	0	2	18	6	87	0	0	93	50	5	0	1	55	166
8:15 AM	16	12	0	2	28	4	73	0	0	77	53	9	0	0	62	167
8:30 AM	11	3	0	4	14	11	62	0	0	73	56	4	0	2	60	147
8:45 AM	7	8	0	1	15	4	69	0	0	73	55	7	0	1	62	150
Hourly Total	50	25	0	9	75	25	291	0	0	316	214	25	0	4	239	630
9:00 AM	7	2	0	3	9	7	56	0	0	63	57	3	0	0	60	132
9:15 AM	7	9	0	2	16	3	69	0	0	72	76	10	0	0	86	174
9:30 AM	3	9	0	6	12	7	57	0	0	64	54	2	0	0	56	132
9:45 AM	4	11	0	2	15	13	61	0	0	74	90	5	0	0	95	184
Hourly Total	21	31	0	13	52	30	243	0	0	273	277	20	0	0	297	622
10:00 AM	8	5	0	2	13	12	55	0	0	67	86	8	0	0	94	174
10:15 AM	7	4	0	7	11	8	72	0	0	80	74	2	0	0	76	167
10:30 AM	4	5	0	7	9	5	80	0	0	85	88	9	0	0	97	191
10:45 AM	6	8	0	2	14	14	83	0	0	97	89	7	0	5	96	207
Hourly Total	25	22	0	18	47	39	290	0	0	329	337	26	0	5	363	739
11:00 AM	11	9	0	6	20	9	69	0	1	78	101	3	0	0	104	202

11:15 AM	10	4	0	8	14	6	73	0	0	79	95	16	0	0	111	204
11:30 AM	9	7	0	5	16	13	87	0	0	100	122	13	0	0	135	251
11:45 AM	11	5	0	7	16	8	92	0	0	100	126	9	0	3	135	251
Hourly Total	41	25	0	26	66	36	321	0	1	357	444	41	0	3	485	908
12:00 PM	6	8	0	7	14	12	97	0	0	109	152	21	0	0	173	296
12:15 PM	16	10	0	7	26	12	134	0	1	146	138	8	0	0	146	318
12:30 PM	19	9	0	1	28	10	127	0	0	137	125	22	0	1	147	312
12:45 PM	17	9	0	8	26	14	123	0	0	137	141	10	0	1	151	314
Hourly Total	58	36	0	23	94	48	481	0	1	529	556	61	0	2	617	1240
1:00 PM	9	5	0	3	14	13	107	0	0	120	121	15	0	0	136	270
1:15 PM	6	5	0	7	11	12	115	0	0	127	109	14	0	1	123	261
1:30 PM	6	6	0	22	12	15	90	0	0	105	107	17	0	1	124	241
1:45 PM	6	6	0	14	12	18	98	0	0	116	114	11	0	0	125	253
Hourly Total	27	22	0	46	49	58	410	0	0	468	451	57	0	2	508	1025
2:00 PM	12	2	0	6	14	12	120	0	0	132	124	8	0	0	132	278
2:15 PM	10	8	0	7	18	11	105	0	0	116	94	9	0	0	103	237
2:30 PM	10	9	0	16	19	8	82	0	0	90	127	16	0	0	143	252
2:45 PM	12	9	0	11	21	21	118	0	0	139	129	15	0	0	144	304
Hourly Total	44	28	0	40	72	52	425	0	0	477	474	48	0	0	522	1071
3:00 PM	6	9	0	6	15	8	97	0	0	105	125	14	0	0	139	259
3:15 PM	7	5	0	14	12	12	92	0	0	104	117	10	0	0	127	243
3:30 PM	8	12	0	3	20	11	94	0	2	105	103	18	0	0	121	246
3:45 PM	14	5	0	5	19	8	85	0	0	93	113	21	0	0	134	246
Hourly Total	35	31	0	28	66	39	368	0	2	407	458	63	0	0	521	994
4:00 PM	14	3	0	2	17	8	95	0	0	103	157	19	0	0	176	296
4:15 PM	4	3	0	13	7	9	99	0	0	108	139	14	0	1	153	268
4:30 PM	6	13	0	10	19	11	99	0	1	110	132	18	0	2	150	279
4:45 PM	10	9	0	11	19	11	93	0	0	104	146	17	0	1	163	286
Hourly Total	34	28	0	36	62	39	386	0	1	425	574	68	0	4	642	1129
5:00 PM	10	4	0	8	14	8	101	0	0	109	129	19	0	0	148	271
5:15 PM	8	5	0	7	13	7	88	0	0	95	94	16	0	0	110	218
5:30 PM	10	11	0	9	21	10	81	0	0	91	84	18	0	0	102	214
5:45 PM	8	7	0	12	15	11	71	0	0	82	98	13	0	0	111	208
Hourly Total	36	27	0	36	63	36	341	0	0	377	405	66	0	0	471	911
6:00 PM	1	15	0	9	16	7	98	0	0	105	97	9	0	0	106	227
6:15 PM	11	7	0	7	18	6	82	0	2	88	78	14	0	0	92	198
6:30 PM	11	5	0	11	16	9	67	0	0	76	73	8	0	0	81	173
6:45 PM	7	8	0	12	15	7	61	0	0	68	57	13	0	0	70	153
Hourly Total	30	35	0	39	65	29	308	0	2	337	305	44	0	0	349	751
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	4	7	0	1	11	6	38	1	0	45	45	6	0	0	51	107
7:15 AM	6	6	0	4	12	3	42	0	0	45	44	5	0	1	49	106
7:30 AM	8	3	0	5	11	8	80	0	1	88	44	8	0	0	52	151
7:45 AM	15	9	0	7	24	7	100	0	0	107	66	9	0	0	75	206
Hourly Total	33	25	0	17	58	24	260	1	1	285	199	28	0	1	227	570
8:00 AM	22	4	0	2	26	7	75	0	0	82	48	5	0	1	53	161
8:15 AM	18	10	0	3	28	9	87	0	0	96	54	8	0	0	62	186
8:30 AM	14	8	0	1	22	14	86	0	0	100	67	7	0	0	74	196
8:45 AM	9	9	0	4	18	11	85	0	0	96	75	10	0	1	85	199
Hourly Total	63	31	0	10	94	41	333	0	0	374	244	30	0	2	274	742
9:00 AM	10	8	0	1	18	8	46	0	0	54	72	9	0	0	81	153
9:15 AM	8	8	0	6	16	5	83	0	1	88	60	11	0	1	71	175

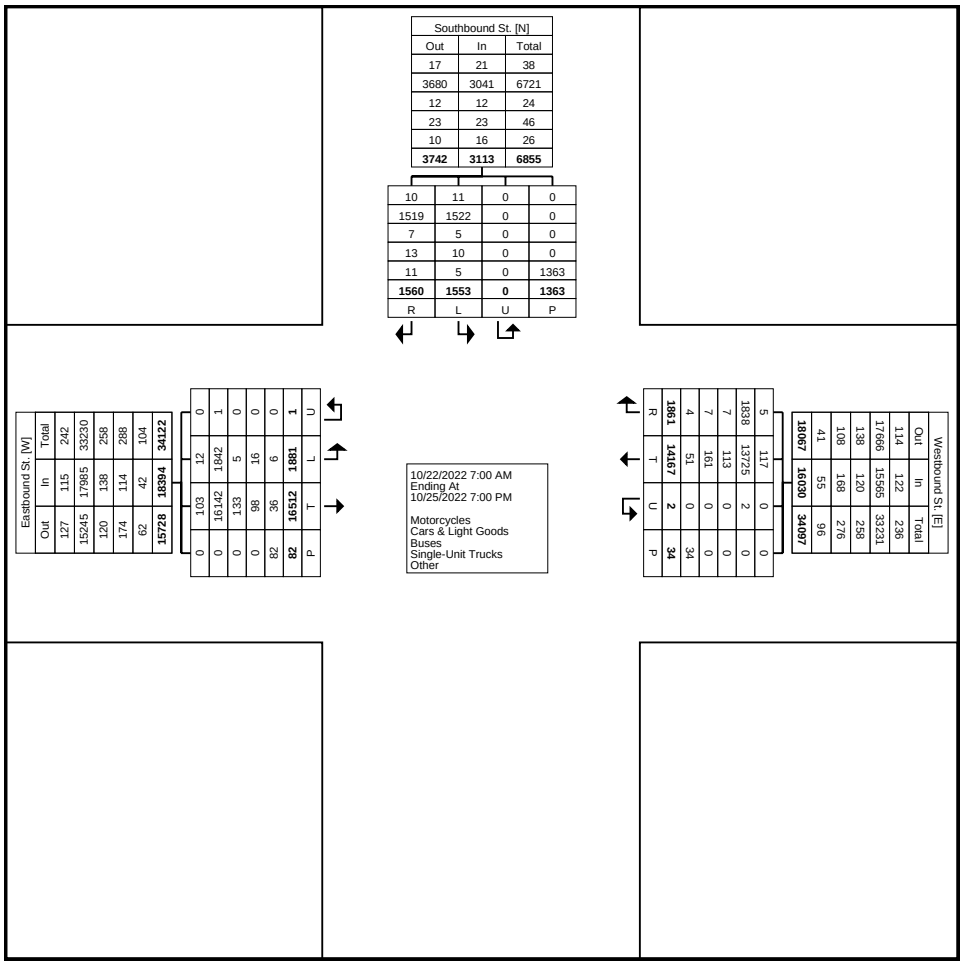
9:30 AM	11	8	0	6	19	8	81	0	0	89	76	8	1	0	85	193
9:45 AM	8	10	0	2	18	9	71	0	0	80	118	12	0	0	130	228
Hourly Total	37	34	0	15	71	30	281	0	1	311	326	40	1	1	367	749
10:00 AM	4	8	0	0	12	6	81	0	0	87	95	11	0	0	106	205
10:15 AM	7	14	0	6	21	8	71	0	0	79	92	10	0	0	102	202
10:30 AM	8	7	0	1	15	5	86	0	0	91	100	7	0	0	107	213
10:45 AM	6	6	0	8	12	8	85	0	0	93	89	5	0	0	94	199
Hourly Total	25	35	0	15	60	27	323	0	0	350	376	33	0	0	409	819
11:00 AM	5	6	0	5	11	9	90	0	0	99	103	11	0	0	114	224
11:15 AM	10	9	0	4	19	10	69	0	0	79	89	18	0	0	107	205
11:30 AM	7	10	0	7	17	11	75	0	0	86	119	25	0	0	144	247
11:45 AM	15	11	0	5	26	11	100	0	0	111	138	10	0	2	148	285
Hourly Total	37	36	0	21	73	41	334	0	0	375	449	64	0	2	513	961
12:00 PM	14	6	0	5	20	16	102	0	0	118	156	19	0	0	175	313
12:15 PM	6	8	0	6	14	13	120	0	0	133	119	20	0	0	139	286
12:30 PM	21	6	0	8	27	9	122	0	1	131	112	26	0	0	138	296
12:45 PM	14	7	0	7	21	16	119	0	0	135	124	13	0	0	137	293
Hourly Total	55	27	0	26	82	54	463	0	1	517	511	78	0	0	589	1188
1:00 PM	8	8	0	9	16	9	96	0	0	105	136	10	0	0	146	267
1:15 PM	9	3	0	9	12	14	96	0	1	110	109	19	0	3	128	250
1:30 PM	9	10	0	5	19	12	103	0	0	115	127	13	0	0	140	274
1:45 PM	12	11	0	20	23	11	91	0	1	102	118	9	0	0	127	252
Hourly Total	38	32	0	43	70	46	386	0	2	432	490	51	0	3	541	1043
2:00 PM	12	2	0	4	14	11	109	0	0	120	108	9	0	0	117	251
2:15 PM	15	2	0	18	17	8	99	0	0	107	101	12	0	0	113	237
2:30 PM	5	5	0	8	10	8	78	0	0	86	106	16	0	0	122	218
2:45 PM	10	8	0	13	18	12	84	0	1	96	134	11	0	0	145	259
Hourly Total	42	17	0	43	59	39	370	0	1	409	449	48	0	0	497	965
3:00 PM	12	12	0	2	24	12	84	0	1	96	106	19	0	0	125	245
3:15 PM	5	7	0	8	12	16	109	0	0	125	130	12	0	0	142	279
3:30 PM	6	11	0	9	17	11	77	0	0	88	136	10	0	0	146	251
3:45 PM	14	5	0	9	19	9	94	0	0	103	119	20	0	1	139	261
Hourly Total	37	35	0	28	72	48	364	0	1	412	491	61	0	1	552	1036
4:00 PM	11	8	0	6	19	6	93	0	0	99	161	29	0	0	190	308
4:15 PM	9	9	0	15	18	14	91	0	0	105	121	11	0	0	132	255
4:30 PM	10	8	0	10	18	12	104	0	0	116	144	10	0	3	154	288
4:45 PM	10	7	0	13	17	13	84	0	0	97	145	10	0	1	155	269
Hourly Total	40	32	0	44	72	45	372	0	0	417	571	60	0	4	631	1120
5:00 PM	5	7	0	9	12	8	98	0	0	106	138	25	0	0	163	281
5:15 PM	13	4	0	2	17	9	86	0	0	95	99	16	0	0	115	227
5:30 PM	19	2	0	6	21	11	72	0	0	83	97	16	0	0	113	217
5:45 PM	7	12	0	4	19	13	80	0	0	93	95	8	0	0	103	215
Hourly Total	44	25	0	21	69	41	336	0	0	377	429	65	0	0	494	940
6:00 PM	8	9	0	4	17	8	67	0	0	75	77	15	0	0	92	184
6:15 PM	9	14	0	5	23	13	65	0	0	78	63	10	0	1	73	174
6:30 PM	7	16	0	8	23	5	56	0	0	61	93	5	0	2	98	182
6:45 PM	6	9	0	14	15	8	65	0	0	73	72	10	0	0	82	170
Hourly Total	30	48	0	31	78	34	253	0	0	287	305	40	0	3	345	710
Grand Total	1560	1553	0	1363	3113	1861	14167	2	34	16030	16512	1881	1	82	18394	37537
Approach %	50.1	49.9	0.0	-	-	11.6	88.4	0.0	-	-	89.8	10.2	0.0	-	-	-
Total %	4.2	4.1	0.0	-	8.3	5.0	37.7	0.0	-	42.7	44.0	5.0	0.0	-	49.0	-
Motorcycles	10	11	0	-	21	5	117	0	-	122	103	12	0	-	115	258

% Motorcycles	0.6	0.7	-	-	0.7	0.3	0.8	0.0	-	0.8	0.6	0.6	0.0	-	0.6	0.7
Cars & Light Goods	1519	1522	0	-	3041	1838	13725	2	-	15565	16142	1842	1	-	17985	36591
% Cars & Light Goods	97.4	98.0	-	-	97.7	98.8	96.9	100.0	-	97.1	97.8	97.9	100.0	-	97.8	97.5
Buses	7	5	0	-	12	7	113	0	-	120	133	5	0	-	138	270
% Buses	0.4	0.3	-	-	0.4	0.4	0.8	0.0	-	0.7	0.8	0.3	0.0	-	0.8	0.7
Single-Unit Trucks	13	10	0	-	23	7	161	0	-	168	98	16	0	-	114	305
% Single-Unit Trucks	0.8	0.6	-	-	0.7	0.4	1.1	0.0	-	1.0	0.6	0.9	0.0	-	0.6	0.8
Articulated Trucks	1	1	0	-	2	1	27	0	-	28	15	2	0	-	17	47
% Articulated Trucks	0.1	0.1	-	-	0.1	0.1	0.2	0.0	-	0.2	0.1	0.1	0.0	-	0.1	0.1
Bicycles on Road	10	4	0	-	14	3	24	0	-	27	21	4	0	-	25	66
% Bicycles on Road	0.6	0.3	-	-	0.4	0.2	0.2	0.0	-	0.2	0.1	0.2	0.0	-	0.1	0.2
Bicycles on Crosswalk	-	-	-	118	-	-	-	-	3	-	-	-	-	8	-	-
% Bicycles on Crosswalk	-	-	-	8.7	-	-	-	-	8.8	-	-	-	-	9.8	-	-
Pedestrians	-	-	-	1245	-	-	-	-	31	-	-	-	-	74	-	-
% Pedestrians	-	-	-	91.3	-	-	-	-	91.2	-	-	-	-	90.2	-	-

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022
Page No: 7



Turning Movement Data Plot

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
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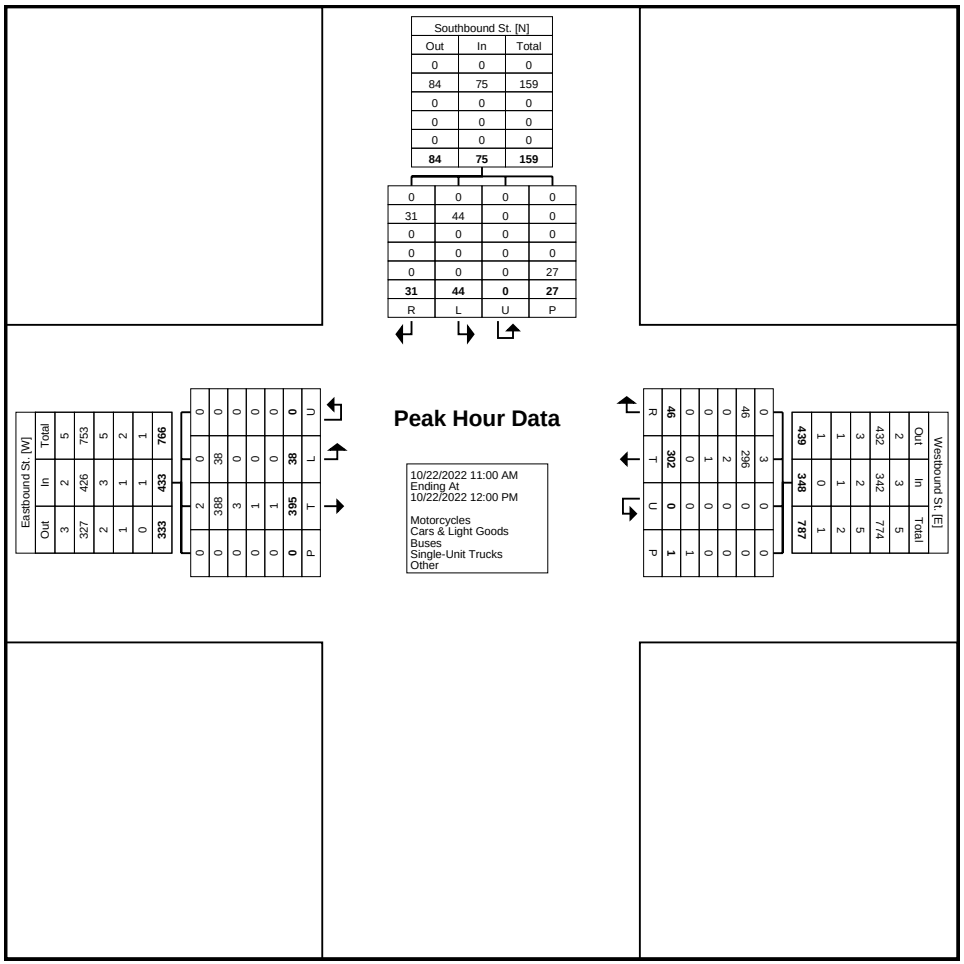
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	6	9	0	7	15	13	56	0	0	69	96	7	0	0	103	187
11:15 AM	9	11	0	7	20	14	73	0	1	87	118	12	0	0	130	237
11:30 AM	7	11	0	10	18	12	81	0	0	93	90	8	0	0	98	209
11:45 AM	9	13	0	3	22	7	92	0	0	99	91	11	0	0	102	223
Total	31	44	0	27	75	46	302	0	1	348	395	38	0	0	433	856
Approach %	41.3	58.7	0.0	-	-	13.2	86.8	0.0	-	-	91.2	8.8	0.0	-	-	-
Total %	3.6	5.1	0.0	-	8.8	5.4	35.3	0.0	-	40.7	46.1	4.4	0.0	-	50.6	-
PHF	0.861	0.846	0.000	-	0.852	0.821	0.821	0.000	-	0.879	0.837	0.792	0.000	-	0.833	0.903
Motorcycles	0	0	0	-	0	0	3	0	-	3	2	0	0	-	2	5
% Motorcycles	0.0	0.0	-	-	0.0	0.0	1.0	-	-	0.9	0.5	0.0	-	-	0.5	0.6
Cars & Light Goods	31	44	0	-	75	46	296	0	-	342	388	38	0	-	426	843
% Cars & Light Goods	100.0	100.0	-	-	100.0	100.0	98.0	-	-	98.3	98.2	100.0	-	-	98.4	98.5
Buses	0	0	0	-	0	0	2	0	-	2	3	0	0	-	3	5
% Buses	0.0	0.0	-	-	0.0	0.0	0.7	-	-	0.6	0.8	0.0	-	-	0.7	0.6
Single-Unit Trucks	0	0	0	-	0	0	1	0	-	1	1	0	0	-	1	2
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.3	0.0	-	-	0.2	0.2
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.3	0.0	-	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	3.7	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	26	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	96.3	-	-	-	-	100.0	-	-	-	-	-	-	-

City of North Bay (ON)
200 McIntyre St. E.

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Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022



Turning Movement Peak Hour Data Plot (11:00 AM)

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022

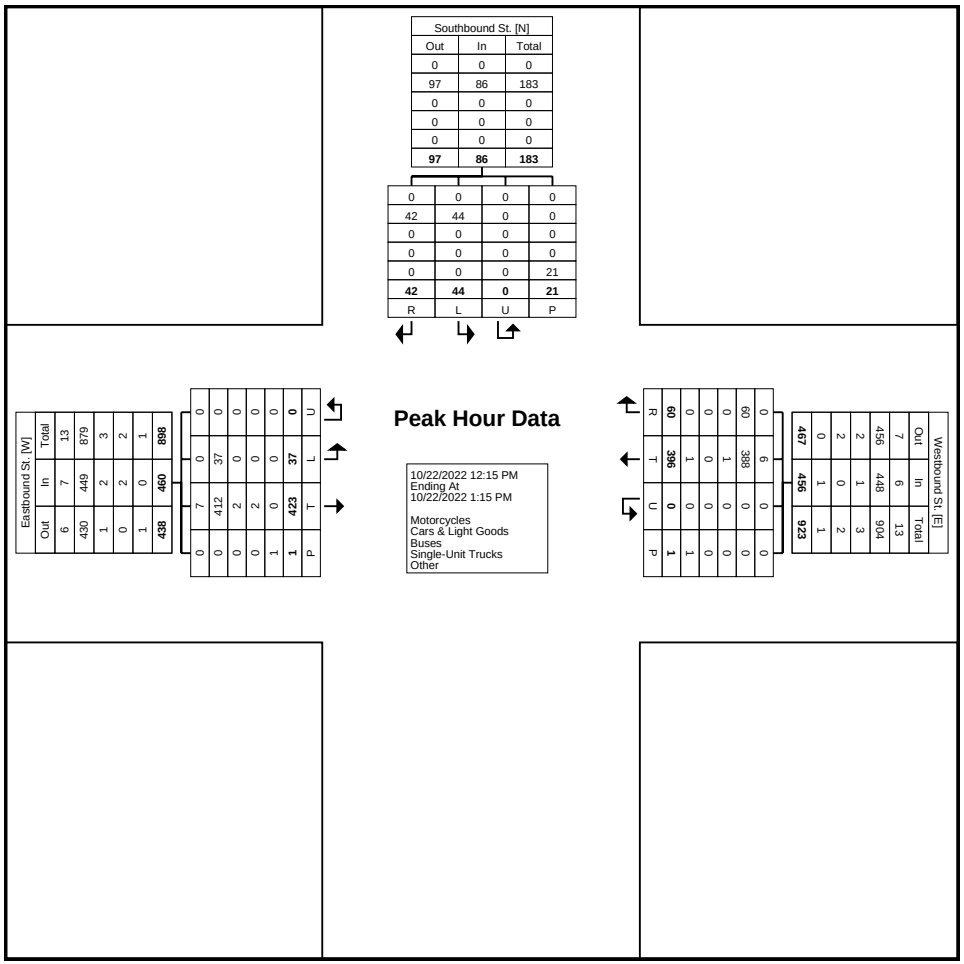
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:15 PM	12	12	0	4	24	12	107	0	0	119	106	13	0	0	119	262
12:30 PM	8	14	0	4	22	20	99	0	0	119	102	8	0	1	110	251
12:45 PM	15	7	0	2	22	16	86	0	0	102	103	8	0	0	111	235
1:00 PM	7	11	0	11	18	12	104	0	1	116	112	8	0	0	120	254
Total	42	44	0	21	86	60	396	0	1	456	423	37	0	1	460	1002
Approach %	48.8	51.2	0.0	-	-	13.2	86.8	0.0	-	-	92.0	8.0	0.0	-	-	-
Total %	4.2	4.4	0.0	-	8.6	6.0	39.5	0.0	-	45.5	42.2	3.7	0.0	-	45.9	-
PHF	0.700	0.786	0.000	-	0.896	0.750	0.925	0.000	-	0.958	0.944	0.712	0.000	-	0.958	0.956
Motorcycles	0	0	0	-	0	0	6	0	-	6	7	0	0	-	7	13
% Motorcycles	0.0	0.0	-	-	0.0	0.0	1.5	-	-	1.3	1.7	0.0	-	-	1.5	1.3
Cars & Light Goods	42	44	0	-	86	60	388	0	-	448	412	37	0	-	449	983
% Cars & Light Goods	100.0	100.0	-	-	100.0	100.0	98.0	-	-	98.2	97.4	100.0	-	-	97.6	98.1
Buses	0	0	0	-	0	0	1	0	-	1	2	0	0	-	2	3
% Buses	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.2	0.5	0.0	-	-	0.4	0.3
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	2	0	0	-	2	2
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.5	0.0	-	-	0.4	0.2
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.2	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	4.8	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	20	-	-	-	-	1	-	-	-	-	1	-	-
% Pedestrians	-	-	-	95.2	-	-	-	-	100.0	-	-	-	-	100.0	-	-

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022



Turning Movement Peak Hour Data Plot (12:15 PM)

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
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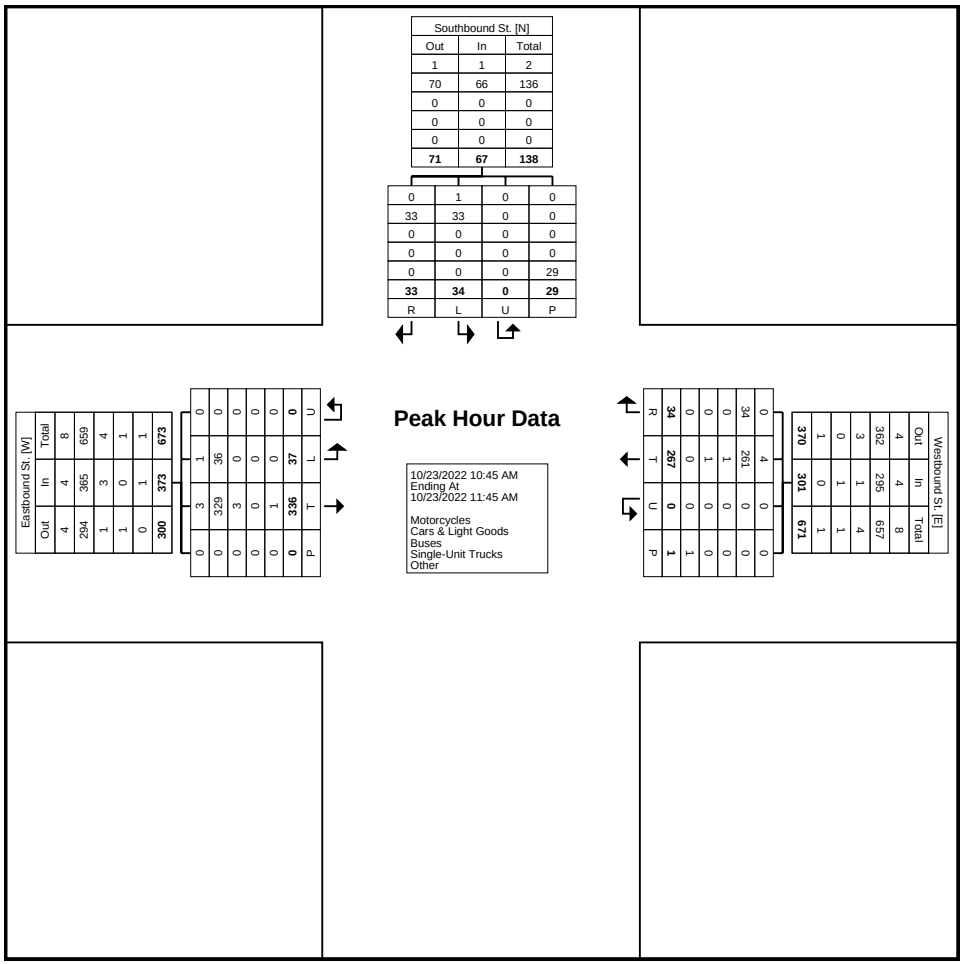
Turning Movement Peak Hour Data (10:45 AM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
10:45 AM	10	8	0	8	18	6	59	0	0	65	93	11	0	0	104	187
11:00 AM	7	10	0	4	17	6	60	0	0	66	79	10	0	0	89	172
11:15 AM	8	5	0	10	13	8	80	0	1	88	69	8	0	0	77	178
11:30 AM	8	11	0	7	19	14	68	0	0	82	95	8	0	0	103	204
Total	33	34	0	29	67	34	267	0	1	301	336	37	0	0	373	741
Approach %	49.3	50.7	0.0	-	-	11.3	88.7	0.0	-	-	90.1	9.9	0.0	-	-	-
Total %	4.5	4.6	0.0	-	9.0	4.6	36.0	0.0	-	40.6	45.3	5.0	0.0	-	50.3	-
PHF	0.825	0.773	0.000	-	0.882	0.607	0.834	0.000	-	0.855	0.884	0.841	0.000	-	0.897	0.908
Motorcycles	0	1	0	-	1	0	4	0	-	4	3	1	0	-	4	9
% Motorcycles	0.0	2.9	-	-	1.5	0.0	1.5	-	-	1.3	0.9	2.7	-	-	1.1	1.2
Cars & Light Goods	33	33	0	-	66	34	261	0	-	295	329	36	0	-	365	726
% Cars & Light Goods	100.0	97.1	-	-	98.5	100.0	97.8	-	-	98.0	97.9	97.3	-	-	97.9	98.0
Buses	0	0	0	-	0	0	1	0	-	1	3	0	0	-	3	4
% Buses	0.0	0.0	-	-	0.0	0.0	0.4	-	-	0.3	0.9	0.0	-	-	0.8	0.5
Single-Unit Trucks	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.4	-	-	0.3	0.0	0.0	-	-	0.0	0.1
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.3	0.0	-	-	0.3	0.1
Bicycles on Crosswalk	-	-	-	6	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	20.7	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	23	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	79.3	-	-	-	-	100.0	-	-	-	-	-	-	-

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022



Turning Movement Peak Hour Data Plot (10:45 AM)

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
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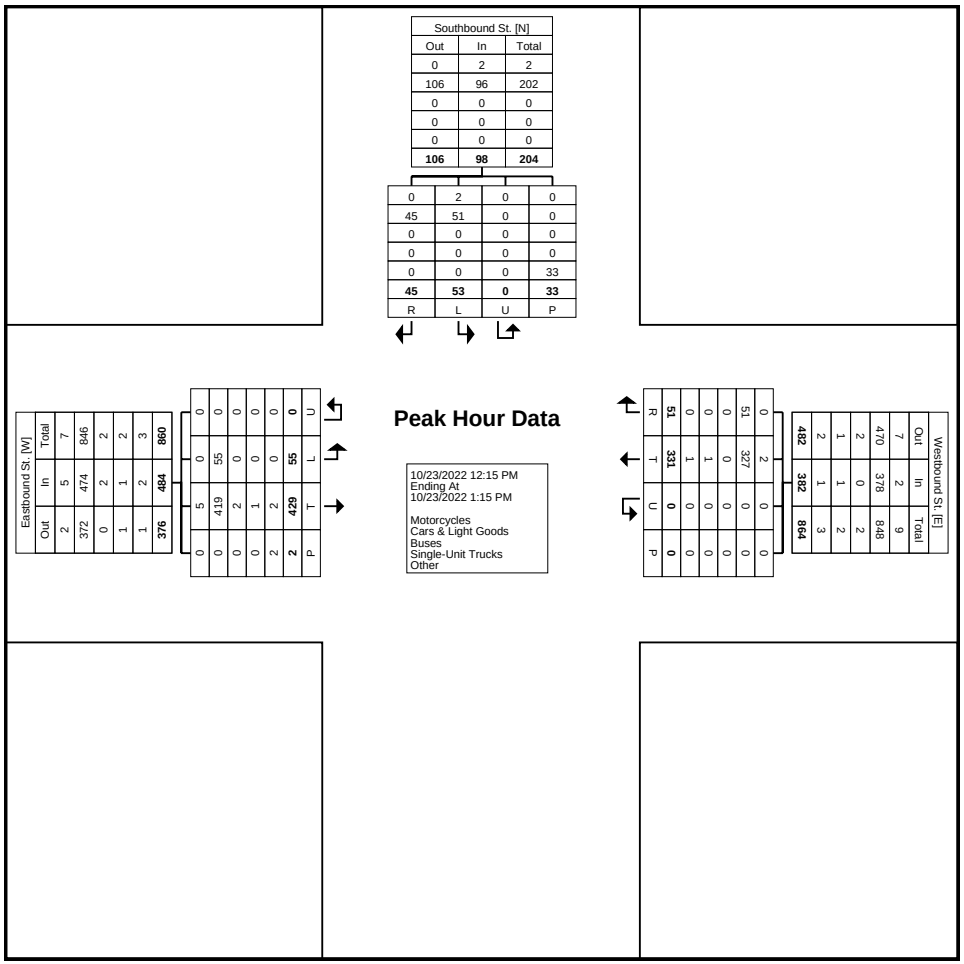
Turning Movement Peak Hour Data (12:15 PM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:15 PM	14	12	0	9	26	17	81	0	0	98	97	18	0	0	115	239
12:30 PM	11	10	0	11	21	8	86	0	0	94	96	12	0	2	108	223
12:45 PM	12	19	0	7	31	13	98	0	0	111	94	9	0	0	103	245
1:00 PM	8	12	0	6	20	13	66	0	0	79	142	16	0	0	158	257
Total	45	53	0	33	98	51	331	0	0	382	429	55	0	2	484	964
Approach %	45.9	54.1	0.0	-	-	13.4	86.6	0.0	-	-	88.6	11.4	0.0	-	-	-
Total %	4.7	5.5	0.0	-	10.2	5.3	34.3	0.0	-	39.6	44.5	5.7	0.0	-	50.2	-
PHF	0.804	0.697	0.000	-	0.790	0.750	0.844	0.000	-	0.860	0.755	0.764	0.000	-	0.766	0.938
Motorcycles	0	2	0	-	2	0	2	0	-	2	5	0	0	-	5	9
% Motorcycles	0.0	3.8	-	-	2.0	0.0	0.6	-	-	0.5	1.2	0.0	-	-	1.0	0.9
Cars & Light Goods	45	51	0	-	96	51	327	0	-	378	419	55	0	-	474	948
% Cars & Light Goods	100.0	96.2	-	-	98.0	100.0	98.8	-	-	99.0	97.7	100.0	-	-	97.9	98.3
Buses	0	0	0	-	0	0	0	0	-	0	2	0	0	-	2	2
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.5	0.0	-	-	0.4	0.2
Single-Unit Trucks	0	0	0	-	0	0	1	0	-	1	1	0	0	-	1	2
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.2	0.0	-	-	0.2	0.2
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	2	0	0	-	2	3
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.5	0.0	-	-	0.4	0.3
Bicycles on Crosswalk	-	-	-	5	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	15.2	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	28	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	84.8	-	-	-	-	-	-	-	-	-	100.0	-	-

City of North Bay (ON)
200 McIntyre St. E.

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(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
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Turning Movement Peak Hour Data Plot (12:15 PM)

City of North Bay (ON)
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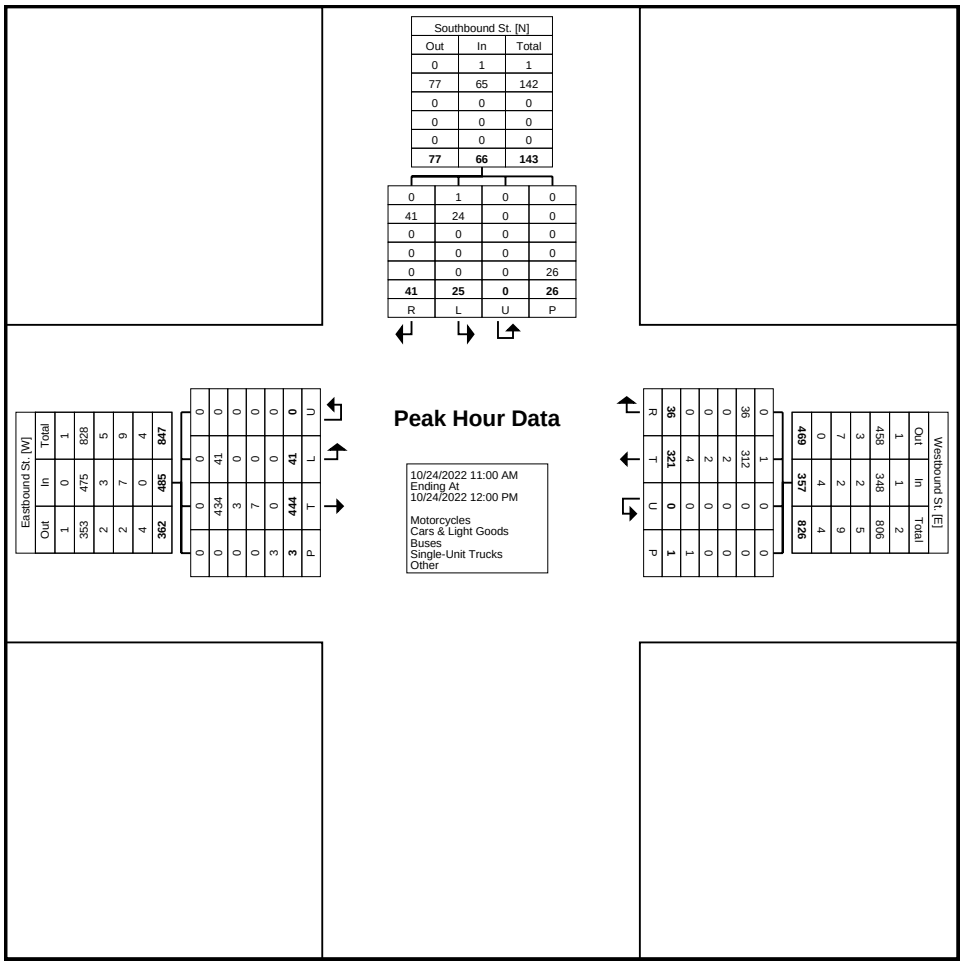
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	11	9	0	6	20	9	69	0	1	78	101	3	0	0	104	202
11:15 AM	10	4	0	8	14	6	73	0	0	79	95	16	0	0	111	204
11:30 AM	9	7	0	5	16	13	87	0	0	100	122	13	0	0	135	251
11:45 AM	11	5	0	7	16	8	92	0	0	100	126	9	0	3	135	251
Total	41	25	0	26	66	36	321	0	1	357	444	41	0	3	485	908
Approach %	62.1	37.9	0.0	-	-	10.1	89.9	0.0	-	-	91.5	8.5	0.0	-	-	-
Total %	4.5	2.8	0.0	-	7.3	4.0	35.4	0.0	-	39.3	48.9	4.5	0.0	-	53.4	-
PHF	0.932	0.694	0.000	-	0.825	0.692	0.872	0.000	-	0.893	0.881	0.641	0.000	-	0.898	0.904
Motorcycles	0	1	0	-	1	0	1	0	-	1	0	0	0	-	0	2
% Motorcycles	0.0	4.0	-	-	1.5	0.0	0.3	-	-	0.3	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	41	24	0	-	65	36	312	0	-	348	434	41	0	-	475	888
% Cars & Light Goods	100.0	96.0	-	-	98.5	100.0	97.2	-	-	97.5	97.7	100.0	-	-	97.9	97.8
Buses	0	0	0	-	0	0	2	0	-	2	3	0	0	-	3	5
% Buses	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.6	0.7	0.0	-	-	0.6	0.6
Single-Unit Trucks	0	0	0	-	0	0	2	0	-	2	7	0	0	-	7	9
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.6	1.6	0.0	-	-	1.4	1.0
Articulated Trucks	0	0	0	-	0	0	3	0	-	3	0	0	0	-	0	3
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.8	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	7.7	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	24	-	-	-	-	1	-	-	-	-	3	-	-
% Pedestrians	-	-	-	92.3	-	-	-	-	100.0	-	-	-	-	100.0	-	-

City of North Bay (ON)
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Count Name: McKeown and Cartier
Site Code:
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Turning Movement Peak Hour Data Plot (11:00 AM)

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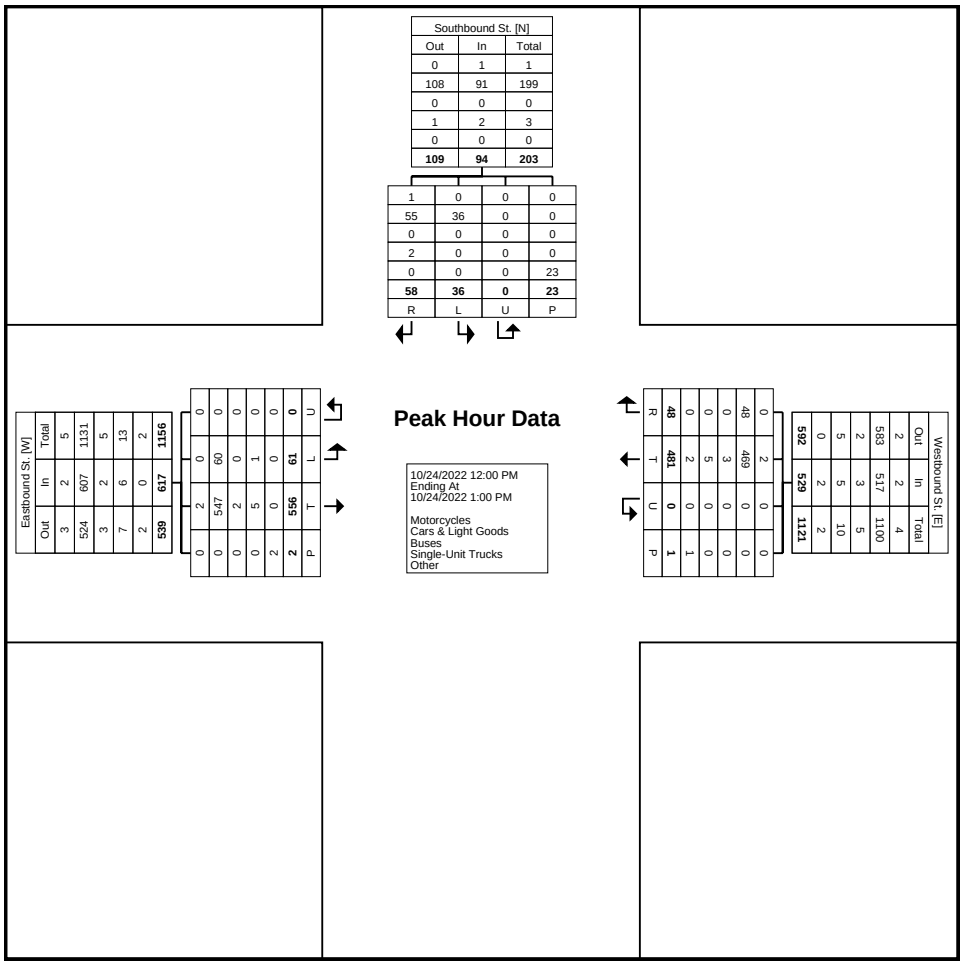
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:00 PM	6	8	0	7	14	12	97	0	0	109	152	21	0	0	173	296
12:15 PM	16	10	0	7	26	12	134	0	1	146	138	8	0	0	146	318
12:30 PM	19	9	0	1	28	10	127	0	0	137	125	22	0	1	147	312
12:45 PM	17	9	0	8	26	14	123	0	0	137	141	10	0	1	151	314
Total	58	36	0	23	94	48	481	0	1	529	556	61	0	2	617	1240
Approach %	61.7	38.3	0.0	-	-	9.1	90.9	0.0	-	-	90.1	9.9	0.0	-	-	-
Total %	4.7	2.9	0.0	-	7.6	3.9	38.8	0.0	-	42.7	44.8	4.9	0.0	-	49.8	-
PHF	0.763	0.900	0.000	-	0.839	0.857	0.897	0.000	-	0.906	0.914	0.693	0.000	-	0.892	0.975
Motorcycles	1	0	0	-	1	0	2	0	-	2	2	0	0	-	2	5
% Motorcycles	1.7	0.0	-	-	1.1	0.0	0.4	-	-	0.4	0.4	0.0	-	-	0.3	0.4
Cars & Light Goods	55	36	0	-	91	48	469	0	-	517	547	60	0	-	607	1215
% Cars & Light Goods	94.8	100.0	-	-	96.8	100.0	97.5	-	-	97.7	98.4	98.4	-	-	98.4	98.0
Buses	0	0	0	-	0	0	3	0	-	3	2	0	0	-	2	5
% Buses	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.6	0.4	0.0	-	-	0.3	0.4
Single-Unit Trucks	2	0	0	-	2	0	5	0	-	5	5	1	0	-	6	13
% Single-Unit Trucks	3.4	0.0	-	-	2.1	0.0	1.0	-	-	0.9	0.9	1.6	-	-	1.0	1.0
Articulated Trucks	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.2	-	-	0.2	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.2	-	-	0.2	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	8.7	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	21	-	-	-	-	1	-	-	-	-	2	-	-
% Pedestrians	-	-	-	91.3	-	-	-	-	100.0	-	-	-	-	100.0	-	-

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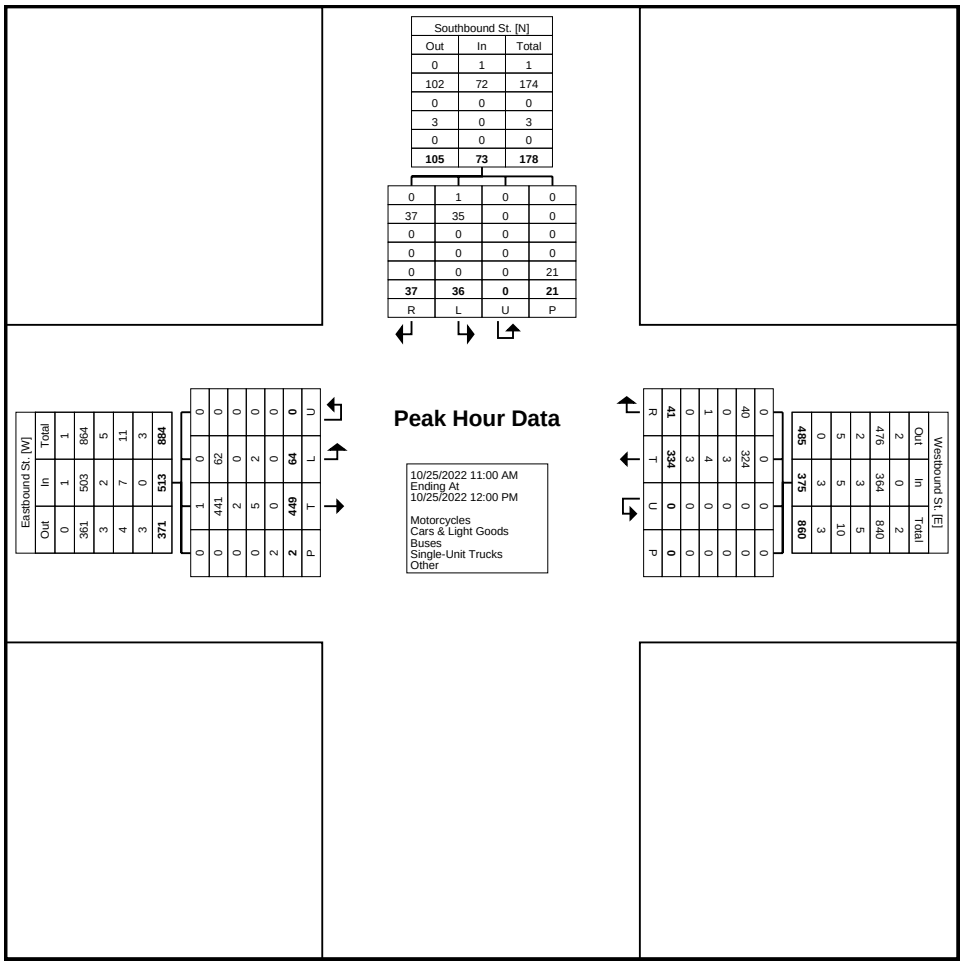
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	5	6	0	5	11	9	90	0	0	99	103	11	0	0	114	224
11:15 AM	10	9	0	4	19	10	69	0	0	79	89	18	0	0	107	205
11:30 AM	7	10	0	7	17	11	75	0	0	86	119	25	0	0	144	247
11:45 AM	15	11	0	5	26	11	100	0	0	111	138	10	0	2	148	285
Total	37	36	0	21	73	41	334	0	0	375	449	64	0	2	513	961
Approach %	50.7	49.3	0.0	-	-	10.9	89.1	0.0	-	-	87.5	12.5	0.0	-	-	-
Total %	3.9	3.7	0.0	-	7.6	4.3	34.8	0.0	-	39.0	46.7	6.7	0.0	-	53.4	-
PHF	0.617	0.818	0.000	-	0.702	0.932	0.835	0.000	-	0.845	0.813	0.640	0.000	-	0.867	0.843
Motorcycles	0	1	0	-	1	0	0	0	-	0	1	0	0	-	1	2
% Motorcycles	0.0	2.8	-	-	1.4	0.0	0.0	-	-	0.0	0.2	0.0	-	-	0.2	0.2
Cars & Light Goods	37	35	0	-	72	40	324	0	-	364	441	62	0	-	503	939
% Cars & Light Goods	100.0	97.2	-	-	98.6	97.6	97.0	-	-	97.1	98.2	96.9	-	-	98.1	97.7
Buses	0	0	0	-	0	0	3	0	-	3	2	0	0	-	2	5
% Buses	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.8	0.4	0.0	-	-	0.4	0.5
Single-Unit Trucks	0	0	0	-	0	1	4	0	-	5	5	2	0	-	7	12
% Single-Unit Trucks	0.0	0.0	-	-	0.0	2.4	1.2	-	-	1.3	1.1	3.1	-	-	1.4	1.2
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.5	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	4.8	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	20	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	95.2	-	-	-	-	-	-	-	-	-	100.0	-	-

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022



Turning Movement Peak Hour Data Plot (11:00 AM)

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022

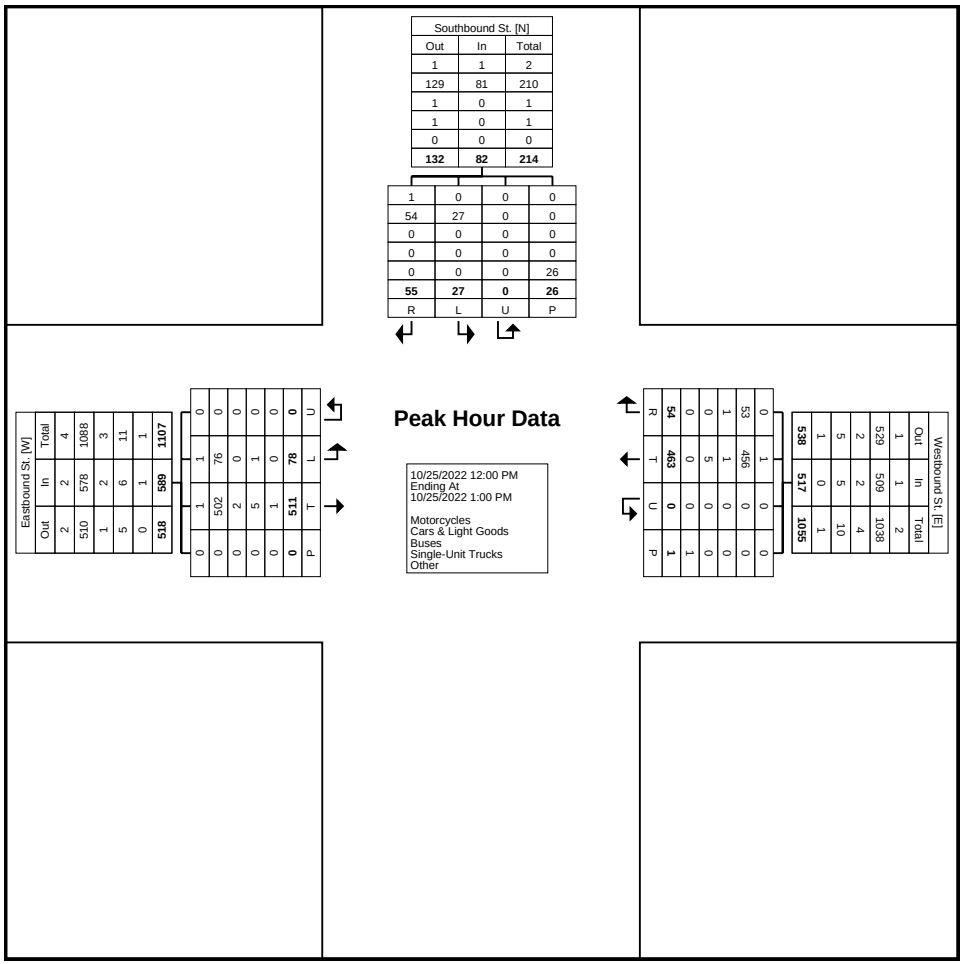
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Southbound St. Southbound					Westbound St. Westbound					Eastbound St. Eastbound					
	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:00 PM	14	6	0	5	20	16	102	0	0	118	156	19	0	0	175	313
12:15 PM	6	8	0	6	14	13	120	0	0	133	119	20	0	0	139	286
12:30 PM	21	6	0	8	27	9	122	0	1	131	112	26	0	0	138	296
12:45 PM	14	7	0	7	21	16	119	0	0	135	124	13	0	0	137	293
Total	55	27	0	26	82	54	463	0	1	517	511	78	0	0	589	1188
Approach %	67.1	32.9	0.0	-	-	10.4	89.6	0.0	-	-	86.8	13.2	0.0	-	-	-
Total %	4.6	2.3	0.0	-	6.9	4.5	39.0	0.0	-	43.5	43.0	6.6	0.0	-	49.6	-
PHF	0.655	0.844	0.000	-	0.759	0.844	0.949	0.000	-	0.957	0.819	0.750	0.000	-	0.841	0.949
Motorcycles	1	0	0	-	1	0	1	0	-	1	1	1	0	-	2	4
% Motorcycles	1.8	0.0	-	-	1.2	0.0	0.2	-	-	0.2	0.2	1.3	-	-	0.3	0.3
Cars & Light Goods	54	27	0	-	81	53	456	0	-	509	502	76	0	-	578	1168
% Cars & Light Goods	98.2	100.0	-	-	98.8	98.1	98.5	-	-	98.5	98.2	97.4	-	-	98.1	98.3
Buses	0	0	0	-	0	1	1	0	-	2	2	0	0	-	2	4
% Buses	0.0	0.0	-	-	0.0	1.9	0.2	-	-	0.4	0.4	0.0	-	-	0.3	0.3
Single-Unit Trucks	0	0	0	-	0	0	5	0	-	5	5	1	0	-	6	11
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	1.1	-	-	1.0	1.0	1.3	-	-	1.0	0.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.2	0.0	-	-	0.2	0.1
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	3.8	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	25	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	96.2	-	-	-	-	100.0	-	-	-	-	-	-	-

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Count Name: McKeown and Cartier
Site Code:
Start Date: 10/22/2022



Turning Movement Peak Hour Data Plot (12:00 PM)

Study Name	McKeown and Cartier Plaza Intersection
Start Date	Friday, November 19, 2021 7:00 AM
End Date	Tuesday, November 23, 2021 7:00 PM
Site Code	

Report Summary

		Southbound						Westbound						Northbound						Eastbound						
Time Period	**Class.**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**Total**
Peak 1	Lights	10	6	29	0	45	43	28	271	97	0	396	399	80	2	69	0	151	216	113	290	13	0	416	350	1008
Specified Period	%	91%	100%	100%	0%	98%	96%	100%	95%	100%	0%	97%	97%	98%	100%	99%	0%	98%	100%	99%	97%	87%	0%	97%	96%	97%
7:00 AM - 12:00 PM	Buses	0	0	0	0	0	0	0	2	0	0	2	10	1	0	0	0	1	1	1	9	0	0	10	2	13
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	2%	1%	0%	0%	0%	1%	0%	1%	3%	0%	0%	2%	1%	1%
11:00 AM - 12:00 PM	ngle-Unit Truc	1	0	0	0	1	2	0	10	0	0	10	1	0	0	1	0	1	0	0	1	2	0	3	12	15
	%	9%	0%	0%	0%	2%	4%	0%	4%	0%	0%	2%	0%	0%	0%	1%	0%	1%	0%	0%	0%	13%	0%	1%	3%	1%
	ticulated Truc	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	1	2
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	Total	**11**	**6**	**29**	**0**	**46**	**45**	**28**	**284**	**97**	**0**	**409**	**411**	**82**	**2**	**70**	**0**	**154**	**217**	**114**	**300**	**15**	**0**	**429**	**365**	**1038**
	PHF	0.46	0.5	0.66	0	0.82	0.75	0.78	0.88	0.87	0	0.92	0.93	0.73	0.5	0.73	0	0.88	0.92	0.89	0.83	0.62	0	0.84	0.91	0.96
	Approach %					4%	4%					39%	40%					15%	21%					41%	35%	
Peak 2	Lights	14	9	38	0	61	75	54	461	142	0	657	644	120	9	129	0	258	315	164	486	12	0	662	604	1638
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	99%	100%	0%	99%	98%	99%	100%	99%	0%	99%	99%	99%	98%	100%	0%	98%	99%	99%
12:00 PM - 7:00 PM	Buses	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	1	2
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:15 PM - 2:15 PM	ngle-Unit Truc	0	0	0	0	0	0	0	4	0	0	4	8	1	0	1	0	2	2	2	7	0	0	9	5	15
	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	1%	0%	1%	0%	1%	1%	1%	1%	0%	0%	1%	1%	1%
	ticulated Truc	0	0	0	0	0	0	0	2	0	0	2	2	0	0	0	0	0	0	0	2	0	0	2	2	4
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total	**14**	**9**	**38**	**0**	**61**	**75**	**54**	**468**	**142**	**0**	**664**	**655**	**121**	**9**	**130**	**0**	**260**	**317**	**166**	**496**	**12**	**0**	**674**	**612**	**1659**
	PHF	0.7	0.56	0.68	0	0.76	0.75	0.71	0.92	0.81	0	0.94	0.91	0.8	0.56	0.81	0	0.88	0.77	0.73	0.94	0.75	0	0.91	0.91	0.95
	Approach %					4%	5%					40%	39%					16%	19%					41%	37%	

Study Name	McKeown and Cartier Plaza Intersection
Start Date	Friday, November 19, 2021 7:00 AM
End Date	Tuesday, November 23, 2021 7:00 PM
Site Code	

Report Summary

		Southbound						Westbound						Northbound						Eastbound						
Time Period	**Class.**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**Total**
Peak 1	Lights	4	5	29	0	38	37	30	256	63	0	349	367	58	2	60	0	120	161	93	280	5	0	378	320	885
Specified Period	%	100%	100%	97%	0%	97%	97%	100%	96%	100%	0%	97%	98%	100%	100%	98%	0%	99%	99%	98%	97%	83%	0%	97%	96%	97%
7:00 AM - 12:00 PM	Buses	0	0	0	0	0	0	0	2	0	0	2	3	0	0	0	0	0	0	0	3	0	0	3	2	5
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	1%
11:00 AM - 12:00 PM	ngle-Unit Truc	0	0	0	0	0	1	0	8	0	0	8	5	0	0	1	0	1	2	2	5	1	0	8	9	17
	%	0%	0%	0%	0%	0%	3%	0%	3%	0%	0%	2%	1%	0%	0%	2%	0%	1%	1%	2%	2%	17%	0%	2%	3%	2%
	ticulated Truc	0	0	1	0	1	0	0	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	2	3
	%	0%	0%	3%	0%	3%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
	Total	**4**	**5**	**30**	**0**	**39**	**38**	**30**	**268**	**63**	**0**	**361**	**376**	**58**	**2**	**61**	**0**	**121**	**163**	**95**	**288**	**6**	**0**	**389**	**333**	**910**
	PHF	0.5	0.42	0.83	0	0.81	0.86	0.83	0.83	0.75	0	0.91	0.91	0.85	0.25	0.8	0	0.86	0.82	0.91	0.89	0.75	0	0.91	0.82	0.93
	Approach %					4%	4%					40%	41%					13%	18%					43%	37%	
Peak 2	Lights	14	17	34	0	65	62	38	379	104	0	521	558	97	9	109	0	215	248	127	427	15	0	569	502	1370
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	98%	100%	0%	99%	99%	99%	100%	100%	0%	100%	100%	100%	99%	100%	0%	99%	99%	99%
12:00 PM - 7:00 PM	Buses	0	0	0	0	0	0	0	3	0	0	3	3	0	0	0	0	0	0	0	3	0	0	3	3	6
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%
1:00 PM - 2:00 PM	ngle-Unit Truc	0	0	0	0	0	0	0	2	0	0	2	2	1	0	0	0	1	0	0	1	0	0	1	2	4
	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	ticulated Truc	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	2	0	0	2	1	3
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total	**14**	**17**	**34**	**0**	**65**	**62**	**38**	**385**	**104**	**0**	**527**	**565**	**98**	**9**	**109**	**0**	**216**	**248**	**127**	**433**	**15**	**0**	**575**	**508**	**1383**
	PHF	0.7	0.61	0.85	0	0.81	0.97	0.86	0.82	0.79	0	0.83	0.86	0.7	0.75	0.78	0	0.9	0.9	0.77	0.81	0.62	0	0.82	0.83	0.94
	Approach %					5%	4%					38%	41%					16%	18%					42%	37%	

Study Name	McKeown and Cartier Plaza Intersection
Start Date	Friday, November 19, 2021 7:00 AM
End Date	Tuesday, November 23, 2021 7:00 PM
Site Code	

Report Summary

		Southbound						Westbound						Northbound						Eastbound						
Time Period	**Class.**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**R**	**T**	**L**	**U**	**I**	**O**	**Total**
Peak 1	Lights	5	7	33	0	45	40	29	260	60	0	349	383	47	3	58	0	108	173	106	303	8	0	417	323	919
Specified Period	%	100%	100%	97%	0%	98%	95%	97%	95%	98%	0%	96%	97%	98%	100%	100%	0%	99%	99%	99%	96%	89%	0%	97%	96%	97%
7:00 AM - 12:00 PM	Buses	0	0	0	0	0	0	0	2	0	0	2	4	0	0	0	0	0	0	0	4	0	0	4	2	6
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%	1%
11:00 AM - 12:00 PM	ngle-Unit Truc	0	0	1	0	1	2	1	10	1	0	12	8	0	0	0	0	0	2	1	7	1	0	9	10	22
	%	0%	0%	3%	0%	2%	5%	3%	4%	2%	0%	3%	2%	0%	0%	0%	0%	0%	1%	1%	2%	11%	0%	2%	3%	2%
	ticulated Truc	0	0	0	0	0	0	0	2	0	0	2	1	1	0	0	0	1	0	0	0	0	0	0	2	3
	%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	2%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%
	Total	**5**	**7**	**34**	**0**	**46**	**42**	**30**	**274**	**61**	**0**	**365**	**396**	**48**	**3**	**58**	**0**	**109**	**175**	**107**	**314**	**9**	**0**	**430**	**337**	**950**
	PHF	0.62	0.58	0.77	0	0.77	0.88	0.83	0.78	0.8	0	0.81	0.91	0.67	0.75	0.66	0	0.72	0.88	0.81	0.85	0.45	0	0.9	0.76	0.85
	Approach %					5%	4%					38%	42%					11%	18%					45%	35%	
Peak 2	Lights	10	10	35	0	55	53	37	400	88	0	525	585	90	7	111	0	208	230	132	460	9	0	601	521	1389
Specified Period	%	91%	100%	100%	0%	98%	98%	97%	98%	100%	0%	98%	98%	98%	100%	100%	0%	99%	99%	99%	98%	100%	0%	98%	98%	98%
12:00 PM - 7:00 PM	Buses	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	2	0	0	2	1	3
One Hour Peak	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00 PM - 2:00 PM	ngle-Unit Truc	1	0	0	0	1	1	1	7	0	0	8	8	2	0	0	0	2	2	2	6	0	0	8	8	19
	%	9%	0%	0%	0%	2%	2%	3%	2%	0%	0%	1%	1%	2%	0%	0%	0%	1%	1%	1%	1%	0%	0%	1%	2%	1%
	ticulated Truc	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	1	2
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total	**11**	**10**	**35**	**0**	**56**	**54**	**38**	**409**	**88**	**0**	**535**	**596**	**92**	**7**	**111**	**0**	**210**	**232**	**134**	**469**	**9**	**0**	**612**	**531**	**1413**
	PHF	0.69	0.62	0.67	0	0.7	0.84	0.86	0.87	0.81	0	0.92	0.94	0.82	0.44	0.84	0	0.88	0.84	0.8	0.94	0.75	0	0.91	0.86	0.97
	Approach %					4%	4%					38%	42%					15%	16%					43%	38%	

City of North Bay (ON)
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Count Name: McKeown and Champlain
Site Code:
Start Date: 10/21/2022

Turning Movement Data

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
7:00 AM	0	6	8	0	1	14	3	48	1	0	0	52	1	1	2	0	1	4	6	45	0	0	0	51	121
7:15 AM	2	8	7	0	3	17	2	58	6	0	0	66	3	1	3	0	0	7	7	40	0	0	0	47	137
7:30 AM	3	2	17	0	0	22	5	111	4	0	0	120	1	2	2	0	0	5	12	43	0	0	0	55	202
7:45 AM	2	17	18	0	2	37	8	87	8	0	1	103	1	1	4	0	0	6	16	42	0	0	5	58	204
Hourly Total	7	33	50	0	6	90	18	304	19	0	1	341	6	5	11	0	1	22	41	170	0	0	5	211	664
8:00 AM	2	11	16	0	1	29	13	84	10	0	1	107	4	0	10	0	0	14	7	62	0	0	3	69	219
8:15 AM	4	14	28	0	3	46	11	73	7	0	0	91	8	4	8	0	0	20	15	75	2	0	5	92	249
8:30 AM	4	12	14	0	0	30	9	94	12	0	0	115	3	3	9	0	0	15	8	69	1	0	0	78	238
8:45 AM	3	7	17	0	0	27	8	101	12	0	0	121	5	2	10	0	0	17	12	56	1	0	3	69	234
Hourly Total	13	44	75	0	4	132	41	352	41	0	1	434	20	9	37	0	0	66	42	262	4	0	11	308	940
9:00 AM	3	8	8	0	2	19	12	78	7	0	1	97	8	0	9	0	1	17	15	51	0	0	2	66	199
9:15 AM	4	7	13	0	4	24	12	70	11	0	1	93	10	1	9	0	1	20	15	84	1	0	3	100	237
9:30 AM	0	9	14	0	0	23	10	75	28	0	5	113	7	1	10	0	1	18	19	85	1	0	0	105	259
9:45 AM	1	10	13	0	4	24	5	76	21	0	1	102	11	2	10	0	2	23	18	91	0	0	4	109	258
Hourly Total	8	34	48	0	10	90	39	299	67	0	8	405	36	4	38	0	5	78	67	311	2	0	9	380	953
10:00 AM	0	3	12	0	6	15	9	88	13	0	2	110	7	0	11	0	2	18	18	91	1	0	0	110	253
10:15 AM	1	10	11	0	3	22	13	105	16	0	0	134	9	4	12	0	0	25	18	79	1	0	2	98	279
10:30 AM	4	7	8	0	6	19	21	86	23	0	4	130	9	2	6	0	1	17	26	112	1	0	3	139	305
10:45 AM	2	4	16	0	2	22	12	112	29	0	2	153	13	3	16	0	1	32	28	98	1	0	7	127	334
Hourly Total	7	24	47	0	17	78	55	391	81	0	8	527	38	9	45	0	4	92	90	380	4	0	12	474	1171
11:00 AM	3	4	9	0	2	16	8	90	15	0	1	113	8	5	12	0	1	25	26	105	2	0	5	133	287
11:15 AM	2	7	16	0	7	25	17	83	37	0	4	137	14	6	5	0	3	25	19	125	3	0	2	147	334
11:30 AM	2	7	17	0	0	26	14	92	24	0	1	130	17	2	14	0	3	33	26	147	3	0	1	176	365
11:45 AM	1	5	9	0	1	15	9	110	26	0	1	145	15	3	19	0	4	37	34	117	1	0	12	152	349
Hourly Total	8	23	51	0	10	82	48	375	102	0	7	525	54	16	50	0	11	120	105	494	9	0	20	608	1335
12:00 PM	1	9	17	0	4	27	16	117	27	0	2	160	16	5	14	0	0	35	28	153	1	0	2	182	404
12:15 PM	2	3	18	1	5	24	19	118	24	0	0	161	20	9	20	0	0	49	30	129	1	0	4	160	394
12:30 PM	3	7	19	0	6	29	20	118	35	0	4	173	20	1	22	0	0	43	24	145	2	0	1	171	416
12:45 PM	4	15	20	0	9	39	12	154	24	0	1	190	17	3	18	0	0	38	40	109	2	0	5	151	418
Hourly Total	10	34	74	1	24	119	67	507	110	0	7	684	73	18	74	0	0	165	122	536	6	0	12	664	1632
1:00 PM	4	14	15	0	2	33	14	128	42	0	2	184	13	11	13	0	3	37	25	117	1	0	3	143	397
1:15 PM	3	4	4	0	6	11	10	123	22	0	3	155	18	8	14	0	4	40	34	132	1	0	6	167	373
1:30 PM	4	6	18	0	5	28	12	112	44	0	3	168	23	4	10	0	1	37	23	133	1	0	6	157	390
1:45 PM	2	9	17	0	3	28	9	116	26	0	2	151	12	5	13	0	0	30	35	131	2	0	0	168	377
Hourly Total	13	33	54	0	16	100	45	479	134	0	10	658	66	28	50	0	8	144	117	513	5	0	15	635	1537
2:00 PM	4	9	15	0	2	28	12	105	23	0	2	140	15	3	21	0	2	39	28	138	5	0	3	171	378
2:15 PM	3	3	15	0	9	21	24	105	20	0	2	149	11	7	10	0	3	28	34	126	3	0	6	163	361
2:30 PM	0	14	18	0	5	32	18	96	32	0	6	146	14	7	18	0	7	39	29	113	3	0	5	145	362

2:45 PM	5	10	18	0	11	33	24	78	14	0	0	116	21	3	6	0	2	30	26	138	3	0	3	167	346
Hourly Total	12	36	66	0	27	114	78	384	89	0	10	551	61	20	55	0	14	136	117	515	14	0	17	646	1447
3:00 PM	2	12	12	0	10	26	27	105	25	1	1	158	16	14	14	0	4	44	22	106	2	0	10	130	358
3:15 PM	5	9	18	0	4	32	21	91	23	0	0	135	11	9	16	0	1	36	23	128	1	0	4	152	355
3:30 PM	3	8	15	0	5	26	22	120	30	0	4	172	9	8	10	0	3	27	20	99	1	0	5	120	345
3:45 PM	3	12	19	0	5	34	14	112	16	0	4	142	10	5	15	0	7	30	31	109	1	0	11	141	347
Hourly Total	13	41	64	0	24	118	84	428	94	1	9	607	46	36	55	0	15	137	96	442	5	0	30	543	1405
4:00 PM	4	11	18	0	11	33	24	118	24	0	2	166	16	2	13	0	1	31	28	127	2	0	8	157	387
4:15 PM	2	6	17	0	10	25	17	102	12	0	3	131	16	6	7	0	8	29	36	116	0	0	8	152	337
4:30 PM	5	11	14	0	11	30	24	106	37	0	2	167	13	6	22	0	0	41	34	141	6	0	9	181	419
4:45 PM	4	11	13	0	7	28	19	123	21	0	3	163	14	18	10	0	4	42	26	120	2	0	8	148	381
Hourly Total	15	39	62	0	39	116	84	449	94	0	10	627	59	32	52	0	13	143	124	504	10	0	33	638	1524
5:00 PM	3	12	13	0	5	28	19	115	21	0	3	155	10	11	19	0	1	40	22	129	3	0	7	154	377
5:15 PM	3	5	14	0	4	22	29	111	24	0	1	164	11	9	17	0	3	37	33	138	0	0	8	171	394
5:30 PM	3	17	8	0	9	28	19	113	20	0	4	152	13	10	21	0	2	44	25	121	3	0	8	149	373
5:45 PM	5	10	9	0	8	24	26	107	23	0	1	156	13	9	16	0	1	38	18	131	2	0	5	151	369
Hourly Total	14	44	44	0	26	102	93	446	88	0	9	627	47	39	73	0	7	159	98	519	8	0	28	625	1513
6:00 PM	1	11	7	0	4	19	19	98	24	0	2	141	20	17	15	0	1	52	25	90	0	0	5	115	327
6:15 PM	2	9	13	0	9	24	17	93	21	0	4	131	11	11	18	0	5	40	25	117	0	0	8	142	337
6:30 PM	1	7	13	0	7	21	15	108	25	0	5	148	16	3	14	0	5	33	17	95	2	0	4	114	316
6:45 PM	2	12	14	0	6	28	19	71	24	0	7	114	9	6	7	0	5	22	18	108	0	0	3	126	290
Hourly Total	6	39	47	0	26	92	70	370	94	0	18	534	56	37	54	0	16	147	85	410	2	0	20	497	1270
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	0	1	5	0	3	6	4	13	3	0	1	20	0	2	0	0	0	2	5	18	1	0	1	24	52
7:15 AM	2	0	4	0	2	6	1	19	6	0	1	26	5	0	0	0	0	5	2	20	0	0	0	22	59
7:30 AM	1	1	6	0	0	8	5	15	6	0	0	26	1	1	2	0	0	4	5	24	0	0	2	29	67
7:45 AM	0	3	14	0	4	17	6	21	7	0	2	34	3	1	1	0	1	5	8	19	0	0	0	27	83
Hourly Total	3	5	29	0	9	37	16	68	22	0	4	106	9	4	3	0	1	16	20	81	1	0	3	102	261
8:00 AM	2	2	15	0	3	19	4	37	7	0	0	48	0	0	3	0	0	3	1	34	0	0	0	35	105
8:15 AM	1	5	7	0	4	13	6	33	11	0	0	50	4	0	2	0	0	6	4	26	1	0	1	31	100
8:30 AM	2	3	8	0	1	13	6	42	7	0	0	55	7	2	4	0	0	13	6	33	1	0	2	40	121
8:45 AM	3	5	18	0	0	26	7	60	6	0	1	73	2	1	2	0	1	5	10	41	0	0	4	51	155
Hourly Total	8	15	48	0	8	71	23	172	31	0	1	226	13	3	11	0	1	27	21	134	2	0	7	157	481
9:00 AM	0	1	5	0	3	6	5	42	18	0	0	65	3	1	4	0	1	8	7	49	0	0	2	56	135
9:15 AM	2	12	9	0	1	23	6	59	15	0	1	80	2	4	3	0	1	9	10	56	0	0	1	66	178
9:30 AM	1	10	9	0	3	20	10	72	18	0	1	100	3	2	6	0	1	11	8	69	2	0	0	79	210
9:45 AM	2	6	7	0	7	15	12	84	17	0	1	113	6	2	6	0	16	14	8	81	1	0	4	90	232
Hourly Total	5	29	30	0	14	64	33	257	68	0	3	358	14	9	19	0	19	42	33	255	3	0	7	291	755
10:00 AM	1	7	11	0	2	19	12	85	26	0	0	123	6	2	3	0	21	11	19	83	1	0	0	103	256
10:15 AM	4	12	15	0	4	31	18	89	23	0	0	130	9	4	16	0	0	29	14	87	0	0	1	101	291
10:30 AM	0	5	13	0	5	18	14	71	29	0	0	114	15	3	7	0	1	25	26	88	2	0	4	116	273
10:45 AM	3	14	15	1	4	33	19	92	30	0	1	141	17	6	7	0	1	30	13	96	0	0	7	109	313
Hourly Total	8	38	54	1	15	101	63	337	108	0	1	508	47	15	33	0	23	95	72	354	3	0	12	429	1133
11:00 AM	3	11	17	0	2	31	14	66	26	0	0	106	14	2	10	0	4	26	24	101	1	0	3	126	289
11:15 AM	1	7	16	0	0	24	15	108	38	0	0	161	9	2	15	0	1	26	19	117	2	0	1	138	349
11:30 AM	3	4	17	0	1	24	18	101	27	0	0	146	11	10	12	0	1	33	27	109	1	0	6	137	340
11:45 AM	4	12	16	0	1	32	19	107	29	0	9	155	14	2	16	0	5	32	22	99	1	0	3	122	341
Hourly Total	11	34	66	0	4	111	66	382	120	0	9	568	48	16	53	0	11	117	92	426	5	0	13	523	1319
12:00 PM	3	7	14	0	3	24	14	99	19	0	1	132	17	8	8	0	5	33	19	113	0	0	3	132	321
12:15 PM	1	5	10	0	6	16	14	126	16	0	1	156	11	0	13	0	0	24	16	117	2	0	5	135	331
12:30 PM	2	16	12	0	2	30	11	117	33	0	1	161	14	4	12	0	1	30	21	118	1	0	3	140	361
12:45 PM	1	9	14	0	4	24	15	108	41	0	0	164	13	1	15	0	1	29	25	108	3	0	14	136	353

Hourly Total	7	37	50	0	15	94	54	450	109	0	3	613	55	13	48	0	7	116	81	456	6	0	25	543	1366
1:00 PM	1	5	19	0	1	25	26	112	37	0	1	175	20	6	23	0	2	49	37	128	1	0	8	166	415
1:15 PM	3	8	22	0	7	33	15	118	33	0	0	166	18	9	11	0	1	38	22	125	2	0	7	149	386
1:30 PM	2	8	12	0	6	22	23	91	18	0	1	132	14	6	16	0	1	36	20	110	1	0	2	131	321
1:45 PM	0	11	18	0	3	29	14	78	27	0	3	119	16	8	20	0	3	44	28	98	2	0	1	128	320
Hourly Total	6	32	71	0	17	109	78	399	115	0	5	592	68	29	70	0	7	167	107	461	6	0	18	574	1442
2:00 PM	6	10	13	0	4	29	20	68	33	0	0	121	20	8	18	0	0	46	19	103	5	0	3	127	323
2:15 PM	5	11	18	0	3	34	23	93	37	0	1	153	16	6	16	0	0	38	26	116	3	0	6	145	370
2:30 PM	4	13	10	0	12	27	13	69	28	0	9	110	13	8	14	0	6	35	25	112	4	0	22	141	313
2:45 PM	4	6	14	0	3	24	15	109	33	0	5	157	14	9	20	0	4	43	23	100	3	0	9	126	350
Hourly Total	19	40	55	0	22	114	71	339	131	0	15	541	63	31	68	0	10	162	93	431	15	0	40	539	1356
3:00 PM	0	11	9	0	5	20	24	88	28	0	4	140	12	10	12	0	2	34	13	114	1	0	5	128	322
3:15 PM	2	8	9	0	5	19	20	87	31	0	1	138	17	5	21	0	1	43	13	98	2	0	6	113	313
3:30 PM	5	14	13	0	6	32	14	76	35	0	8	125	20	11	8	0	5	39	15	117	1	0	6	133	329
3:45 PM	2	7	12	0	7	21	16	79	19	0	1	114	21	8	12	0	3	41	21	104	2	0	3	127	303
Hourly Total	9	40	43	0	23	92	74	330	113	0	14	517	70	34	53	0	11	157	62	433	6	0	20	501	1267
4:00 PM	5	11	15	0	8	31	20	73	18	0	2	111	11	8	12	0	3	31	16	114	0	0	5	130	303
4:15 PM	2	8	13	0	4	23	19	79	31	0	2	129	13	7	9	0	2	29	19	88	1	0	6	108	289
4:30 PM	0	9	15	0	8	24	15	83	27	0	1	125	14	8	14	0	0	36	17	104	2	0	4	123	308
4:45 PM	0	7	13	0	7	20	20	66	27	0	1	113	11	11	11	0	1	33	27	91	2	0	5	120	286
Hourly Total	7	35	56	0	27	98	74	301	103	0	6	478	49	34	46	0	6	129	79	397	5	0	20	481	1186
5:00 PM	1	8	7	0	6	16	24	94	15	0	1	133	12	3	13	0	2	28	27	99	0	0	7	126	303
5:15 PM	1	12	10	0	3	23	12	79	28	0	4	119	6	11	16	0	5	33	24	78	2	0	7	104	279
5:30 PM	2	7	7	0	10	16	12	73	21	0	2	106	10	5	13	0	7	28	14	90	1	0	16	105	255
5:45 PM	4	11	5	0	13	20	21	69	7	0	0	97	14	9	12	0	3	35	23	91	0	0	7	114	266
Hourly Total	8	38	29	0	32	75	69	315	71	0	7	455	42	28	54	0	17	124	88	358	3	0	37	449	1103
6:00 PM	1	10	13	0	6	24	11	62	10	0	0	83	11	3	8	0	1	22	14	88	4	0	10	106	235
6:15 PM	4	11	7	0	0	22	17	87	18	0	1	122	14	5	15	0	1	34	10	57	1	0	0	68	246
6:30 PM	1	4	9	0	6	14	13	65	15	0	4	93	7	3	17	0	11	27	25	68	1	0	8	94	228
6:45 PM	3	10	12	0	9	25	21	56	17	0	4	94	12	8	17	0	5	37	17	72	0	0	0	89	245
Hourly Total	9	35	41	0	21	85	62	270	60	0	9	392	44	19	57	0	18	120	66	285	6	0	18	357	954
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	0	2	0	0	0	2	1	9	0	0	0	10	3	1	1	0	0	5	2	18	1	0	0	21	38
7:15 AM	1	0	5	0	4	6	3	10	0	0	1	13	0	0	1	0	0	1	2	15	1	0	0	18	38
7:30 AM	2	4	4	0	2	10	4	12	0	0	2	16	1	0	0	0	0	1	4	11	0	0	0	15	42
7:45 AM	0	1	8	0	2	9	3	20	1	0	0	24	0	1	0	0	0	1	3	17	0	0	0	20	54
Hourly Total	3	7	17	0	8	27	11	51	1	0	3	63	4	2	2	0	0	8	11	61	2	0	0	74	172
8:00 AM	2	2	6	0	0	10	6	14	2	0	0	22	1	0	3	0	5	4	1	21	2	0	2	24	60
8:15 AM	1	4	6	0	0	11	4	27	5	0	3	36	5	0	2	0	0	7	3	22	1	0	3	26	80
8:30 AM	0	4	7	0	1	11	5	20	5	0	1	30	1	2	4	0	1	7	5	29	0	0	0	34	82
8:45 AM	2	4	11	0	0	17	11	36	8	0	1	55	2	1	4	0	0	7	9	24	0	0	4	33	112
Hourly Total	5	14	30	0	1	49	26	97	20	0	5	143	9	3	13	0	6	25	18	96	3	0	9	117	334
9:00 AM	0	2	12	0	0	14	9	54	11	0	2	74	6	1	3	0	4	10	6	44	1	0	2	51	149
9:15 AM	4	4	6	0	1	14	3	42	16	0	1	61	9	2	4	1	0	16	8	39	0	0	0	47	138
9:30 AM	2	4	16	0	4	22	12	50	13	0	2	75	6	1	3	0	1	10	8	40	0	0	2	48	155
9:45 AM	2	8	23	0	4	33	5	78	14	0	2	97	4	3	4	0	0	11	4	51	0	0	6	55	196
Hourly Total	8	18	57	0	9	83	29	224	54	0	7	307	25	7	14	1	5	47	26	174	1	0	10	201	638
10:00 AM	0	7	11	0	0	18	10	75	23	0	0	108	5	2	3	0	1	10	13	80	0	0	1	93	229
10:15 AM	1	5	10	0	1	16	11	68	25	0	0	104	10	2	7	0	0	19	13	69	1	0	0	83	222
10:30 AM	2	14	12	0	1	28	17	71	25	0	2	113	7	5	3	0	0	15	16	75	0	0	2	91	247
10:45 AM	1	10	14	0	5	25	12	73	27	0	1	112	14	3	7	0	4	24	13	97	1	0	4	111	272
Hourly Total	4	36	47	0	7	87	50	287	100	0	3	437	36	12	20	0	5	68	55	321	2	0	7	378	970

11:00 AM	3	9	5	0	1	17	17	66	26	0	1	109	24	1	8	0	2	33	21	87	0	0	2	108	267
11:15 AM	4	7	13	0	3	24	15	75	30	0	4	120	10	8	7	0	0	25	12	93	0	0	3	105	274
11:30 AM	5	6	19	0	5	30	17	102	23	0	0	142	6	4	10	0	0	20	27	99	2	0	6	128	320
11:45 AM	1	12	15	0	9	28	16	83	34	0	3	133	20	3	12	0	1	35	25	96	1	0	6	122	318
Hourly Total	13	34	52	0	18	99	65	326	113	0	8	504	60	16	37	0	3	113	85	375	3	0	17	463	1179
12:00 PM	2	5	13	0	3	20	17	88	31	0	2	136	10	2	10	0	5	22	12	99	2	0	4	113	291
12:15 PM	5	7	12	0	3	24	16	90	33	0	0	139	15	6	13	0	1	34	20	115	1	0	1	136	333
12:30 PM	4	10	20	0	3	34	16	80	28	0	2	124	9	6	13	0	2	28	10	124	0	0	6	134	320
12:45 PM	2	12	13	0	4	27	24	110	28	0	4	162	10	4	11	0	0	25	18	97	2	0	7	117	331
Hourly Total	13	34	58	0	13	105	73	368	120	0	8	561	44	18	47	0	8	109	60	435	5	0	18	500	1275
1:00 PM	1	14	21	0	5	36	13	87	36	0	3	136	8	4	11	0	2	23	26	125	5	0	11	156	351
1:15 PM	1	9	17	0	6	27	25	93	40	0	0	158	18	3	9	0	4	30	23	108	2	0	6	133	348
1:30 PM	7	16	20	0	3	43	21	90	27	0	4	138	12	7	9	0	3	28	25	88	3	0	7	116	325
1:45 PM	4	6	14	0	4	24	18	64	30	0	1	112	18	2	19	0	0	39	28	110	0	0	4	138	313
Hourly Total	13	45	72	0	18	130	77	334	133	0	8	544	56	16	48	0	9	120	102	431	10	0	28	543	1337
2:00 PM	1	11	8	1	9	21	16	76	38	0	0	130	14	5	11	0	0	30	20	103	1	0	6	124	305
2:15 PM	2	9	15	0	9	26	11	89	22	0	0	122	13	9	9	0	1	31	22	93	1	0	9	116	295
2:30 PM	1	10	16	0	5	27	21	82	28	0	4	131	16	5	13	0	2	34	27	104	2	0	4	133	325
2:45 PM	1	10	7	0	10	18	25	105	25	0	3	155	15	8	27	0	4	50	22	86	2	0	6	110	333
Hourly Total	5	40	46	1	33	92	73	352	113	0	7	538	58	27	60	0	7	145	91	386	6	0	25	483	1258
3:00 PM	5	6	15	0	3	26	13	85	28	0	2	126	8	8	5	0	0	21	14	112	2	0	3	128	301
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3:30 PM	3	15	9	0	6	27	15	76	25	0	5	116	10	5	15	0	2	30	16	89	4	0	5	109	282
3:45 PM	4	5	10	0	8	19	10	55	25	0	0	90	14	8	7	0	0	29	25	83	2	0	8	110	248
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4:15 PM	0	11	12	0	4	23	21	78	24	0	3	123	13	8	11	0	5	32	12	83	1	0	6	96	274
4:30 PM	3	6	17	0	6	26	16	79	19	0	0	114	8	7	8	0	0	23	11	77	4	0	5	92	255
4:45 PM	3	7	14	0	12	24	26	62	17	0	3	105	13	7	12	0	1	32	13	80	1	0	4	94	255
Hourly Total	10	41	61	0	24	112	80	291	85	0	10	456	46	26	45	0	13	117	48	332	7	0	22	387	1072
5:00 PM	2	4	8	0	4	14	20	98	27	0	2	145	15	2	14	0	5	31	25	77	0	0	6	102	292
5:15 PM	2	15	6	0	6	23	15	82	22	0	2	119	10	8	11	0	2	29	14	72	3	0	4	89	260
5:30 PM	3	4	15	0	6	22	11	54	7	0	0	72	14	8	10	0	3	32	14	64	0	0	8	78	204
5:45 PM	0	6	10	0	4	16	16	61	7	0	2	84	19	4	7	0	0	30	10	73	3	0	6	86	216
Hourly Total	7	29	39	0	20	75	62	295	63	0	6	420	58	22	42	0	10	122	63	286	6	0	24	355	972
6:00 PM	3	8	14	0	4	25	16	63	10	0	0	89	13	5	14	0	1	32	17	59	3	0	7	79	225
6:15 PM	1	7	9	0	6	17	17	71	9	0	1	97	5	7	13	0	8	25	10	75	1	0	4	86	225
6:30 PM	1	1	15	0	4	17	18	66	10	0	0	94	5	2	9	0	0	16	15	79	0	0	3	94	221
6:45 PM	1	3	14	0	3	18	15	44	10	0	0	69	2	3	8	0	2	13	13	69	1	0	5	83	183
Hourly Total	6	19	52	0	17	77	66	244	39	0	1	349	25	17	44	0	11	86	55	282	5	0	19	342	854
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	1	2	6	0	1	9	4	39	3	0	0	46	3	1	2	0	0	6	7	29	0	0	0	36	97
7:15 AM	0	9	9	0	2	18	2	53	2	0	1	57	4	2	6	0	0	12	3	31	0	0	2	34	121
7:30 AM	5	11	13	0	0	29	6	78	3	0	0	87	1	0	4	0	0	5	6	33	1	0	0	40	161
7:45 AM	1	16	18	0	3	35	4	109	2	0	1	115	0	0	5	0	2	5	14	42	1	0	2	57	212
Hourly Total	7	38	46	0	6	91	16	279	10	0	2	305	8	3	17	0	2	28	30	135	2	0	4	167	591
8:00 AM	5	9	18	0	0	32	9	81	3	0	0	93	3	1	5	0	2	9	11	35	2	0	2	48	182
8:15 AM	2	10	12	0	1	24	9	73	8	0	1	90	5	1	5	0	0	11	7	52	1	0	2	60	185
8:30 AM	1	12	9	0	0	22	6	66	18	0	0	90	10	0	2	0	1	12	6	47	1	0	2	54	178
8:45 AM	3	13	18	0	0	34	5	67	14	0	0	86	6	2	8	0	1	16	8	47	0	0	1	55	191
Hourly Total	11	44	57	0	1	112	29	287	43	0	1	359	24	4	20	0	4	48	32	181	4	0	7	217	736
9:00 AM	0	10	10	0	0	20	7	65	18	0	0	90	4	1	9	0	0	14	10	40	0	0	1	50	174

9:15 AM	3	4	16	0	1	23	7	64	14	0	1	85	3	3	7	0	0	13	9	70	0	0	1	79	200
9:30 AM	2	2	12	0	8	16	5	75	18	0	2	98	8	0	5	0	3	13	14	64	1	0	2	79	206
9:45 AM	0	6	14	0	5	20	16	70	14	0	0	100	3	4	9	0	1	16	15	91	1	0	5	107	243
Hourly Total	5	22	52	0	14	79	35	274	64	0	3	373	18	8	30	0	4	56	48	265	2	0	9	315	823
10:00 AM	2	7	9	0	5	18	9	91	16	0	0	116	9	2	1	0	1	12	11	86	5	0	3	102	248
10:15 AM	2	10	7	0	2	19	11	81	9	0	4	101	3	3	13	0	1	19	15	73	0	0	4	88	227
10:30 AM	3	4	17	0	6	24	8	71	24	0	3	103	12	3	19	0	3	34	13	65	2	0	5	80	241
10:45 AM	1	12	10	0	2	23	13	86	14	0	2	113	15	0	13	0	3	28	28	94	0	0	3	122	286
Hourly Total	8	33	43	0	15	84	41	329	63	0	9	433	39	8	46	0	8	93	67	318	7	0	15	392	1002
11:00 AM	0	7	8	0	8	15	17	65	17	0	1	99	7	4	8	0	2	19	12	100	0	0	2	112	245
11:15 AM	1	6	9	0	4	16	13	88	15	0	1	116	13	4	6	0	0	23	15	89	1	0	1	105	260
11:30 AM	2	9	14	0	5	25	16	96	23	0	0	135	9	4	14	0	0	27	20	115	1	0	4	136	323
11:45 AM	2	6	14	0	2	22	18	99	27	0	1	144	12	8	10	0	2	30	24	107	2	0	3	133	329
Hourly Total	5	28	45	0	19	78	64	348	82	0	3	494	41	20	38	0	4	99	71	411	4	0	10	486	1157
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12:15 PM	3	8	14	0	6	25	16	146	28	0	0	190	11	4	28	0	0	43	36	144	0	0	2	180	438
12:30 PM	5	7	15	0	5	27	20	129	23	0	1	172	24	4	16	0	0	44	38	130	1	0	9	169	412
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1:00 PM	3	7	15	0	2	25	15	96	19	0	3	130	10	0	14	0	2	24	22	114	1	0	6	137	316
1:15 PM	5	5	17	0	2	27	10	117	15	0	0	142	11	2	13	0	0	26	20	110	1	0	6	131	326
1:30 PM	1	6	15	0	7	22	13	96	28	0	3	137	10	2	9	0	3	21	23	107	0	0	4	130	310
1:45 PM	2	7	21	0	5	30	18	112	22	0	1	152	14	3	16	0	3	33	20	111	0	0	7	131	346
Hourly Total	11	25	68	0	16	104	56	421	84	0	7	561	45	7	52	0	8	104	85	442	2	0	23	529	1298
2:00 PM	5	4	7	0	8	16	14	108	25	0	2	147	13	4	12	0	3	29	20	118	1	0	2	139	331
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2:30 PM	3	8	19	0	9	30	14	87	20	0	1	121	16	8	11	0	1	35	33	113	1	0	12	147	333
2:45 PM	0	8	14	0	3	22	21	129	28	0	5	178	17	2	13	0	10	32	24	125	0	0	4	149	381
Hourly Total	9	26	54	0	23	89	69	421	114	0	8	604	60	21	53	0	15	134	107	469	3	0	21	579	1406
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3:15 PM	3	8	14	0	7	25	27	95	23	0	1	145	9	5	16	0	0	30	23	120	0	0	1	143	343
3:30 PM	2	20	15	0	2	37	17	96	21	0	2	134	4	4	12	0	3	20	20	114	1	0	3	135	326
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4:30 PM	4	10	19	0	7	33	23	108	20	1	7	152	10	12	6	0	3	28	33	132	1	0	3	166	379
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5:00 PM	1	6	13	0	2	20	24	87	28	0	2	139	18	10	19	0	3	47	33	126	2	0	7	161	367
5:15 PM	8	13	13	0	6	34	31	89	25	0	0	145	13	8	18	0	2	39	22	105	1	0	3	128	346
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5:45 PM	3	10	12	0	8	25	21	76	22	0	5	119	14	8	11	0	2	33	18	98	3	0	4	119	296
Hourly Total	15	36	47	0	20	98	98	329	94	0	12	521	57	36	65	0	8	158	98	426	7	0	25	531	1308
6:00 PM	2	6	9	0	4	17	22	93	22	0	2	137	8	6	14	0	0	28	20	84	2	0	4	106	288
6:15 PM	2	4	11	0	5	17	16	79	23	0	0	118	5	4	9	0	4	18	18	87	2	0	0	107	260
6:30 PM	3	13	11	0	7	27	22	62	18	0	0	102	13	4	8	0	0	25	14	69	0	0	13	83	237
6:45 PM	2	7	8	0	2	17	21	62	13	0	2	96	9	8	7	0	4	24	13	64	1	0	2	78	215
Hourly Total	9	30	39	0	18	78	81	296	76	0	4	453	35	22	38	0	8	95	65	304	5	0	19	374	1000
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1

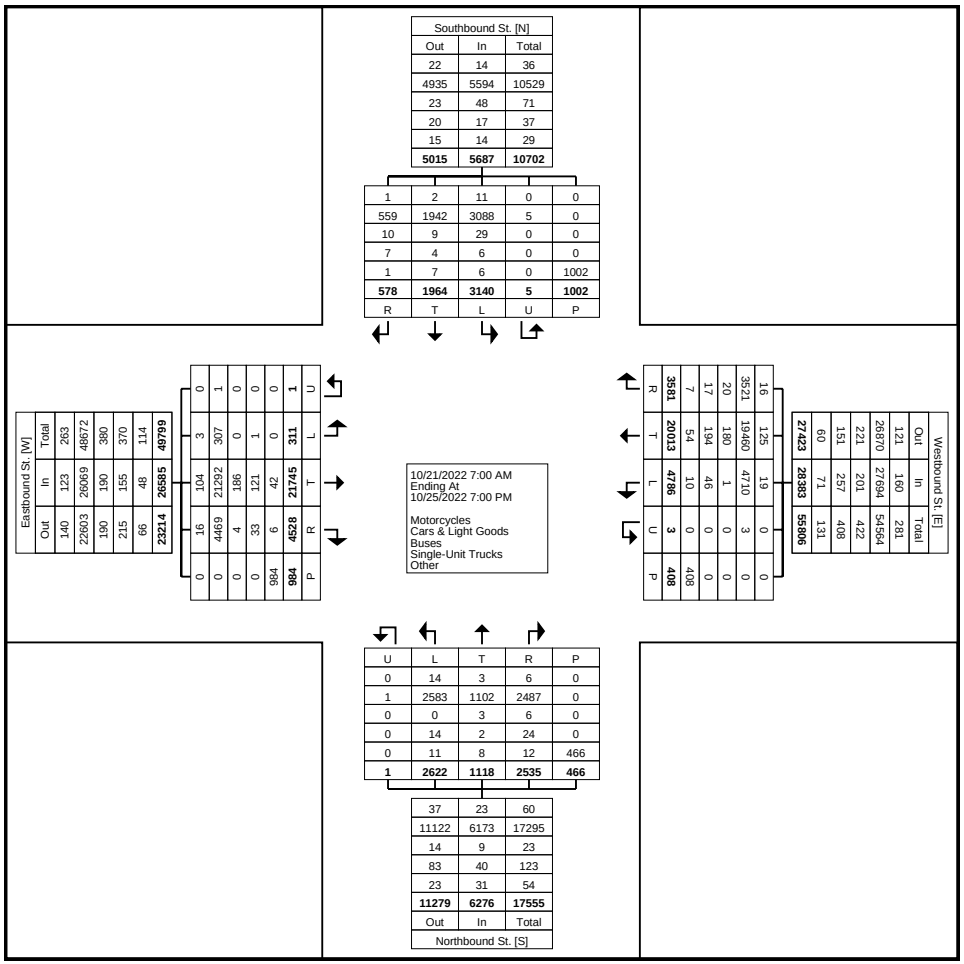
7:00 AM	1	4	7	0	0	12	5	46	4	0	0	55	3	2	1	0	0	6	8	40	0	0	0	48	121
7:15 AM	1	5	15	0	1	21	4	49	3	0	0	56	0	2	7	0	0	9	8	39	0	0	1	47	133
7:30 AM	4	9	17	0	2	30	8	90	5	0	0	103	0	1	5	0	1	6	7	30	0	0	1	37	176
7:45 AM	1	19	17	0	1	37	10	120	5	0	4	135	3	3	9	0	1	15	15	44	0	0	9	59	246
Hourly Total	7	37	56	0	4	100	27	305	17	0	4	349	6	8	22	0	2	36	38	153	0	0	11	191	676
8:00 AM	5	7	22	0	1	34	9	80	1	0	1	90	3	1	4	0	1	8	7	46	0	0	2	53	185
8:15 AM	4	14	21	0	0	39	13	81	2	0	0	96	4	1	8	0	0	13	15	45	1	0	3	61	209
8:30 AM	2	12	25	0	1	39	7	107	7	0	0	121	6	3	12	0	0	21	10	60	0	0	3	70	251
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Hourly Total	12	42	84	0	3	138	41	362	19	0	1	422	21	6	33	0	1	60	45	218	2	0	11	265	885
9:00 AM	2	7	8	0	2	17	11	63	17	0	2	91	6	1	0	0	1	7	12	64	2	0	1	78	193
9:15 AM	3	1	16	0	3	20	10	79	25	0	0	114	5	1	13	0	1	19	15	56	0	0	1	71	224
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9:45 AM	2	8	13	0	4	23	13	83	19	0	2	115	12	2	12	0	2	26	13	99	2	0	4	114	278
Hourly Total	10	22	53	0	15	85	48	309	72	0	9	429	31	4	32	0	4	67	48	295	6	0	7	349	930
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10:15 AM	4	4	8	0	6	16	11	77	16	0	0	104	9	1	9	0	1	19	21	87	1	0	3	109	248
10:30 AM	2	8	16	0	3	26	13	103	20	0	4	136	10	1	11	0	2	22	18	88	2	0	5	108	292
10:45 AM	3	7	10	0	7	20	14	92	20	0	1	126	15	0	10	0	0	25	18	81	2	0	2	101	272
Hourly Total	12	33	45	0	19	90	50	348	72	0	5	470	41	4	42	0	3	87	73	347	6	0	11	426	1073
11:00 AM	4	4	12	0	3	20	14	85	14	0	3	113	9	7	9	0	0	25	21	107	3	0	3	131	289
11:15 AM	4	10	10	0	5	24	9	86	26	0	3	121	11	3	7	0	0	21	23	83	3	0	2	109	275
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Hourly Total	11	24	50	0	16	85	53	365	83	0	7	501	43	20	41	0	1	104	94	419	8	0	16	521	1211
12:00 PM	1	9	10	0	3	20	27	103	25	0	2	155	11	3	25	0	1	39	22	137	1	0	4	160	374
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12:45 PM	8	8	16	0	2	32	15	116	27	0	0	158	10	4	23	0	0	37	27	125	2	0	4	154	381
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Hourly Total	15	30	60	0	33	105	73	357	79	0	9	509	50	23	49	0	6	122	99	431	9	0	20	539	1275
3:00 PM	4	8	12	0	1	24	19	80	16	0	1	115	10	5	9	0	6	24	22	123	0	0	2	145	308
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4:00 PM	5	9	19	0	4	33	22	87	24	0	3	133	13	11	12	0	0	36	23	155	3	0	5	181	383
4:15 PM	3	12	11	0	1	26	27	90	27	0	1	144	10	9	17	0	0	36	22	113	1	0	4	136	342
4:30 PM	4	11	23	0	3	38	33	107	18	0	0	158	9	5	13	0	0	27	26	156	1	0	3	183	406
4:45 PM	0	11	18	0	5	29	27	80	20	0	1	127	15	12	11	0	0	38	25	129	5	0	11	159	353
Hourly Total	12	43	71	0	13	126	109	364	89	0	5	562	47	37	53	0	0	137	96	553	10	0	23	659	1484
5:00 PM	2	13	11	0	2	26	38	93	22	0	1	153	22	10	19	0	1	51	42	127	3	0	2	172	402
5:15 PM	0	15	12	0	6	27	21	78	26	1	0	126	11	7	10	0	0	28	21	97	1	0	4	119	300

5:30 PM	3	8	12	0	6	23	20	73	23	0	1	116	18	7	13	0	8	38	22	95	0	0	3	117	294
5:45 PM	3	20	12	0	2	35	21	88	18	0	1	127	11	8	13	0	3	32	21	92	0	0	1	113	307
Hourly Total	8	56	47	0	16	111	100	332	89	1	3	522	62	32	55	0	12	149	106	411	4	0	10	521	1303
6:00 PM	1	6	14	0	7	21	26	70	25	0	5	121	12	4	10	0	8	26	20	85	2	0	12	107	275
6:15 PM	0	14	15	0	8	29	21	92	18	0	1	131	9	5	9	0	10	23	11	81	0	0	2	92	275
6:30 PM	2	7	13	0	5	22	12	50	15	0	2	77	7	6	9	0	2	22	13	97	2	0	5	112	233
6:45 PM	2	3	12	0	2	17	25	71	17	0	0	113	9	6	8	0	2	23	17	72	1	0	3	90	243
Hourly Total	5	30	54	0	22	89	84	283	75	0	8	442	37	21	36	0	22	94	61	335	5	0	22	401	1026
Grand Total	578	1964	3140	5	1002	5687	3581	20013	4786	3	408	28383	2535	1118	2622	1	466	6276	4528	21745	311	1	984	26585	66931
Approach %	10.2	34.5	55.2	0.1	-	-	12.6	70.5	16.9	0.0	-	-	40.4	17.8	41.8	0.0	-	-	17.0	81.8	1.2	0.0	-	-	-
Total %	0.9	2.9	4.7	0.0	-	8.5	5.4	29.9	7.2	0.0	-	42.4	3.8	1.7	3.9	0.0	-	9.4	6.8	32.5	0.5	0.0	-	39.7	-
Motorcycles	1	2	11	0	-	14	16	125	19	0	-	160	6	3	14	0	-	23	16	104	3	0	-	123	320
% Motorcycles	0.2	0.1	0.4	0.0	-	0.2	0.4	0.6	0.4	0.0	-	0.6	0.2	0.3	0.5	0.0	-	0.4	0.4	0.5	1.0	0.0	-	0.5	0.5
Cars & Light Goods	559	1942	3088	5	-	5594	3521	19460	4710	3	-	27694	2487	1102	2583	1	-	6173	4469	21292	307	1	-	26069	65530
% Cars & Light Goods	96.7	98.9	98.3	100.0	-	98.4	98.3	97.2	98.4	100.0	-	97.6	98.1	98.6	98.5	100.0	-	98.4	98.7	97.9	98.7	100.0	-	98.1	97.9
Buses	10	9	29	0	-	48	20	180	1	0	-	201	6	3	0	0	-	9	4	186	0	0	-	190	448
% Buses	1.7	0.5	0.9	0.0	-	0.8	0.6	0.9	0.0	0.0	-	0.7	0.2	0.3	0.0	0.0	-	0.1	0.1	0.9	0.0	0.0	-	0.7	0.7
Single-Unit Trucks	7	4	6	0	-	17	17	194	46	0	-	257	24	2	14	0	-	40	33	121	1	0	-	155	469
% Single-Unit Trucks	1.2	0.2	0.2	0.0	-	0.3	0.5	1.0	1.0	0.0	-	0.9	0.9	0.2	0.5	0.0	-	0.6	0.7	0.6	0.3	0.0	-	0.6	0.7
Articulated Trucks	0	1	0	0	-	1	0	41	8	0	-	49	11	0	6	0	-	17	3	29	0	0	-	32	99
% Articulated Trucks	0.0	0.1	0.0	0.0	-	0.0	0.0	0.2	0.2	0.0	-	0.2	0.4	0.0	0.2	0.0	-	0.3	0.1	0.1	0.0	0.0	-	0.1	0.1
Bicycles on Road	1	6	6	0	-	13	7	13	2	0	-	22	1	8	5	0	-	14	3	13	0	0	-	16	65
% Bicycles on Road	0.2	0.3	0.2	0.0	-	0.2	0.2	0.1	0.0	0.0	-	0.1	0.0	0.7	0.2	0.0	-	0.2	0.1	0.1	0.0	0.0	-	0.1	0.1
Bicycles on Crosswalk	-	-	-	-	111	-	-	-	-	-	22	-	-	-	-	-	41	-	-	-	-	-	50	-	-
% Bicycles on Crosswalk	-	-	-	-	11.1	-	-	-	-	-	5.4	-	-	-	-	-	8.8	-	-	-	-	-	5.1	-	-
Pedestrians	-	-	-	-	891	-	-	-	-	-	386	-	-	-	-	-	425	-	-	-	-	-	934	-	-
% Pedestrians	-	-	-	-	88.9	-	-	-	-	-	94.6	-	-	-	-	-	91.2	-	-	-	-	-	94.9	-	-

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Site Code:
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Turning Movement Data Plot

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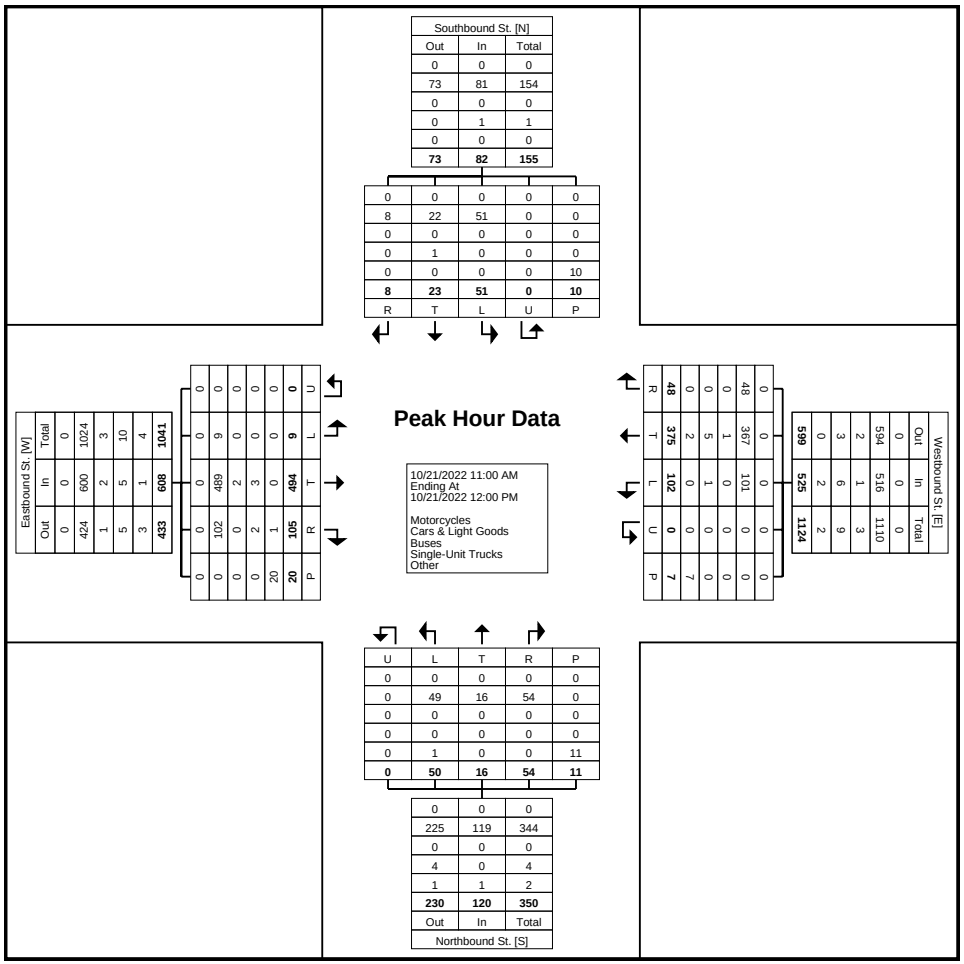
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	3	4	9	0	2	16	8	90	15	0	1	113	8	5	12	0	1	25	26	105	2	0	5	133	287
11:15 AM	2	7	16	0	7	25	17	83	37	0	4	137	14	6	5	0	3	25	19	125	3	0	2	147	334
11:30 AM	2	7	17	0	0	26	14	92	24	0	1	130	17	2	14	0	3	33	26	147	3	0	1	176	365
11:45 AM	1	5	9	0	1	15	9	110	26	0	1	145	15	3	19	0	4	37	34	117	1	0	12	152	349
Total	8	23	51	0	10	82	48	375	102	0	7	525	54	16	50	0	11	120	105	494	9	0	20	608	1335
Approach %	9.8	28.0	62.2	0.0	-	-	9.1	71.4	19.4	0.0	-	-	45.0	13.3	41.7	0.0	-	-	17.3	81.3	1.5	0.0	-	-	-
Total %	0.6	1.7	3.8	0.0	-	6.1	3.6	28.1	7.6	0.0	-	39.3	4.0	1.2	3.7	0.0	-	9.0	7.9	37.0	0.7	0.0	-	45.5	-
PHF	0.667	0.821	0.750	0.000	-	0.788	0.706	0.852	0.689	0.000	-	0.905	0.794	0.667	0.658	0.000	-	0.811	0.772	0.840	0.750	0.000	-	0.864	0.914
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	8	22	51	0	-	81	48	367	101	0	-	516	54	16	49	0	-	119	102	489	9	0	-	600	1316
% Cars & Light Goods	100.0	95.7	100.0	-	-	98.8	100.0	97.9	99.0	-	-	98.3	100.0	100.0	98.0	-	-	99.2	97.1	99.0	100.0	-	-	98.7	98.6
Buses	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	3
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.2
Single-Unit Trucks	0	1	0	0	-	1	0	5	1	0	-	6	0	0	0	0	-	0	2	3	0	0	-	5	12
% Single-Unit Trucks	0.0	4.3	0.0	-	-	1.2	0.0	1.3	1.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	1.9	0.6	0.0	-	-	0.8	0.9
Articulated Trucks	0	0	0	0	-	0	0	2	0	0	-	2	0	0	1	0	-	1	1	0	0	0	-	1	4
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.0	0.0	2.0	-	-	0.8	1.0	0.0	0.0	-	-	0.2	0.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	40.0	-	-	-	-	-	14.3	-	-	-	-	-	9.1	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	6	-	-	-	-	-	6	-	-	-	-	-	10	-	-	-	-	-	20	-	-
% Pedestrians	-	-	-	-	60.0	-	-	-	-	-	85.7	-	-	-	-	-	90.9	-	-	-	-	-	100.0	-	-

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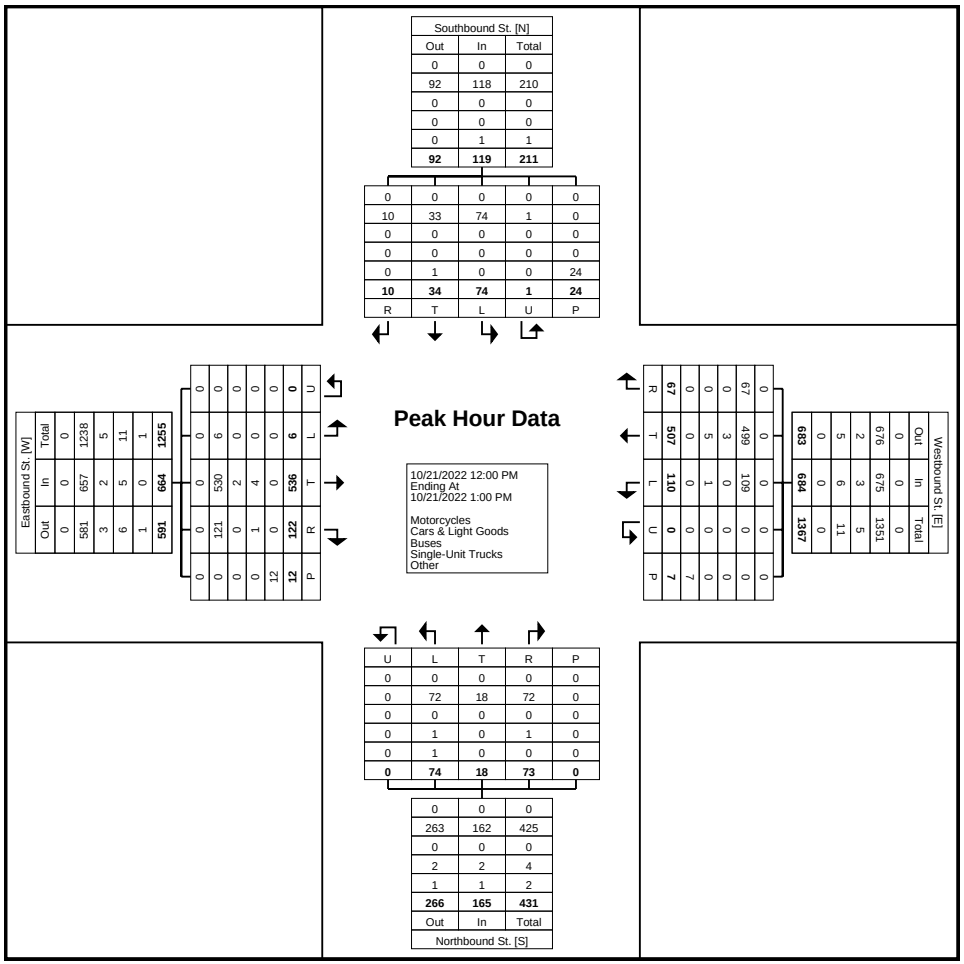
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:00 PM	1	9	17	0	4	27	16	117	27	0	2	160	16	5	14	0	0	35	28	153	1	0	2	182	404
12:15 PM	2	3	18	1	5	24	19	118	24	0	0	161	20	9	20	0	0	49	30	129	1	0	4	160	394
12:30 PM	3	7	19	0	6	29	20	118	35	0	4	173	20	1	22	0	0	43	24	145	2	0	1	171	416
12:45 PM	4	15	20	0	9	39	12	154	24	0	1	190	17	3	18	0	0	38	40	109	2	0	5	151	418
Total	10	34	74	1	24	119	67	507	110	0	7	684	73	18	74	0	0	165	122	536	6	0	12	664	1632
Approach %	8.4	28.6	62.2	0.8	-	-	9.8	74.1	16.1	0.0	-	-	44.2	10.9	44.8	0.0	-	-	18.4	80.7	0.9	0.0	-	-	-
Total %	0.6	2.1	4.5	0.1	-	7.3	4.1	31.1	6.7	0.0	-	41.9	4.5	1.1	4.5	0.0	-	10.1	7.5	32.8	0.4	0.0	-	40.7	-
PHF	0.625	0.567	0.925	0.250	-	0.763	0.838	0.823	0.786	0.000	-	0.900	0.913	0.500	0.841	0.000	-	0.842	0.763	0.876	0.750	0.000	-	0.912	0.976
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	10	33	74	1	-	118	67	499	109	0	-	675	72	18	72	0	-	162	121	530	6	0	-	657	1612
% Cars & Light Goods	100.0	97.1	100.0	100.0	-	99.2	100.0	98.4	99.1	-	-	98.7	98.6	100.0	97.3	-	-	98.2	99.2	98.9	100.0	-	-	98.9	98.8
Buses	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	2	0	0	-	2	5
% Buses	0.0	0.0	0.0	0.0	-	0.0	0.0	0.6	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.3
Single-Unit Trucks	0	0	0	0	-	0	0	5	1	0	-	6	1	0	1	0	-	2	1	4	0	0	-	5	13
% Single-Unit Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	1.0	0.9	-	-	0.9	1.4	0.0	1.4	-	-	1.2	0.8	0.7	0.0	-	-	0.8	0.8
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	2
% Bicycles on Road	0.0	2.9	0.0	0.0	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.4	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	12.5	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	21	-	-	-	-	-	7	-	-	-	-	-	0	-	-	-	-	-	12	-	-
% Pedestrians	-	-	-	-	87.5	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

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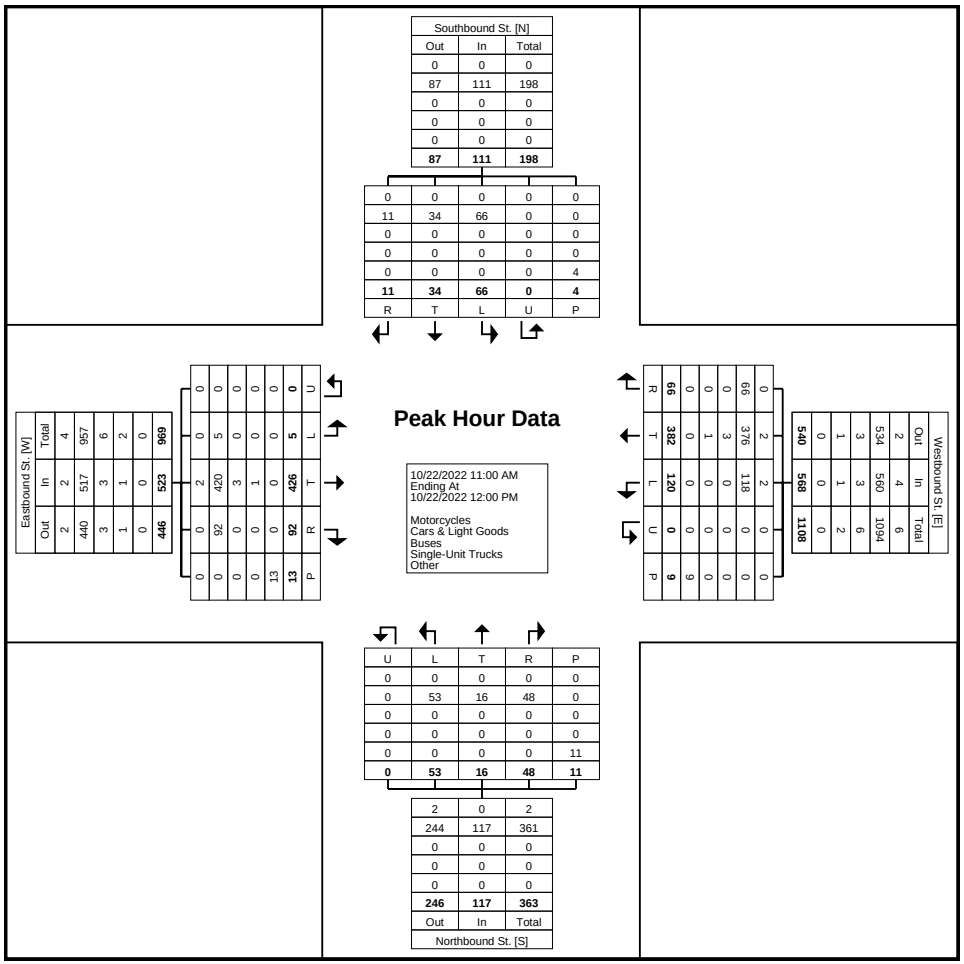
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	3	11	17	0	2	31	14	66	26	0	0	106	14	2	10	0	4	26	24	101	1	0	3	126	289
11:15 AM	1	7	16	0	0	24	15	108	38	0	0	161	9	2	15	0	1	26	19	117	2	0	1	138	349
11:30 AM	3	4	17	0	1	24	18	101	27	0	0	146	11	10	12	0	1	33	27	109	1	0	6	137	340
11:45 AM	4	12	16	0	1	32	19	107	29	0	9	155	14	2	16	0	5	32	22	99	1	0	3	122	341
Total	11	34	66	0	4	111	66	382	120	0	9	568	48	16	53	0	11	117	92	426	5	0	13	523	1319
Approach %	9.9	30.6	59.5	0.0	-	-	11.6	67.3	21.1	0.0	-	-	41.0	13.7	45.3	0.0	-	-	17.6	81.5	1.0	0.0	-	-	-
Total %	0.8	2.6	5.0	0.0	-	8.4	5.0	29.0	9.1	0.0	-	43.1	3.6	1.2	4.0	0.0	-	8.9	7.0	32.3	0.4	0.0	-	39.7	-
PHF	0.688	0.708	0.971	0.000	-	0.867	0.868	0.884	0.789	0.000	-	0.882	0.857	0.400	0.828	0.000	-	0.886	0.852	0.910	0.625	0.000	-	0.947	0.945
Motorcycles	0	0	0	0	-	0	0	2	2	0	-	4	0	0	0	0	-	0	0	2	0	0	-	2	6
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.5	1.7	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.5
Cars & Light Goods	11	34	66	0	-	111	66	376	118	0	-	560	48	16	53	0	-	117	92	420	5	0	-	517	1305
% Cars & Light Goods	100.0	100.0	100.0	-	-	100.0	100.0	98.4	98.3	-	-	98.6	100.0	100.0	100.0	-	-	100.0	100.0	98.6	100.0	-	-	98.9	98.9
Buses	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	3	0	0	-	3	6
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.6	0.5
Single-Unit Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	2
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	25.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	7.7	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	9	-	-	-	-	-	11	-	-	-	-	-	12	-	-
% Pedestrians	-	-	-	-	75.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	92.3	-	-

City of North Bay (ON)
200 McIntyre St. E.

North Bay, Ontario, Canada P1B 8H8
(705) 474-0626 x 237 don.norman@cityofnorthbay.ca

Count Name: McKeown and Champlain
Site Code:
Start Date: 10/21/2022



Turning Movement Peak Hour Data Plot (11:00 AM)

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North Bay, Ontario, Canada P1B 8H8
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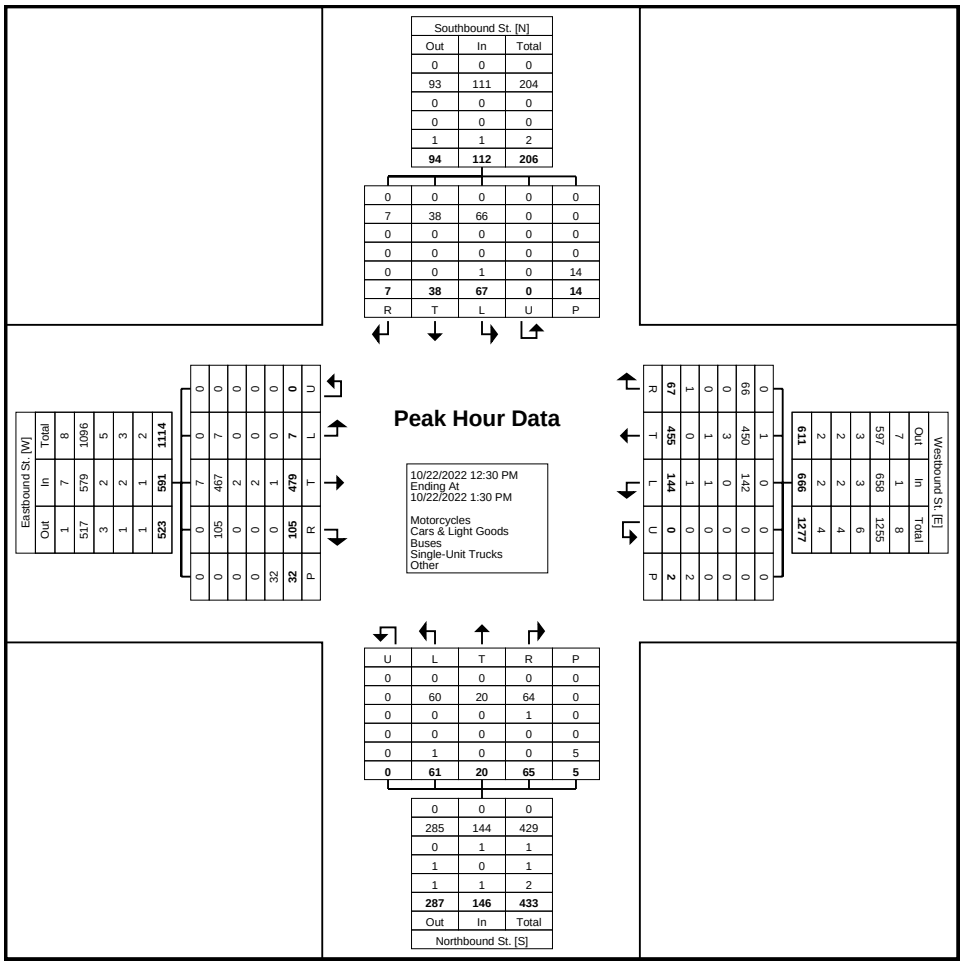
Turning Movement Peak Hour Data (12:30 PM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:30 PM	2	16	12	0	2	30	11	117	33	0	1	161	14	4	12	0	1	30	21	118	1	0	3	140	361
12:45 PM	1	9	14	0	4	24	15	108	41	0	0	164	13	1	15	0	1	29	25	108	3	0	14	136	353
1:00 PM	1	5	19	0	1	25	26	112	37	0	1	175	20	6	23	0	2	49	37	128	1	0	8	166	415
1:15 PM	3	8	22	0	7	33	15	118	33	0	0	166	18	9	11	0	1	38	22	125	2	0	7	149	386
Total	7	38	67	0	14	112	67	455	144	0	2	666	65	20	61	0	5	146	105	479	7	0	32	591	1515
Approach %	6.3	33.9	59.8	0.0	-	-	10.1	68.3	21.6	0.0	-	-	44.5	13.7	41.8	0.0	-	-	17.8	81.0	1.2	0.0	-	-	-
Total %	0.5	2.5	4.4	0.0	-	7.4	4.4	30.0	9.5	0.0	-	44.0	4.3	1.3	4.0	0.0	-	9.6	6.9	31.6	0.5	0.0	-	39.0	-
PHF	0.583	0.594	0.761	0.000	-	0.848	0.644	0.964	0.878	0.000	-	0.951	0.813	0.556	0.663	0.000	-	0.745	0.709	0.936	0.583	0.000	-	0.890	0.913
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	7	0	0	-	7	8
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	1.5	0.0	-	-	1.2	0.5
Cars & Light Goods	7	38	66	0	-	111	66	450	142	0	-	658	64	20	60	0	-	144	105	467	7	0	-	579	1492
% Cars & Light Goods	100.0	100.0	98.5	-	-	99.1	98.5	98.9	98.6	-	-	98.8	98.5	100.0	98.4	-	-	98.6	100.0	97.5	100.0	-	-	98.0	98.5
Buses	0	0	0	0	-	0	0	3	0	0	-	3	1	0	0	0	-	1	0	2	0	0	-	2	6
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.5	1.5	0.0	0.0	-	-	0.7	0.0	0.4	0.0	-	-	0.3	0.4
Single-Unit Trucks	0	0	0	0	-	0	0	1	1	0	-	2	0	0	0	0	-	0	0	2	0	0	-	2	4
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.7	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.3
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.1
Bicycles on Road	0	0	1	0	-	1	1	0	1	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.0	1.5	-	-	0.9	1.5	0.0	0.7	-	-	0.3	0.0	0.0	1.6	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	7.1	-	-	-	-	-	0.0	-	-	-	-	-	20.0	-	-	-	-	-	9.4	-	-
Pedestrians	-	-	-	-	13	-	-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-	29	-	-
% Pedestrians	-	-	-	-	92.9	-	-	-	-	-	100.0	-	-	-	-	-	80.0	-	-	-	-	-	90.6	-	-

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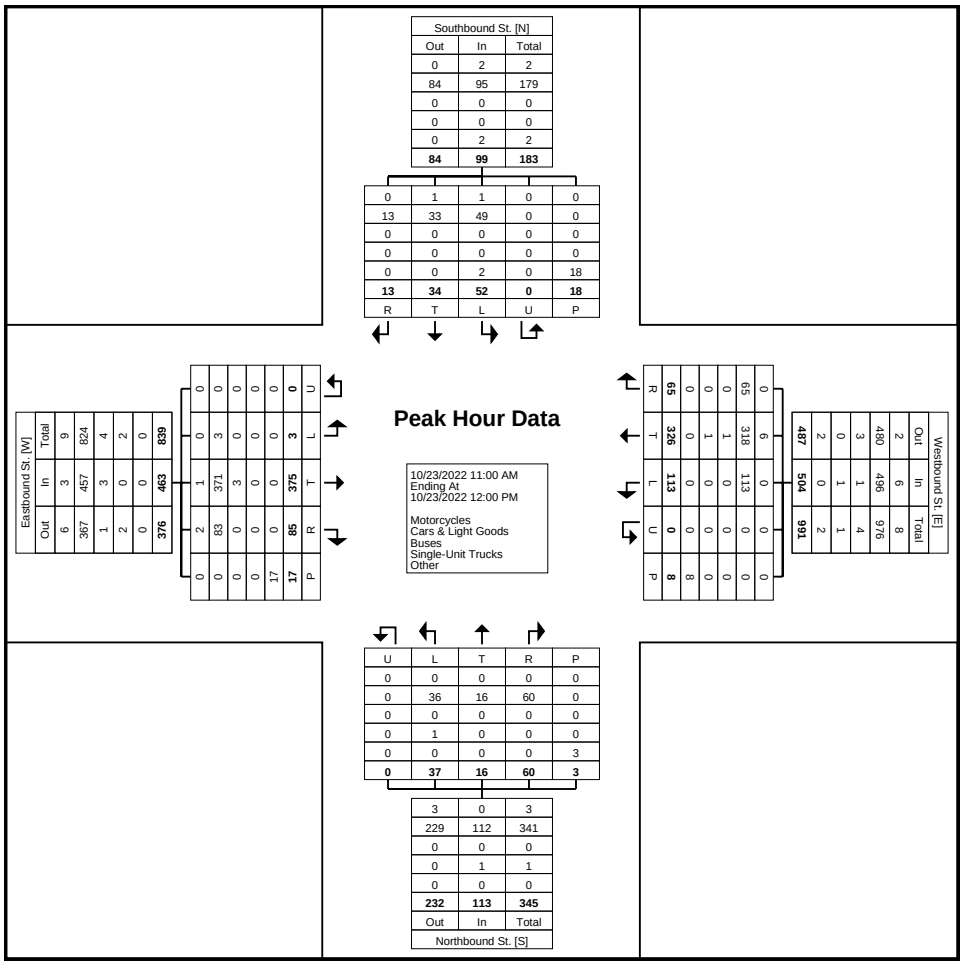
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
11:00 AM	3	9	5	0	1	17	17	66	26	0	1	109	24	1	8	0	2	33	21	87	0	0	2	108	267
11:15 AM	4	7	13	0	3	24	15	75	30	0	4	120	10	8	7	0	0	25	12	93	0	0	3	105	274
11:30 AM	5	6	19	0	5	30	17	102	23	0	0	142	6	4	10	0	0	20	27	99	2	0	6	128	320
11:45 AM	1	12	15	0	9	28	16	83	34	0	3	133	20	3	12	0	1	35	25	96	1	0	6	122	318
Total	13	34	52	0	18	99	65	326	113	0	8	504	60	16	37	0	3	113	85	375	3	0	17	463	1179
Approach %	13.1	34.3	52.5	0.0	-	-	12.9	64.7	22.4	0.0	-	-	53.1	14.2	32.7	0.0	-	-	18.4	81.0	0.6	0.0	-	-	-
Total %	1.1	2.9	4.4	0.0	-	8.4	5.5	27.7	9.6	0.0	-	42.7	5.1	1.4	3.1	0.0	-	9.6	7.2	31.8	0.3	0.0	-	39.3	-
PHF	0.650	0.708	0.684	0.000	-	0.825	0.956	0.799	0.831	0.000	-	0.887	0.625	0.500	0.771	0.000	-	0.807	0.787	0.947	0.375	0.000	-	0.904	0.921
Motorcycles	0	1	1	0	-	2	0	6	0	0	-	6	0	0	0	0	-	0	2	1	0	0	-	3	11
% Motorcycles	0.0	2.9	1.9	-	-	2.0	0.0	1.8	0.0	-	-	1.2	0.0	0.0	0.0	-	-	0.0	2.4	0.3	0.0	-	-	0.6	0.9
Cars & Light Goods	13	33	49	0	-	95	65	318	113	0	-	496	60	16	36	0	-	112	83	371	3	0	-	457	1160
% Cars & Light Goods	100.0	97.1	94.2	-	-	96.0	100.0	97.5	100.0	-	-	98.4	100.0	100.0	97.3	-	-	99.1	97.6	98.9	100.0	-	-	98.7	98.4
Buses	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	3	0	0	-	3	4
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.6	0.3
Single-Unit Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	2
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	2.7	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	3.8	-	-	2.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	22.2	-	-	-	-	-	25.0	-	-	-	-	-	0.0	-	-	-	-	-	5.9	-	-
Pedestrians	-	-	-	-	14	-	-	-	-	-	6	-	-	-	-	-	3	-	-	-	-	-	16	-	-
% Pedestrians	-	-	-	-	77.8	-	-	-	-	-	75.0	-	-	-	-	-	100.0	-	-	-	-	-	94.1	-	-

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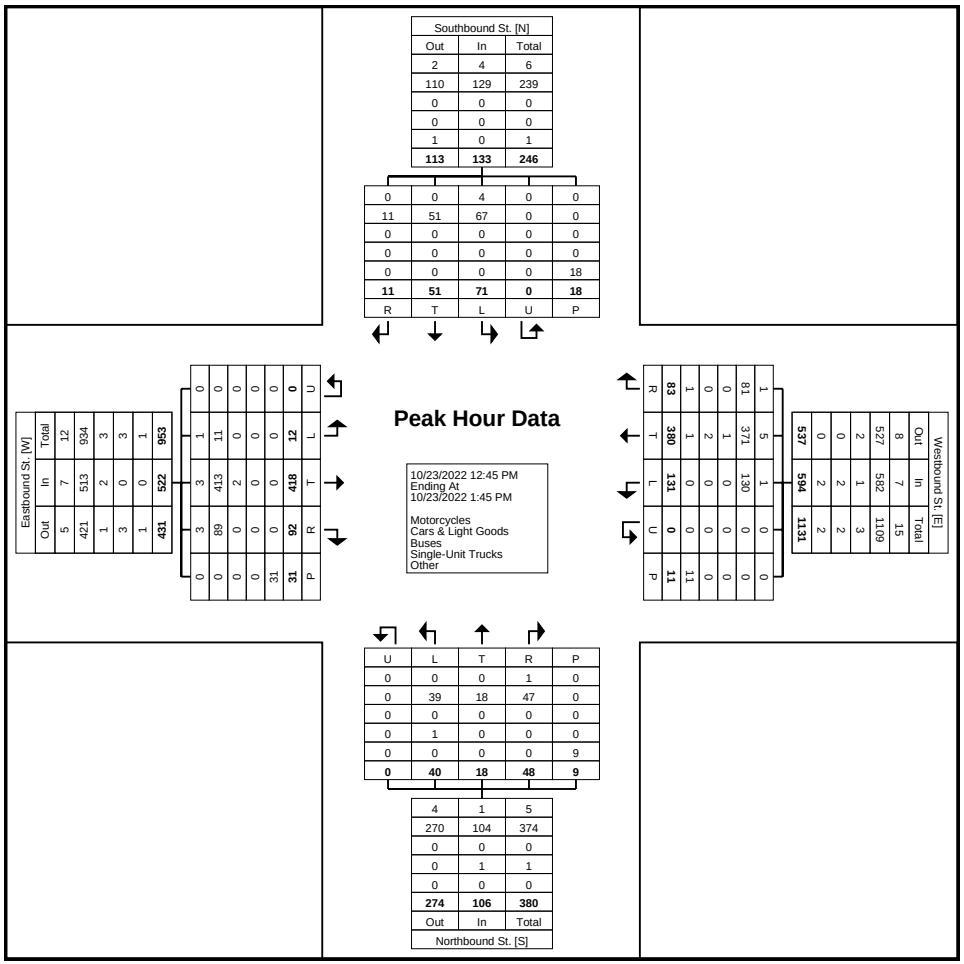
Turning Movement Peak Hour Data (12:45 PM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:45 PM	2	12	13	0	4	27	24	110	28	0	4	162	10	4	11	0	0	25	18	97	2	0	7	117	331
1:00 PM	1	14	21	0	5	36	13	87	36	0	3	136	8	4	11	0	2	23	26	125	5	0	11	156	351
1:15 PM	1	9	17	0	6	27	25	93	40	0	0	158	18	3	9	0	4	30	23	108	2	0	6	133	348
1:30 PM	7	16	20	0	3	43	21	90	27	0	4	138	12	7	9	0	3	28	25	88	3	0	7	116	325
Total	11	51	71	0	18	133	83	380	131	0	11	594	48	18	40	0	9	106	92	418	12	0	31	522	1355
Approach %	8.3	38.3	53.4	0.0	-	-	14.0	64.0	22.1	0.0	-	-	45.3	17.0	37.7	0.0	-	-	17.6	80.1	2.3	0.0	-	-	-
Total %	0.8	3.8	5.2	0.0	-	9.8	6.1	28.0	9.7	0.0	-	43.8	3.5	1.3	3.0	0.0	-	7.8	6.8	30.8	0.9	0.0	-	38.5	-
PHF	0.393	0.797	0.845	0.000	-	0.773	0.830	0.864	0.819	0.000	-	0.917	0.667	0.643	0.909	0.000	-	0.883	0.885	0.836	0.600	0.000	-	0.837	0.965
Motorcycles	0	0	4	0	-	4	1	5	1	0	-	7	1	0	0	0	-	1	3	3	1	0	-	7	19
% Motorcycles	0.0	0.0	5.6	-	-	3.0	1.2	1.3	0.8	-	-	1.2	2.1	0.0	0.0	-	-	0.9	3.3	0.7	8.3	-	-	1.3	1.4
Cars & Light Goods	11	51	67	0	-	129	81	371	130	0	-	582	47	18	39	0	-	104	89	413	11	0	-	513	1328
% Cars & Light Goods	100.0	100.0	94.4	-	-	97.0	97.6	97.6	99.2	-	-	98.0	97.9	100.0	97.5	-	-	98.1	96.7	98.8	91.7	-	-	98.3	98.0
Buses	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	3
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.2
Single-Unit Trucks	0	0	0	0	-	0	0	2	0	0	-	2	0	0	1	0	-	1	0	0	0	0	-	0	3
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.3	0.0	0.0	2.5	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	1	1	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	1.2	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	5.6	-	-	-	-	-	27.3	-	-	-	-	-	11.1	-	-	-	-	-	9.7	-	-
Pedestrians	-	-	-	-	17	-	-	-	-	-	8	-	-	-	-	-	8	-	-	-	-	-	28	-	-
% Pedestrians	-	-	-	-	94.4	-	-	-	-	-	72.7	-	-	-	-	-	88.9	-	-	-	-	-	90.3	-	-

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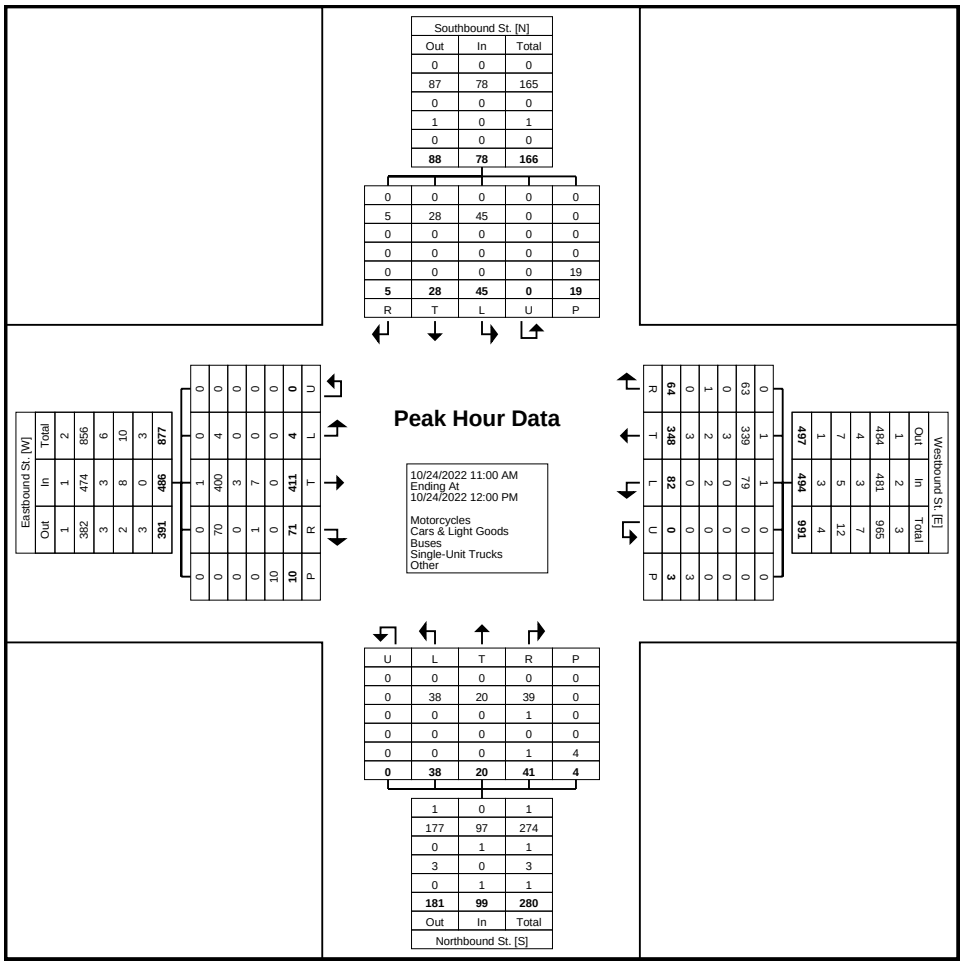
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Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	0	7	8	0	8	15	17	65	17	0	1	99	7	4	8	0	2	19	12	100	0	0	2	112	245
11:15 AM	1	6	9	0	4	16	13	88	15	0	1	116	13	4	6	0	0	23	15	89	1	0	1	105	260
11:30 AM	2	9	14	0	5	25	16	96	23	0	0	135	9	4	14	0	0	27	20	115	1	0	4	136	323
11:45 AM	2	6	14	0	2	22	18	99	27	0	1	144	12	8	10	0	2	30	24	107	2	0	3	133	329
Total	5	28	45	0	19	78	64	348	82	0	3	494	41	20	38	0	4	99	71	411	4	0	10	486	1157
Approach %	6.4	35.9	57.7	0.0	-	-	13.0	70.4	16.6	0.0	-	-	41.4	20.2	38.4	0.0	-	-	14.6	84.6	0.8	0.0	-	-	-
Total %	0.4	2.4	3.9	0.0	-	6.7	5.5	30.1	7.1	0.0	-	42.7	3.5	1.7	3.3	0.0	-	8.6	6.1	35.5	0.3	0.0	-	42.0	-
PHF	0.625	0.778	0.804	0.000	-	0.780	0.889	0.879	0.759	0.000	-	0.858	0.788	0.625	0.679	0.000	-	0.825	0.740	0.893	0.500	0.000	-	0.893	0.879
Motorcycles	0	0	0	0	-	0	0	1	1	0	-	2	0	0	0	0	-	0	0	1	0	0	-	1	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.3	1.2	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.3
Cars & Light Goods	5	28	45	0	-	78	63	339	79	0	-	481	39	20	38	0	-	97	70	400	4	0	-	474	1130
% Cars & Light Goods	100.0	100.0	100.0	-	-	100.0	98.4	97.4	96.3	-	-	97.4	95.1	100.0	100.0	-	-	98.0	98.6	97.3	100.0	-	-	97.5	97.7
Buses	0	0	0	0	-	0	0	3	0	0	-	3	1	0	0	0	-	1	0	3	0	0	-	3	7
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.9	0.0	-	-	0.6	2.4	0.0	0.0	-	-	1.0	0.0	0.7	0.0	-	-	0.6	0.6
Single-Unit Trucks	0	0	0	0	-	0	1	2	2	0	-	5	0	0	0	0	-	0	1	7	0	0	-	8	13
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	1.6	0.6	2.4	-	-	1.0	0.0	0.0	0.0	-	-	0.0	1.4	1.7	0.0	-	-	1.6	1.1
Articulated Trucks	0	0	0	0	-	0	0	3	0	0	-	3	1	0	0	0	-	1	0	0	0	0	-	0	4
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.9	0.0	-	-	0.6	2.4	0.0	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	5.3	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	18	-	-	-	-	-	3	-	-	-	-	-	4	-	-	-	-	-	10	-	-
% Pedestrians	-	-	-	-	94.7	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

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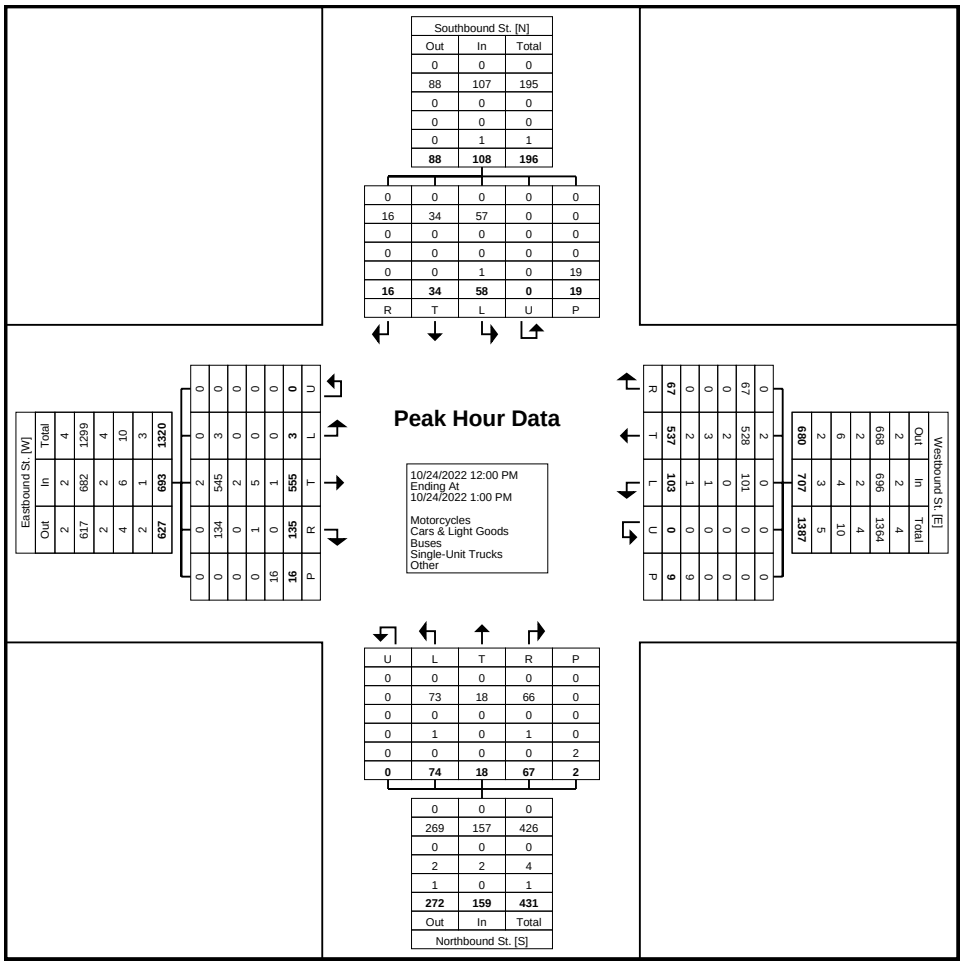
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
12:00 PM	4	6	14	0	2	24	16	128	33	0	5	177	13	8	13	0	2	34	30	134	0	0	2	164	399
12:15 PM	3	8	14	0	6	25	16	146	28	0	0	190	11	4	28	0	0	43	36	144	0	0	2	180	438
12:30 PM	5	7	15	0	5	27	20	129	23	0	1	172	24	4	16	0	0	44	38	130	1	0	9	169	412
12:45 PM	4	13	15	0	6	32	15	134	19	0	3	168	19	2	17	0	0	38	31	147	2	0	3	180	418
Total	16	34	58	0	19	108	67	537	103	0	9	707	67	18	74	0	2	159	135	555	3	0	16	693	1667
Approach %	14.8	31.5	53.7	0.0	-	-	9.5	76.0	14.6	0.0	-	-	42.1	11.3	46.5	0.0	-	-	19.5	80.1	0.4	0.0	-	-	-
Total %	1.0	2.0	3.5	0.0	-	6.5	4.0	32.2	6.2	0.0	-	42.4	4.0	1.1	4.4	0.0	-	9.5	8.1	33.3	0.2	0.0	-	41.6	-
PHF	0.800	0.654	0.967	0.000	-	0.844	0.838	0.920	0.780	0.000	-	0.930	0.698	0.563	0.661	0.000	-	0.903	0.888	0.944	0.375	0.000	-	0.963	0.951
Motorcycles	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	2	0	0	-	2	4
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.2
Cars & Light Goods	16	34	57	0	-	107	67	528	101	0	-	696	66	18	73	0	-	157	134	545	3	0	-	682	1642
% Cars & Light Goods	100.0	100.0	98.3	-	-	99.1	100.0	98.3	98.1	-	-	98.4	98.5	100.0	98.6	-	-	98.7	99.3	98.2	100.0	-	-	98.4	98.5
Buses	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	2	0	0	-	2	4
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.2
Single-Unit Trucks	0	0	0	0	-	0	0	3	1	0	-	4	1	0	1	0	-	2	1	5	0	0	-	6	12
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.6	1.0	-	-	0.6	1.5	0.0	1.4	-	-	1.3	0.7	0.9	0.0	-	-	0.9	0.7
Articulated Trucks	0	0	0	0	-	0	0	2	1	0	-	3	0	0	0	0	-	0	0	1	0	0	-	1	4
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.4	1.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.1	0.2
Bicycles on Road	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	1.7	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	10.5	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	17	-	-	-	-	-	9	-	-	-	-	-	2	-	-	-	-	-	16	-	-
% Pedestrians	-	-	-	-	89.5	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

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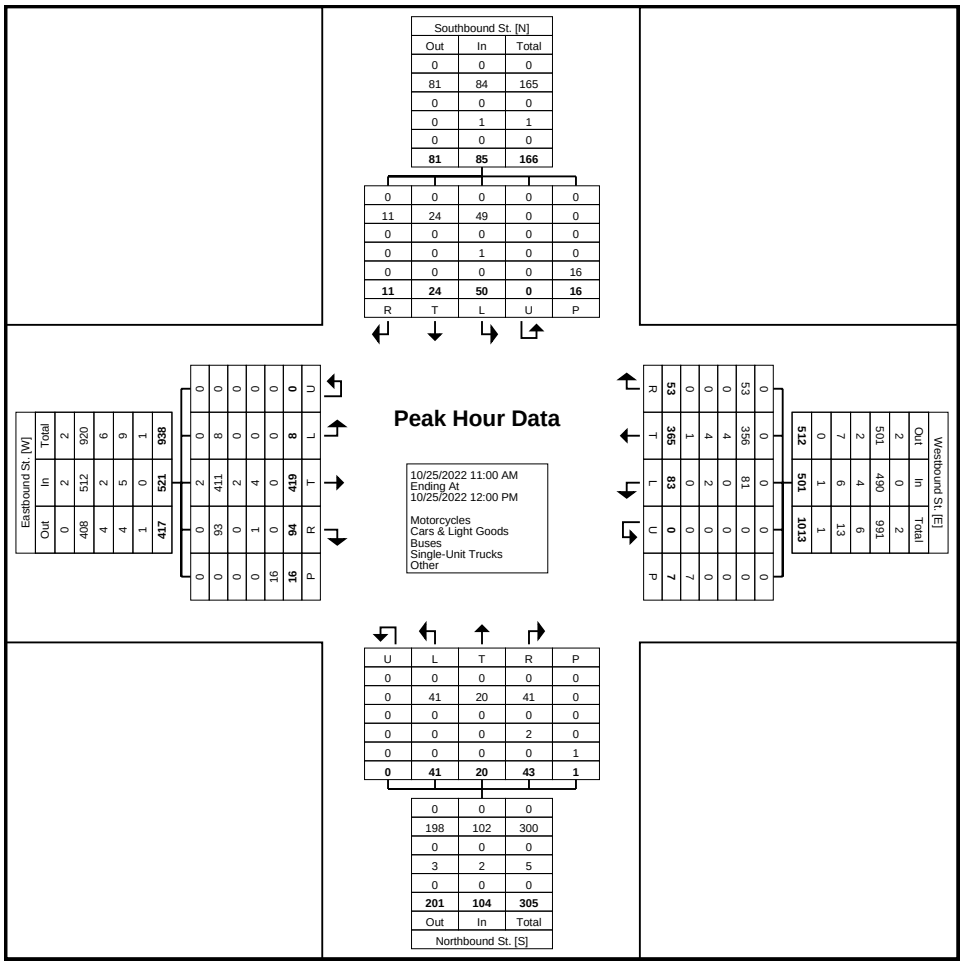
Turning Movement Peak Hour Data (11:00 AM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
11:00 AM	4	4	12	0	3	20	14	85	14	0	3	113	9	7	9	0	0	25	21	107	3	0	3	131	289
11:15 AM	4	10	10	0	5	24	9	86	26	0	3	121	11	3	7	0	0	21	23	83	3	0	2	109	275
11:30 AM	2	6	10	0	5	18	8	80	15	0	1	103	9	6	10	0	1	25	23	112	1	0	8	136	282
11:45 AM	1	4	18	0	3	23	22	114	28	0	0	164	14	4	15	0	0	33	27	117	1	0	3	145	365
Total	11	24	50	0	16	85	53	365	83	0	7	501	43	20	41	0	1	104	94	419	8	0	16	521	1211
Approach %	12.9	28.2	58.8	0.0	-	-	10.6	72.9	16.6	0.0	-	-	41.3	19.2	39.4	0.0	-	-	18.0	80.4	1.5	0.0	-	-	-
Total %	0.9	2.0	4.1	0.0	-	7.0	4.4	30.1	6.9	0.0	-	41.4	3.6	1.7	3.4	0.0	-	8.6	7.8	34.6	0.7	0.0	-	43.0	-
PHF	0.688	0.600	0.694	0.000	-	0.885	0.602	0.800	0.741	0.000	-	0.764	0.768	0.714	0.683	0.000	-	0.788	0.870	0.895	0.667	0.000	-	0.898	0.829
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.2
Cars & Light Goods	11	24	49	0	-	84	53	356	81	0	-	490	41	20	41	0	-	102	93	411	8	0	-	512	1188
% Cars & Light Goods	100.0	100.0	98.0	-	-	98.8	100.0	97.5	97.6	-	-	97.8	95.3	100.0	100.0	-	-	98.1	98.9	98.1	100.0	-	-	98.3	98.1
Buses	0	0	0	0	-	0	0	4	0	0	-	4	0	0	0	0	-	0	0	2	0	0	-	2	6
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	1.1	0.0	-	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.5
Single-Unit Trucks	0	0	1	0	-	1	0	4	2	0	-	6	2	0	0	0	-	2	1	4	0	0	-	5	14
% Single-Unit Trucks	0.0	0.0	2.0	-	-	1.2	0.0	1.1	2.4	-	-	1.2	4.7	0.0	0.0	-	-	1.9	1.1	1.0	0.0	-	-	1.0	1.2
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	25.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	6.3	-	-
Pedestrians	-	-	-	-	12	-	-	-	-	-	7	-	-	-	-	-	1	-	-	-	-	-	15	-	-
% Pedestrians	-	-	-	-	75.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	93.8	-	-

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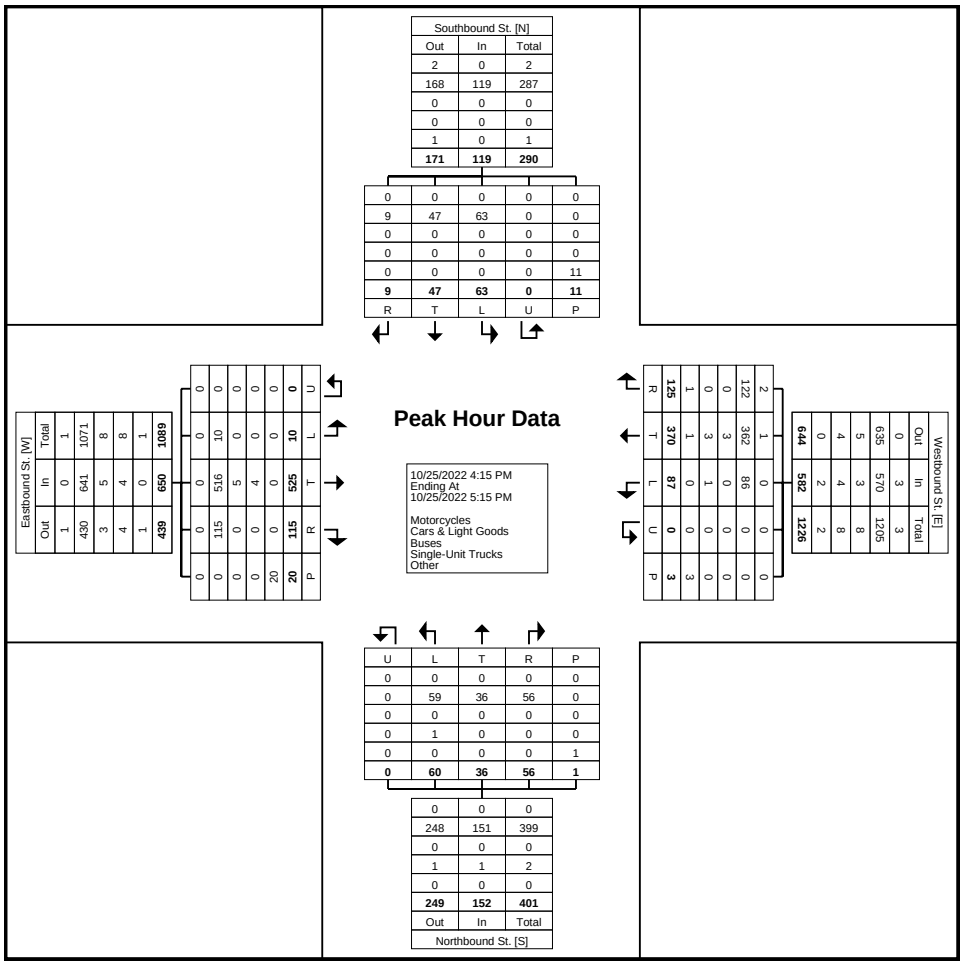
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Southbound St. Southbound						Westbound St. Westbound						Northbound St. Northbound						Eastbound St. Eastbound						
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Int. Total
4:15 PM	3	12	11	0	1	26	27	90	27	0	1	144	10	9	17	0	0	36	22	113	1	0	4	136	342
4:30 PM	4	11	23	0	3	38	33	107	18	0	0	158	9	5	13	0	0	27	26	156	1	0	3	183	406
4:45 PM	0	11	18	0	5	29	27	80	20	0	1	127	15	12	11	0	0	38	25	129	5	0	11	159	353
5:00 PM	2	13	11	0	2	26	38	93	22	0	1	153	22	10	19	0	1	51	42	127	3	0	2	172	402
Total	9	47	63	0	11	119	125	370	87	0	3	582	56	36	60	0	1	152	115	525	10	0	20	650	1503
Approach %	7.6	39.5	52.9	0.0	-	-	21.5	63.6	14.9	0.0	-	-	36.8	23.7	39.5	0.0	-	-	17.7	80.8	1.5	0.0	-	-	-
Total %	0.6	3.1	4.2	0.0	-	7.9	8.3	24.6	5.8	0.0	-	38.7	3.7	2.4	4.0	0.0	-	10.1	7.7	34.9	0.7	0.0	-	43.2	-
PHF	0.563	0.904	0.685	0.000	-	0.783	0.822	0.864	0.806	0.000	-	0.921	0.636	0.750	0.789	0.000	-	0.745	0.685	0.841	0.500	0.000	-	0.888	0.925
Motorcycles	0	0	0	0	-	0	2	1	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	1.6	0.3	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	9	47	63	0	-	119	122	362	86	0	-	570	56	36	59	0	-	151	115	516	10	0	-	641	1481
% Cars & Light Goods	100.0	100.0	100.0	-	-	100.0	97.6	97.8	98.9	-	-	97.9	100.0	100.0	98.3	-	-	99.3	100.0	98.3	100.0	-	-	98.6	98.5
Buses	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	5	0	0	-	5	8
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	1.0	0.0	-	-	0.8	0.5
Single-Unit Trucks	0	0	0	0	-	0	0	3	1	0	-	4	0	0	1	0	-	1	0	4	0	0	-	4	9
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.8	1.1	-	-	0.7	0.0	0.0	1.7	-	-	0.7	0.0	0.8	0.0	-	-	0.6	0.6
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.8	0.0	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	9.1	-	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-	-	-	-	10.0	-	-
Pedestrians	-	-	-	-	10	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	18	-	-
% Pedestrians	-	-	-	-	90.9	-	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-	-	-	-	90.0	-	-

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APPENDIX E

TRUSSLER SCHOOL SITE TRIPS

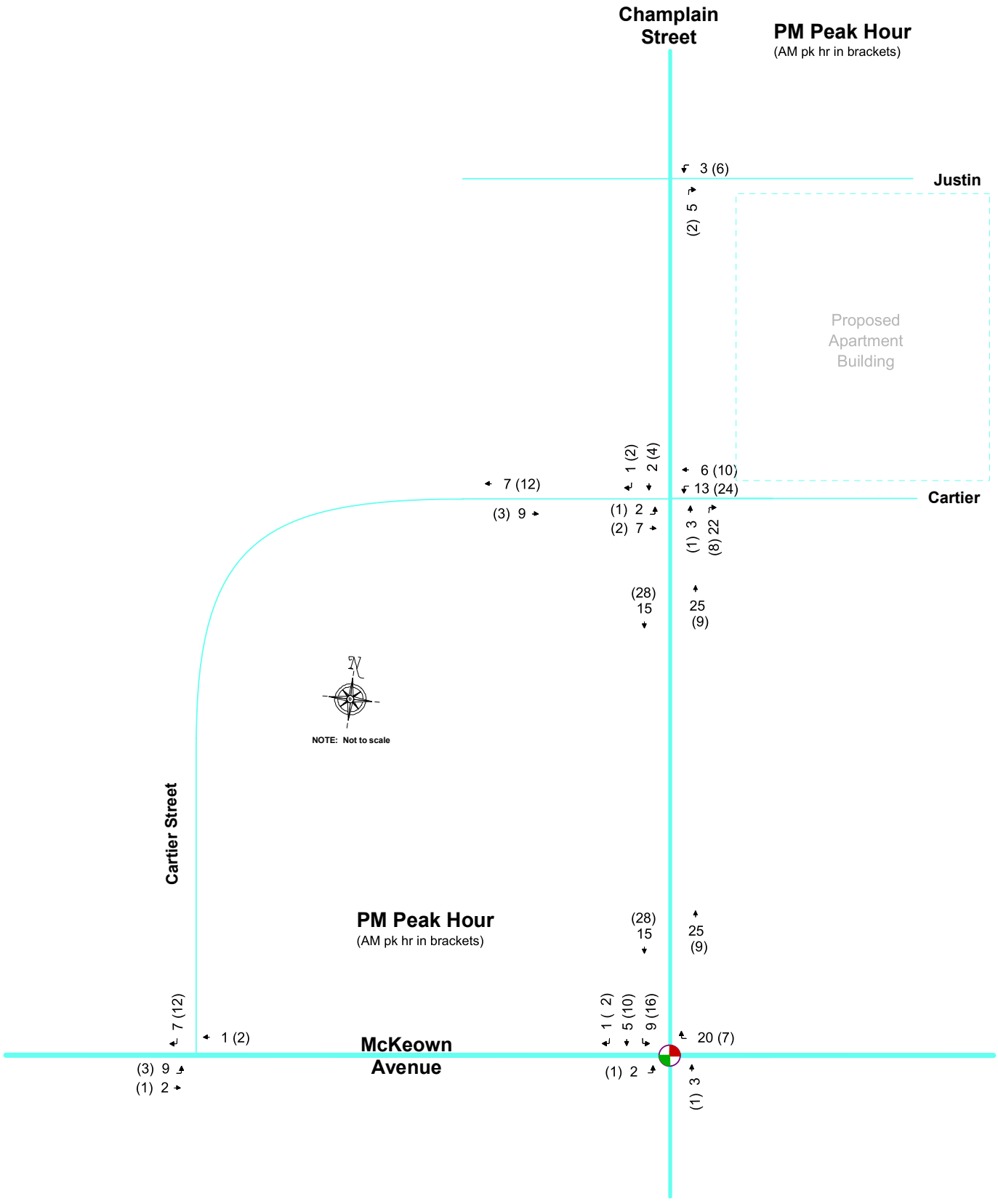


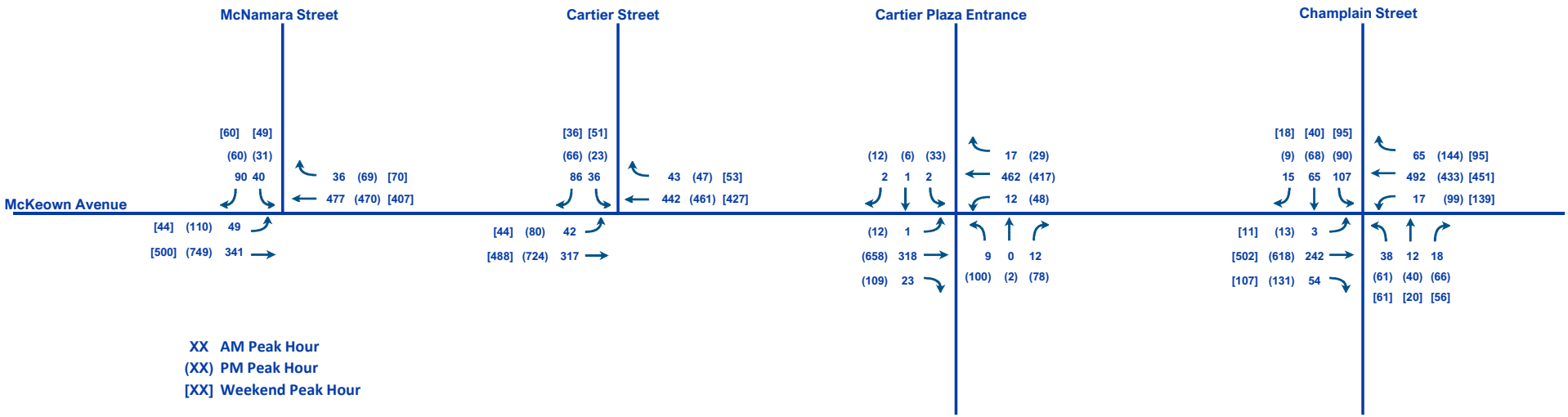
Exhibit 4.3

Site Traffic

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APPENDIX F

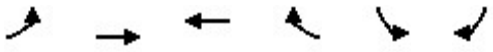
2041 TRAFFIC VOLUMES



XX AM Peak Hour
(XX) PM Peak Hour
[XX] Weekend Peak Hour

APPENDIX G

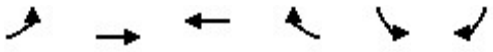
HCM REPORTS – EXISTING TRAFFIC CONDITIONS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	291	389	31	35	77
Future Volume (Veh/h)	43	291	389	31	35	77
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	316	423	34	38	84
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	457				850	440
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	457				850	440
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				88	86
cM capacity (veh/h)	1114				319	621

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	363	457	122
Volume Left	47	0	38
Volume Right	0	34	84
cSH	1114	1700	480
Volume to Capacity	0.04	0.27	0.25
Queue Length 95th (m)	1.1	0.0	8.0
Control Delay (s)	1.5	0.0	15.0
Lane LOS	A		C
Approach Delay (s)	1.5	0.0	15.0
Approach LOS			C

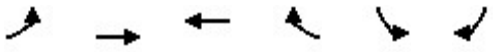
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	623	384	59	27	51
Future Volume (Veh/h)	95	623	384	59	27	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	677	417	64	29	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	481				1332	449
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	481				1332	449
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				81	91
cM capacity (veh/h)	1082				155	610

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	780	481	84
Volume Left	103	0	29
Volume Right	0	64	55
cSH	1082	1700	304
Volume to Capacity	0.10	0.28	0.28
Queue Length 95th (m)	2.5	0.0	8.8
Control Delay (s)	2.3	0.0	21.3
Lane LOS	A		C
Approach Delay (s)	2.3	0.0	21.3
Approach LOS			C

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		



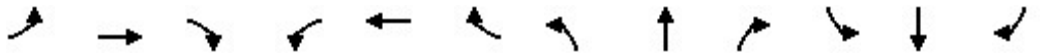
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	599	380	41	20	47
Future Volume (Veh/h)	67	599	380	41	20	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	651	413	45	22	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	458				1232	229
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	458				1232	229
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				86	93
cM capacity (veh/h)	1114				161	770

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	724	275	183	73
Volume Left	73	0	0	22
Volume Right	0	0	45	51
cSH	1114	1700	1700	360
Volume to Capacity	0.07	0.16	0.11	0.20
Queue Length 95th (m)	1.7	0.0	0.0	6.0
Control Delay (s)	1.7	0.0	0.0	17.5
Lane LOS	A			C
Approach Delay (s)	1.7	0.0		17.5
Approach LOS				C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	698	443	168	48
v/c Ratio	0.34	0.24	0.54	0.17
Control Delay	6.1	5.7	20.6	17.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.1	5.7	20.6	17.0
Queue Length 50th (m)	14.7	8.9	10.9	3.3
Queue Length 95th (m)	29.5	18.8	26.5	10.6
Internal Link Dist (m)	96.7	220.1	81.1	57.7
Turn Bay Length (m)				
Base Capacity (vph)	2048	2092	561	530
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.21	0.30	0.09

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	538	94	42	340	25	86	2	67	29	5	10
Future Volume (vph)	10	538	94	42	340	25	86	2	67	29	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			0.99			0.94			0.97	
Flt Protected		1.00			0.99			0.97			0.97	
Satd. Flow (prot)		3459			3489			1706			1747	
Flt Permitted		0.95			0.85			0.80			0.77	
Satd. Flow (perm)		3280			2966			1405			1394	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	585	102	46	370	27	93	2	73	32	5	11
RTOR Reduction (vph)	0	13	0	0	5	0	0	44	0	0	9	0
Lane Group Flow (vph)	0	685	0	0	438	0	0	124	0	0	39	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		37.2			37.2			11.5			11.5	
Effective Green, g (s)		37.2			37.2			11.5			11.5	
Actuated g/C Ratio		0.62			0.62			0.19			0.19	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2036			1841			269			267	
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.15			c0.09			0.03	
v/c Ratio		0.34			0.24			0.46			0.15	
Uniform Delay, d1		5.4			5.0			21.5			20.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.1			1.3			0.3	
Delay (s)		5.9			5.1			22.7			20.4	
Level of Service		A			A			C			C	
Approach Delay (s)		5.9			5.1			22.7			20.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	14.2
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

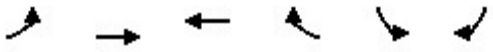
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	688	611	157	131
v/c Ratio	0.31	0.33	0.46	0.44
Control Delay	5.4	5.4	19.9	24.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.4	5.4	19.9	24.7
Queue Length 50th (m)	14.3	12.0	11.0	12.3
Queue Length 95th (m)	27.5	24.6	25.6	26.0
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	2234	2185	639	590
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.28	0.25	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	509	114	86	358	119	53	34	57	64	50	6
Future Volume (vph)	10	509	114	86	358	119	53	34	57	64	50	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.97			0.97			0.95			0.99	
Flt Protected		1.00			0.99			0.98			0.97	
Satd. Flow (prot)		3441			3401			1731			1801	
Flt Permitted		0.95			0.77			0.86			0.79	
Satd. Flow (perm)		3254			2641			1525			1461	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	553	124	93	389	129	58	37	62	70	54	7
RTOR Reduction (vph)	0	15	0	0	25	0	0	35	0	0	3	0
Lane Group Flow (vph)	0	673	0	0	586	0	0	122	0	0	128	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		36.9			36.9			9.0			9.0	
Effective Green, g (s)		36.9			36.9			9.0			9.0	
Actuated g/C Ratio		0.65			0.65			0.16			0.16	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2102			1706			240			230	
v/s Ratio Prot												
v/s Ratio Perm		0.21			c0.22			0.08			c0.09	
v/c Ratio		0.32			0.34			0.51			0.55	
Uniform Delay, d1		4.5			4.6			22.0			22.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.1			1.7			2.9	
Delay (s)		4.9			4.7			23.7			25.1	
Level of Service		A			A			C			C	
Approach Delay (s)		4.9			4.7			23.7			25.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	14.2
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

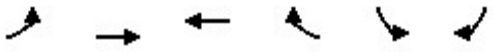
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	623	384	59	27	51
Future Volume (Veh/h)	95	623	384	59	27	51
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	677	417	64	29	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	481				1332	449
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	481				1332	449
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				81	91
cM capacity (veh/h)	1082				155	610

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	780	481	84
Volume Left	103	0	29
Volume Right	0	64	55
cSH	1082	1700	304
Volume to Capacity	0.10	0.28	0.28
Queue Length 95th (m)	2.5	0.0	8.8
Control Delay (s)	2.3	0.0	21.3
Lane LOS	A		C
Approach Delay (s)	2.3	0.0	21.3
Approach LOS			C

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		



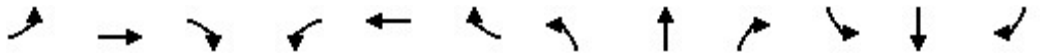
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	67	599	380	41	20	47
Future Volume (Veh/h)	67	599	380	41	20	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	651	413	45	22	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	458				1232	229
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	458				1232	229
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				86	93
cM capacity (veh/h)	1114				161	770

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	724	275	183	73
Volume Left	73	0	0	22
Volume Right	0	0	45	51
cSH	1114	1700	1700	360
Volume to Capacity	0.07	0.16	0.11	0.20
Queue Length 95th (m)	1.7	0.0	0.0	6.0
Control Delay (s)	1.7	0.0	0.0	17.5
Lane LOS	A			C
Approach Delay (s)	1.7	0.0		17.5
Approach LOS				C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	698	443	168	48
v/c Ratio	0.34	0.24	0.54	0.17
Control Delay	6.1	5.7	20.6	17.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.1	5.7	20.6	17.0
Queue Length 50th (m)	14.7	8.9	10.9	3.3
Queue Length 95th (m)	29.5	18.8	26.5	10.6
Internal Link Dist (m)	96.7	220.1	81.1	57.7
Turn Bay Length (m)				
Base Capacity (vph)	2048	2092	561	530
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.21	0.30	0.09

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	538	94	42	340	25	86	2	67	29	5	10
Future Volume (vph)	10	538	94	42	340	25	86	2	67	29	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			0.99			0.94			0.97	
Flt Protected		1.00			0.99			0.97			0.97	
Satd. Flow (prot)		3459			3489			1706			1747	
Flt Permitted		0.95			0.85			0.80			0.77	
Satd. Flow (perm)		3280			2966			1405			1394	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	585	102	46	370	27	93	2	73	32	5	11
RTOR Reduction (vph)	0	13	0	0	5	0	0	44	0	0	9	0
Lane Group Flow (vph)	0	685	0	0	438	0	0	124	0	0	39	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		37.2			37.2			11.5			11.5	
Effective Green, g (s)		37.2			37.2			11.5			11.5	
Actuated g/C Ratio		0.62			0.62			0.19			0.19	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2036			1841			269			267	
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.15			c0.09			0.03	
v/c Ratio		0.34			0.24			0.46			0.15	
Uniform Delay, d1		5.4			5.0			21.5			20.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.1			1.3			0.3	
Delay (s)		5.9			5.1			22.7			20.4	
Level of Service		A			A			C			C	
Approach Delay (s)		5.9			5.1			22.7			20.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	14.2
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

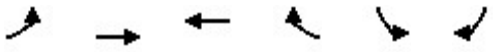
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	688	611	157	131
v/c Ratio	0.31	0.33	0.46	0.44
Control Delay	5.4	5.4	19.9	24.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.4	5.4	19.9	24.7
Queue Length 50th (m)	14.3	12.0	11.0	12.3
Queue Length 95th (m)	27.5	24.6	25.6	26.0
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	2234	2185	639	590
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.28	0.25	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	509	114	86	358	119	53	34	57	64	50	6
Future Volume (vph)	10	509	114	86	358	119	53	34	57	64	50	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.97			0.97			0.95			0.99	
Flt Protected		1.00			0.99			0.98			0.97	
Satd. Flow (prot)		3441			3401			1731			1801	
Flt Permitted		0.95			0.77			0.86			0.79	
Satd. Flow (perm)		3254			2641			1525			1461	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	553	124	93	389	129	58	37	62	70	54	7
RTOR Reduction (vph)	0	15	0	0	25	0	0	35	0	0	3	0
Lane Group Flow (vph)	0	673	0	0	586	0	0	122	0	0	128	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		36.9			36.9			9.0			9.0	
Effective Green, g (s)		36.9			36.9			9.0			9.0	
Actuated g/C Ratio		0.65			0.65			0.16			0.16	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2102			1706			240			230	
v/s Ratio Prot												
v/s Ratio Perm		0.21			c0.22			0.08			c0.09	
v/c Ratio		0.32			0.34			0.51			0.55	
Uniform Delay, d1		4.5			4.6			22.0			22.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.1			1.7			2.9	
Delay (s)		4.9			4.7			23.7			25.1	
Level of Service		A			A			C			C	
Approach Delay (s)		4.9			4.7			23.7			25.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	14.2
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

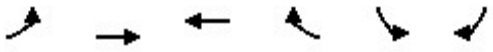
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	425	345	60	42	52
Future Volume (Veh/h)	38	425	345	60	42	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	462	375	65	46	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	440				952	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				952	408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	91
cM capacity (veh/h)	1115				280	648

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	503	440	103
Volume Left	41	0	46
Volume Right	0	65	57
cSH	1115	1700	408
Volume to Capacity	0.04	0.26	0.25
Queue Length 95th (m)	0.9	0.0	7.9
Control Delay (s)	1.1	0.0	16.8
Lane LOS	A		C
Approach Delay (s)	1.1	0.0	16.8
Approach LOS			C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		



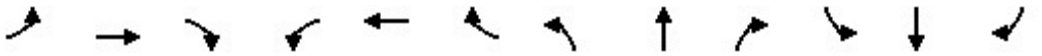
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	415	362	46	44	31
Future Volume (Veh/h)	38	415	362	46	44	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	451	393	50	48	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	443				951	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	443				951	222
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				81	96
cM capacity (veh/h)	1106				252	788

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	492	262	181	82
Volume Left	41	0	0	48
Volume Right	0	0	50	34
cSH	1106	1700	1700	351
Volume to Capacity	0.04	0.15	0.11	0.23
Queue Length 95th (m)	0.9	0.0	0.0	7.1
Control Delay (s)	1.1	0.0	0.0	18.4
Lane LOS	A			C
Approach Delay (s)	1.1	0.0		18.4
Approach LOS				C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (m)
Queue Length 95th (m)
Internal Link Dist (m)
Turn Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Frt												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type												
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d1												
Progression Factor												
Incremental Delay, d2												
Delay (s)												
Level of Service												
Approach Delay (s)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.00		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	568	617	127	121
v/c Ratio	0.25	0.35	0.39	0.41
Control Delay	4.9	5.8	17.5	23.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	4.9	5.8	17.5	23.4
Queue Length 50th (m)	11.2	13.5	7.6	10.9
Queue Length 95th (m)	21.4	26.6	20.3	23.9
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	2256	2112	616	595
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.25	0.29	0.21	0.20

Intersection Summary

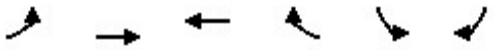
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	426	92	120	382	66	53	16	48	66	34	11
Future Volume (vph)	5	426	92	120	382	66	53	16	48	66	34	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.97			0.98			0.94			0.99	
Flt Protected		1.00			0.99			0.98			0.97	
Satd. Flow (prot)		3444			3441			1720			1785	
Flt Permitted		0.95			0.74			0.84			0.81	
Satd. Flow (perm)		3276			2557			1485			1490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	463	100	130	415	72	58	17	52	72	37	12
RTOR Reduction (vph)	0	14	0	0	10	0	0	38	0	0	6	0
Lane Group Flow (vph)	0	554	0	0	607	0	0	89	0	0	115	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		37.5			37.5			8.9			8.9	
Effective Green, g (s)		37.5			37.5			8.9			8.9	
Actuated g/C Ratio		0.65			0.65			0.15			0.15	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2132			1664			229			230	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.24			0.06			c0.08	
v/c Ratio		0.26			0.36			0.39			0.50	
Uniform Delay, d1		4.2			4.6			21.9			22.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.1			1.1			1.7	
Delay (s)		4.5			4.7			23.0			24.0	
Level of Service		A			A			C			C	
Approach Delay (s)		4.5			4.7			23.0			24.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	57.6	Sum of lost time (s)	14.2
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX H

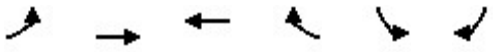
HCM REPORTS – 2041 DO-NOTHING TRAFFIC CONDITIONS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	356	498	36	41	89
Future Volume (Veh/h)	50	356	498	36	41	89
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	387	541	39	45	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	580				1056	560
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	580				1056	560
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				81	82
cM capacity (veh/h)	1004				238	531

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	441	580	142
Volume Left	54	0	45
Volume Right	0	39	97
cSH	1004	1700	382
Volume to Capacity	0.05	0.34	0.37
Queue Length 95th (m)	1.4	0.0	13.4
Control Delay (s)	1.6	0.0	19.9
Lane LOS	A		C
Approach Delay (s)	1.6	0.0	19.9
Approach LOS			C

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		



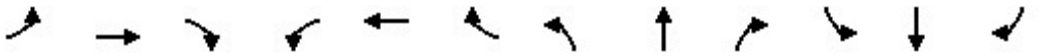
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	354	468	43	36	80
Future Volume (Veh/h)	34	354	468	43	36	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	385	509	47	39	87
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked	1.00				1.00	1.00
vC, conflicting volume	556				992	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	552				988	274
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	96				83	88
cM capacity (veh/h)	979				233	696

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	422	339	217	126
Volume Left	37	0	0	39
Volume Right	0	0	47	87
cSH	979	1700	1700	431
Volume to Capacity	0.04	0.20	0.13	0.29
Queue Length 95th (m)	0.9	0.0	0.0	9.6
Control Delay (s)	1.2	0.0	0.0	16.8
Lane LOS	A			C
Approach Delay (s)	1.2	0.0		16.8
Approach LOS				C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	410	590	23	5
v/c Ratio	0.13	0.19	0.06	0.02
Control Delay	1.5	1.6	0.3	16.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	1.5	1.6	0.3	16.8
Queue Length 50th (m)	0.0	0.0	0.0	0.3
Queue Length 95th (m)	12.9	19.1	0.0	2.7
Internal Link Dist (m)	96.7	220.1	81.1	57.7
Turn Bay Length (m)				
Base Capacity (vph)	3096	3139	746	714
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.13	0.19	0.03	0.01

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	353	23	12	514	17	9	0	12	2	1	2
Future Volume (vph)	1	353	23	12	514	17	9	0	12	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.92			0.95	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3506			3519			1684			1728	
Flt Permitted		0.95			0.95			1.00			1.00	
Satd. Flow (perm)		3347			3331			1721			1762	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	384	25	13	559	18	10	0	13	2	1	2
RTOR Reduction (vph)	0	3	0	0	2	0	0	22	0	0	2	0
Lane Group Flow (vph)	0	407	0	0	588	0	0	1	0	0	3	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		46.6			46.6			2.0			2.0	
Effective Green, g (s)		46.6			46.6			2.0			2.0	
Actuated g/C Ratio		0.78			0.78			0.03			0.03	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2608			2595			57			58	
v/s Ratio Prot												
v/s Ratio Perm		0.12			c0.18			0.00			c0.00	
v/c Ratio		0.16			0.23			0.01			0.05	
Uniform Delay, d1		1.7			1.8			27.9			28.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.0			0.1			0.4	
Delay (s)		1.8			1.8			28.0			28.4	
Level of Service		A			A			C			C	
Approach Delay (s)		1.8			1.8			28.0			28.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	2.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	14.2
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

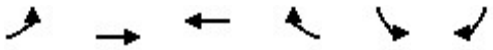
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	378	614	72	223
v/c Ratio	0.20	0.32	0.21	0.64
Control Delay	6.5	7.7	14.9	28.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.5	7.7	14.9	28.8
Queue Length 50th (m)	8.6	16.2	4.7	22.5
Queue Length 95th (m)	18.7	32.4	13.4	42.1
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	1902	2427	531	534
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.20	0.25	0.14	0.42

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	291	55	17	496	52	38	9	19	123	62	20
Future Volume (vph)	2	291	55	17	496	52	38	9	19	123	62	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			0.99			0.96			0.99	
Flt Protected		1.00			1.00			0.97			0.97	
Satd. Flow (prot)		3454			3485			1740			1784	
Flt Permitted		0.95			0.94			0.78			0.77	
Satd. Flow (perm)		3292			3281			1391			1423	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	316	60	18	539	57	41	10	21	134	67	22
RTOR Reduction (vph)	0	15	0	0	10	0	0	16	0	0	5	0
Lane Group Flow (vph)	0	363	0	0	604	0	0	56	0	0	218	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.6			34.6			14.5			14.5	
Effective Green, g (s)		34.6			34.6			14.5			14.5	
Actuated g/C Ratio		0.57			0.57			0.24			0.24	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1888			1882			334			342	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.18			0.04			c0.15	
v/c Ratio		0.19			0.32			0.17			0.64	
Uniform Delay, d1		6.2			6.7			18.1			20.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.2			3.9	
Delay (s)		6.4			6.8			18.4			24.4	
Level of Service		A			A			B			C	
Approach Delay (s)		6.4			6.8			18.4			24.4	
Approach LOS		A			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

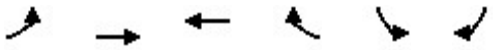
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	110	752	459	68	31	59
Future Volume (Veh/h)	110	752	459	68	31	59
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	817	499	74	34	64
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	573				1593	536
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	573				1593	536
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				68	88
cM capacity (veh/h)	1000				105	545

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	937	573	98
Volume Left	120	0	34
Volume Right	0	74	64
cSH	1000	1700	222
Volume to Capacity	0.12	0.34	0.44
Queue Length 95th (m)	3.3	0.0	16.7
Control Delay (s)	3.0	0.0	33.5
Lane LOS	A		D
Approach Delay (s)	3.0	0.0	33.5
Approach LOS			D

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	78	724	455	48	23	55
Future Volume (Veh/h)	78	724	455	48	23	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	787	495	52	25	60
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked	0.98				0.98	0.98
vC, conflicting volume	547				1478	274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	495				1446	216
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				78	92
cM capacity (veh/h)	1057				112	769

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	872	330	217	85
Volume Left	85	0	0	25
Volume Right	0	0	52	60
cSH	1057	1700	1700	283
Volume to Capacity	0.08	0.19	0.13	0.30
Queue Length 95th (m)	2.1	0.0	0.0	9.8
Control Delay (s)	2.0	0.0	0.0	23.1
Lane LOS	A			C
Approach Delay (s)	2.0	0.0		23.1
Approach LOS				C

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	852	540	196	57
v/c Ratio	0.43	0.31	0.59	0.19
Control Delay	7.3	6.7	22.6	16.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.3	6.7	22.6	16.7
Queue Length 50th (m)	20.9	12.4	14.0	4.0
Queue Length 95th (m)	41.9	26.1	31.5	11.9
Internal Link Dist (m)	96.7	220.1	81.1	57.7
Turn Bay Length (m)				
Base Capacity (vph)	1993	1980	557	520
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.27	0.35	0.11

Intersection Summary

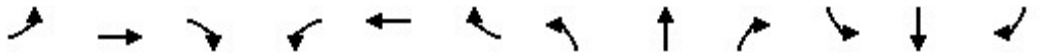
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	663	109	49	419	29	100	2	78	34	6	12
Future Volume (vph)	12	663	109	49	419	29	100	2	78	34	6	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			0.99			0.94			0.97	
Flt Protected		1.00			1.00			0.97			0.97	
Satd. Flow (prot)		3463			3491			1706			1749	
Flt Permitted		0.95			0.82			0.80			0.76	
Satd. Flow (perm)		3277			2879			1395			1364	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	721	118	53	455	32	109	2	85	37	7	13
RTOR Reduction (vph)	0	13	0	0	6	0	0	42	0	0	10	0
Lane Group Flow (vph)	0	839	0	0	534	0	0	154	0	0	47	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		36.1			36.1			12.4			12.4	
Effective Green, g (s)		36.1			36.1			12.4			12.4	
Actuated g/C Ratio		0.60			0.60			0.21			0.21	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1981			1740			289			283	
v/s Ratio Prot												
v/s Ratio Perm		c0.26			0.19			c0.11			0.03	
v/c Ratio		0.42			0.31			0.53			0.17	
Uniform Delay, d1		6.3			5.7			21.1			19.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.1			1.9			0.3	
Delay (s)		6.9			5.8			23.0			19.7	
Level of Service		A			A			C			B	
Approach Delay (s)		6.9			5.8			23.0			19.7	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	840	757	181	171
v/c Ratio	0.44	0.51	0.51	0.55
Control Delay	7.7	8.1	20.3	26.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.7	8.1	20.3	26.9
Queue Length 50th (m)	21.7	18.9	13.4	16.6
Queue Length 95th (m)	42.1	39.8	29.5	33.1
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	1905	1911	590	536
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.40	0.31	0.32

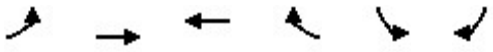
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	623	132	100	436	160	61	40	66	87	59	11
Future Volume (vph)	18	623	132	100	436	160	61	40	66	87	59	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.97			0.97			0.95			0.99	
Flt Protected		1.00			0.99			0.98			0.97	
Satd. Flow (prot)		3445			3393			1731			1795	
Flt Permitted		0.93			0.73			0.84			0.75	
Satd. Flow (perm)		3209			2489			1472			1391	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	677	143	109	474	174	66	43	72	95	64	12
RTOR Reduction (vph)	0	16	0	0	34	0	0	34	0	0	4	0
Lane Group Flow (vph)	0	824	0	0	723	0	0	147	0	0	167	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.5			34.5			12.8			12.8	
Effective Green, g (s)		34.5			34.5			12.8			12.8	
Actuated g/C Ratio		0.59			0.59			0.22			0.22	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1892			1467			322			304	
v/s Ratio Prot												
v/s Ratio Perm		0.26			c0.29			0.10			c0.12	
v/c Ratio		0.44			0.49			0.46			0.55	
Uniform Delay, d1		6.6			6.9			19.8			20.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.3			1.0			2.0	
Delay (s)		7.4			7.2			20.9			22.3	
Level of Service		A			A			C			C	
Approach Delay (s)		7.4			7.2			20.9			22.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	14.2
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

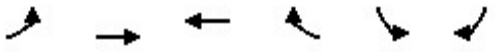
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	500	407	70	49	60
Future Volume (Veh/h)	44	500	407	70	49	60
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	543	442	76	53	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				1119	480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518				1119	480
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				76	89
cM capacity (veh/h)	1043				220	590

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	591	518	118
Volume Left	48	0	53
Volume Right	0	76	65
cSH	1043	1700	336
Volume to Capacity	0.05	0.30	0.35
Queue Length 95th (m)	1.2	0.0	12.3
Control Delay (s)	1.2	0.0	21.4
Lane LOS	A		C
Approach Delay (s)	1.2	0.0	21.4
Approach LOS			C

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		



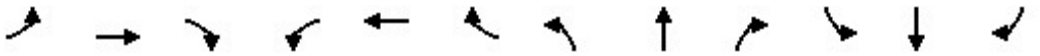
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	488	427	53	51	36
Future Volume (Veh/h)	44	488	427	53	51	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	530	464	58	55	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			121			
pX, platoon unblocked						
vC, conflicting volume	522				1119	261
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	522				1119	261
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				72	95
cM capacity (veh/h)	1034				194	744

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	578	309	213	94
Volume Left	48	0	0	55
Volume Right	0	0	58	39
cSH	1034	1700	1700	280
Volume to Capacity	0.05	0.18	0.13	0.34
Queue Length 95th (m)	1.2	0.0	0.0	11.4
Control Delay (s)	1.3	0.0	0.0	24.2
Lane LOS	A			C
Approach Delay (s)	1.3	0.0		24.2
Approach LOS				C

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (m)
Queue Length 95th (m)
Internal Link Dist (m)
Turn Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio

Intersection Summary

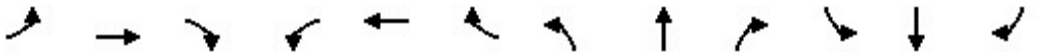


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Frt												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type												
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d1												
Progression Factor												
Incremental Delay, d2												
Delay (s)												
Level of Service												
Approach Delay (s)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.00		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	674	744	149	166
v/c Ratio	0.35	0.51	0.44	0.53
Control Delay	6.7	8.6	18.2	25.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.7	8.6	18.2	25.8
Queue Length 50th (m)	15.6	20.0	9.9	15.5
Queue Length 95th (m)	30.9	41.1	23.8	31.4
Internal Link Dist (m)	220.1	159.5	110.9	132.6
Turn Bay Length (m)				
Base Capacity (vph)	1934	1856	578	550
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.40	0.26	0.30

Intersection Summary



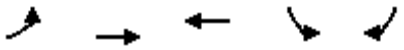
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	502	107	139	451	95	61	20	56	95	40	18
Future Volume (vph)	11	502	107	139	451	95	61	20	56	95	40	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6			5.6	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.97			0.98			0.94			0.98	
Flt Protected		1.00			0.99			0.98			0.97	
Satd. Flow (prot)		3445			3431			1722			1777	
Flt Permitted		0.94			0.70			0.81			0.77	
Satd. Flow (perm)		3242			2418			1430			1413	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	546	116	151	490	103	66	22	61	103	43	20
RTOR Reduction (vph)	0	16	0	0	15	0	0	35	0	0	7	0
Lane Group Flow (vph)	0	658	0	0	729	0	0	114	0	0	159	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.5			34.5			12.5			12.5	
Effective Green, g (s)		34.5			34.5			12.5			12.5	
Actuated g/C Ratio		0.59			0.59			0.21			0.21	
Clearance Time (s)		5.6			5.6			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1921			1433			307			303	
v/s Ratio Prot												
v/s Ratio Perm		0.20			c0.30			0.08			c0.11	
v/c Ratio		0.34			0.51			0.37			0.52	
Uniform Delay, d1		6.1			6.9			19.5			20.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.3			0.8			1.6	
Delay (s)		6.5			7.2			20.2			21.9	
Level of Service		A			A			C			C	
Approach Delay (s)		6.5			7.2			20.2			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	14.2
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX I

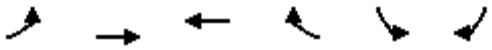
HCM REPORTS – 2041 CORRIDOR MODIFICATION TRAFFIC CONDITIONS



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	53	371	557	43	98
v/c Ratio	0.28	0.39	0.60	0.04	1.00
Control Delay	17.0	14.7	16.9	6.3	109.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	14.7	16.9	6.3	109.3
Queue Length 50th (m)	3.5	13.3	20.6	1.5	0.0
Queue Length 95th (m)	10.6	22.0	32.6	5.8	#23.7
Internal Link Dist (m)		230.8	333.8	171.7	
Turn Bay Length (m)	30.0			20.0	
Base Capacity (vph)	405	2038	1955	961	98
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.13	0.18	0.28	0.04	1.00

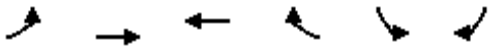
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	49	341	477	36	40	90
Future Volume (vph)	49	341	477	36	40	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	3539	3383		1805	1615
Flt Permitted	0.37	1.00	1.00		0.95	1.00
Satd. Flow (perm)	705	3539	3383		1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	371	518	39	43	98
RTOR Reduction (vph)	0	0	12	0	0	98
Lane Group Flow (vph)	53	371	545	0	43	0
Heavy Vehicles (%)	0%	2%	6%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	custom
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	12.5	12.5	12.5		24.6	0.0
Effective Green, g (s)	12.5	12.5	12.5		24.6	0.0
Actuated g/C Ratio	0.27	0.27	0.27		0.53	0.00
Clearance Time (s)	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	191	959	917		963	0
v/s Ratio Prot		0.10	c0.16		c0.02	
v/s Ratio Perm	0.08					
v/c Ratio	0.28	0.39	0.59		0.04	0.00
Uniform Delay, d1	13.2	13.7	14.6		5.1	23.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	0.3	1.0		0.1	0.0
Delay (s)	14.0	13.9	15.6		5.2	23.1
Level of Service	B	B	B		A	C
Approach Delay (s)		14.0	15.6		17.6	
Approach LOS		B	B		B	

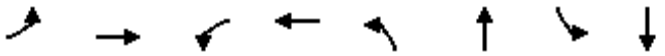
Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	46.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	42	317	442	43	36	86
Future Volume (Veh/h)	42	317	442	43	36	86
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	345	480	47	39	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		358	121			
pX, platoon unblocked						
vC, conflicting volume	527				768	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	527				768	264
tC, single (s)	4.2				6.9	7.1
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.4
p0 queue free %	95				88	87
cM capacity (veh/h)	1002				321	708

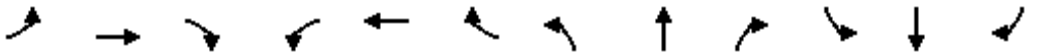
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	46	172	172	320	207	132
Volume Left	46	0	0	0	0	39
Volume Right	0	0	0	0	47	93
cSH	1002	1700	1700	1700	1700	522
Volume to Capacity	0.05	0.10	0.10	0.19	0.12	0.25
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	8.0
Control Delay (s)	8.8	0.0	0.0	0.0	0.0	14.2
Lane LOS	A					B
Approach Delay (s)	1.0			0.0		14.2
Approach LOS						B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1	371	13	520	10	13	2	3
v/c Ratio	0.00	0.12	0.01	0.16	0.03	0.02	0.01	0.01
Control Delay	4.0	2.2	1.6	1.4	19.4	0.1	19.5	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	2.2	1.6	1.4	19.4	0.1	19.5	16.0
Queue Length 50th (m)	0.0	0.0	0.1	0.0	0.9	0.0	0.2	0.1
Queue Length 95th (m)	0.6	15.7	1.5	16.1	4.7	0.0	1.9	2.2
Internal Link Dist (m)		96.7		220.1		81.1		57.7
Turn Bay Length (m)	30.0		30.0		20.0		20.0	
Base Capacity (vph)	781	3196	876	3280	767	928	767	691
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.12	0.01	0.16	0.01	0.01	0.00	0.00

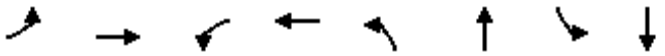
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	318	23	12	462	17	9	0	12	2	1	2
Future Volume (vph)	1	318	23	12	462	17	9	0	12	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3503		1770	3521		1770	1583		1770	1676	
Flt Permitted	0.46	1.00		0.50	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	856	3503		928	3521		1863	1583		1863	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	346	25	13	502	18	10	0	13	2	1	2
RTOR Reduction (vph)	0	3	0	0	2	0	0	13	0	0	2	0
Lane Group Flow (vph)	1	368	0	13	518	0	10	0	0	2	1	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	45.3	45.3		48.8	48.8		1.8	1.8		1.8	1.8	
Effective Green, g (s)	45.3	45.3		48.8	48.8		1.8	1.8		1.8	1.8	
Actuated g/C Ratio	0.73	0.73		0.79	0.79		0.03	0.03		0.03	0.03	
Clearance Time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	627	2567		739	2780		54	46		54	48	
v/s Ratio Prot		0.10		0.00	c0.15			0.00			0.00	
v/s Ratio Perm	0.00			0.01			c0.01			0.00		
v/c Ratio	0.00	0.14		0.02	0.19		0.19	0.01		0.04	0.02	
Uniform Delay, d1	2.2	2.5		1.5	1.6		29.3	29.1		29.2	29.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		0.0	0.0		1.7	0.1		0.3	0.2	
Delay (s)	2.2	2.6		1.5	1.6		30.9	29.2		29.4	29.3	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		2.6			1.6			30.0			29.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	2.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	14.2
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



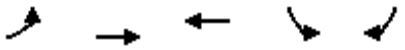
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	3	322	18	606	41	33	116	87
v/c Ratio	0.01	0.14	0.02	0.25	0.16	0.10	0.44	0.24
Control Delay	7.7	5.6	4.0	5.0	22.4	13.6	27.5	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	5.6	4.0	5.0	22.4	13.6	27.5	19.8
Queue Length 50th (m)	0.1	5.3	0.5	12.2	3.7	1.2	11.2	6.6
Queue Length 95th (m)	1.5	18.1	2.6	24.6	12.5	8.1	28.6	19.5
Internal Link Dist (m)		220.1		159.5		110.9		132.6
Turn Bay Length (m)	30.0		30.0		20.0		20.0	
Base Capacity (vph)	523	2301	785	2783	501	662	525	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.14	0.02	0.22	0.08	0.05	0.22	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	242	54	17	492	65	38	12	18	107	65	15
Future Volume (vph)	3	242	54	17	492	65	38	12	18	107	65	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3442		1770	3477		1770	1693		1770	1811	
Flt Permitted	0.42	1.00		0.52	1.00		0.70	1.00		0.74	1.00	
Satd. Flow (perm)	787	3442		961	3477		1305	1693		1370	1811	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	263	59	18	535	71	41	13	20	116	71	16
RTOR Reduction (vph)	0	17	0	0	10	0	0	17	0	0	13	0
Lane Group Flow (vph)	3	305	0	18	596	0	41	16	0	116	74	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	38.0	38.0		42.2	42.2		9.3	9.3		9.3	9.3	
Effective Green, g (s)	38.0	38.0		42.2	42.2		9.3	9.3		9.3	9.3	
Actuated g/C Ratio	0.61	0.61		0.67	0.67		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	476	2086		662	2340		193	251		203	268	
v/s Ratio Prot		0.09		0.00	c0.17			0.01			0.04	
v/s Ratio Perm	0.00			0.02			0.03			c0.08		
v/c Ratio	0.01	0.15		0.03	0.25		0.21	0.06		0.57	0.28	
Uniform Delay, d1	4.9	5.3		3.5	4.0		23.5	23.0		24.8	23.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		0.0	0.1		0.6	0.1		3.8	0.6	
Delay (s)	4.9	5.5		3.5	4.1		24.0	23.1		28.7	24.3	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		5.5			4.1			23.6			26.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

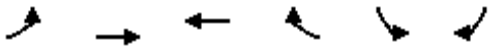
c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	120	814	586	34	65
v/c Ratio	0.47	0.64	0.47	0.04	1.00
Control Delay	18.4	15.1	12.0	9.2	132.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	15.1	12.0	9.2	132.7
Queue Length 50th (m)	7.9	30.2	18.6	1.6	0.0
Queue Length 95th (m)	19.6	44.2	28.9	6.5	#20.5
Internal Link Dist (m)		230.8	333.8	171.7	
Turn Bay Length (m)	30.0			20.0	
Base Capacity (vph)	445	2227	2178	819	65
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.37	0.27	0.04	1.00

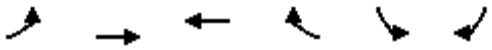
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	110	749	470	69	31	60
Future Volume (vph)	110	749	470	69	31	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3574	3471		1805	1583
Flt Permitted	0.38	1.00	1.00		0.95	1.00
Satd. Flow (perm)	716	3574	3471		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	814	511	75	34	65
RTOR Reduction (vph)	0	0	24	0	0	65
Lane Group Flow (vph)	120	814	562	0	34	0
Heavy Vehicles (%)	2%	1%	2%	2%	0%	2%
Turn Type	Perm	NA	NA		Prot	custom
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	17.0	17.0	17.0		21.7	0.0
Effective Green, g (s)	17.0	17.0	17.0		21.7	0.0
Actuated g/C Ratio	0.36	0.36	0.36		0.45	0.00
Clearance Time (s)	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	255	1273	1237		821	0
v/s Ratio Prot		c0.23	0.16		c0.02	
v/s Ratio Perm	0.17					
v/c Ratio	0.47	0.64	0.45		0.04	0.00
Uniform Delay, d1	11.9	12.8	11.8		7.2	23.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	1.1	0.3		0.1	0.0
Delay (s)	13.2	13.9	12.1		7.3	23.9
Level of Service	B	B	B		A	C
Approach Delay (s)		13.8	12.1		18.2	
Approach LOS		B	B		B	

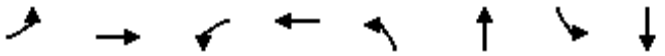
Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	80	724	461	47	23	66
Future Volume (Veh/h)	80	724	461	47	23	66
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	787	501	51	25	72
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		358	121			
pX, platoon unblocked	0.99				0.93	0.99
vC, conflicting volume	552				1094	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	519				887	239
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				90	90
cM capacity (veh/h)	1043				245	749

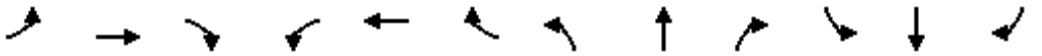
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	87	394	394	334	218	97
Volume Left	87	0	0	0	0	25
Volume Right	0	0	0	0	51	72
cSH	1043	1700	1700	1700	1700	490
Volume to Capacity	0.08	0.23	0.23	0.20	0.13	0.20
Queue Length 95th (m)	2.2	0.0	0.0	0.0	0.0	5.8
Control Delay (s)	8.8	0.0	0.0	0.0	0.0	14.2
Lane LOS	A					B
Approach Delay (s)	0.9			0.0		14.2
Approach LOS						B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	13	833	52	485	109	87	36	20
v/c Ratio	0.02	0.37	0.11	0.20	0.42	0.24	0.15	0.06
Control Delay	7.6	7.8	4.3	4.7	27.8	7.9	22.8	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	7.8	4.3	4.7	27.8	7.9	22.8	14.3
Queue Length 50th (m)	0.6	26.0	1.5	9.8	12.0	0.2	3.7	0.7
Queue Length 95th (m)	3.2	45.2	5.3	19.3	25.4	10.2	10.7	5.7
Internal Link Dist (m)		96.7		220.1		81.1		57.7
Turn Bay Length (m)	30.0		30.0		20.0		20.0	
Base Capacity (vph)	573	2251	457	2541	515	644	486	633
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.37	0.11	0.19	0.21	0.14	0.07	0.03

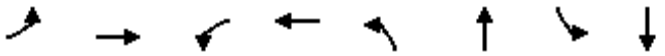
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	658	109	48	417	29	100	2	78	33	6	12
Future Volume (vph)	12	658	109	48	417	29	100	2	78	33	6	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3464		1770	3504		1770	1590		1770	1681	
Flt Permitted	0.48	1.00		0.29	1.00		0.74	1.00		0.70	1.00	
Satd. Flow (perm)	886	3464		545	3504		1386	1590		1305	1681	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	715	118	52	453	32	109	2	85	36	7	13
RTOR Reduction (vph)	0	14	0	0	5	0	0	73	0	0	11	0
Lane Group Flow (vph)	13	819	0	52	480	0	109	14	0	36	9	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	37.9	37.9		42.6	42.6		9.2	9.2		9.2	9.2	
Effective Green, g (s)	37.9	37.9		42.6	42.6		9.2	9.2		9.2	9.2	
Actuated g/C Ratio	0.60	0.60		0.68	0.68		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	533	2083		401	2369		202	232		190	245	
v/s Ratio Prot		c0.24		0.00	c0.14			0.01			0.01	
v/s Ratio Perm	0.01			0.08			c0.08			0.03		
v/c Ratio	0.02	0.39		0.13	0.20		0.54	0.06		0.19	0.04	
Uniform Delay, d1	5.1	6.6		3.7	3.8		24.9	23.2		23.6	23.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.1	0.0		2.8	0.1		0.5	0.1	
Delay (s)	5.2	7.1		3.8	3.9		27.7	23.3		24.1	23.2	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		7.1			3.9			25.7			23.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	63.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



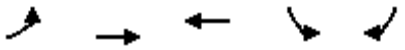
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	14	814	108	628	66	115	98	84
v/c Ratio	0.03	0.40	0.20	0.26	0.28	0.31	0.42	0.25
Control Delay	9.5	10.2	4.6	4.3	25.9	13.1	29.4	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.5	10.2	4.6	4.3	25.9	13.1	29.4	22.5
Queue Length 50th (m)	0.8	29.6	3.2	11.4	7.2	4.6	11.0	8.1
Queue Length 95th (m)	3.8	50.1	9.2	22.4	17.3	16.8	23.9	18.9
Internal Link Dist (m)		220.1		159.5		110.9		132.6
Turn Bay Length (m)	30.0		30.0		20.0		20.0	
Base Capacity (vph)	455	2053	535	2462	541	741	526	762
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.40	0.20	0.26	0.12	0.16	0.19	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	618	131	99	433	144	61	40	66	90	68	9
Future Volume (vph)	13	618	131	99	433	144	61	40	66	90	68	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.91		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3447		1770	3406		1770	1688		1770	1829	
Flt Permitted	0.41	1.00		0.29	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	771	3447		536	3406		1308	1688		1272	1829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	672	142	108	471	157	66	43	72	98	74	10
RTOR Reduction (vph)	0	17	0	0	28	0	0	62	0	0	8	0
Lane Group Flow (vph)	14	797	0	108	600	0	66	53	0	98	76	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	35.2	35.2		43.6	43.6		8.9	8.9		8.9	8.9	
Effective Green, g (s)	35.2	35.2		43.6	43.6		8.9	8.9		8.9	8.9	
Actuated g/C Ratio	0.55	0.55		0.68	0.68		0.14	0.14		0.14	0.14	
Clearance Time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	426	1904		471	2331		182	235		177	255	
v/s Ratio Prot		c0.23		0.02	c0.18			0.03			0.04	
v/s Ratio Perm	0.02			0.14			0.05			c0.08		
v/c Ratio	0.03	0.42		0.23	0.26		0.36	0.23		0.55	0.30	
Uniform Delay, d1	6.5	8.3		3.8	3.8		24.8	24.3		25.5	24.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.7		0.2	0.1		1.2	0.5		3.7	0.7	
Delay (s)	6.6	9.0		4.0	3.9		26.1	24.8		29.3	25.3	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		8.9			3.9			25.3			27.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

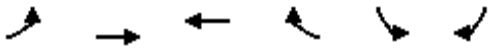
c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	48	501	513	52	66
v/c Ratio	0.23	0.55	0.56	0.06	1.00
Control Delay	15.9	16.9	15.7	7.0	132.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	16.9	15.7	7.0	132.4
Queue Length 50th (m)	3.1	18.7	17.5	2.0	0.0
Queue Length 95th (m)	9.6	29.8	28.6	6.9	#19.3
Internal Link Dist (m)		230.8	333.8	171.7	
Turn Bay Length (m)	30.0			20.0	
Base Capacity (vph)	484	2092	2067	896	66
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.10	0.24	0.25	0.06	1.00

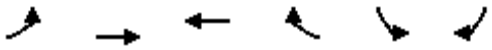
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	44	461	402	70	48	61
Future Volume (vph)	44	461	402	70	48	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6	5.6		5.6	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1752	3574	3500		1805	1615
Flt Permitted	0.45	1.00	1.00		0.95	1.00
Satd. Flow (perm)	828	3574	3500		1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	501	437	76	52	66
RTOR Reduction (vph)	0	0	31	0	0	66
Lane Group Flow (vph)	48	501	482	0	52	0
Heavy Vehicles (%)	3%	1%	1%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	custom
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	11.5	11.5	11.5		22.5	0.0
Effective Green, g (s)	11.5	11.5	11.5		22.5	0.0
Actuated g/C Ratio	0.25	0.25	0.25		0.50	0.00
Clearance Time (s)	5.6	5.6	5.6		5.6	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	210	909	890		898	0
v/s Ratio Prot		c0.14	0.14		c0.03	
v/s Ratio Perm	0.06					
v/c Ratio	0.23	0.55	0.54		0.06	0.00
Uniform Delay, d1	13.3	14.6	14.6		5.9	22.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.7	0.7		0.1	0.0
Delay (s)	13.9	15.3	15.2		6.0	22.6
Level of Service	B	B	B		A	C
Approach Delay (s)		15.2	15.2		15.3	
Approach LOS		B	B		B	

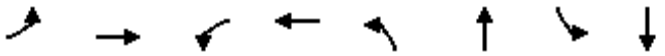
Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	45.2	Sum of lost time (s)	11.2
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	488	457	69	51	48
Future Volume (Veh/h)	43	488	457	69	51	48
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	530	497	75	55	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		358	121			
pX, platoon unblocked						
vC, conflicting volume	572				894	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	572				894	286
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				80	93
cM capacity (veh/h)	990				271	717

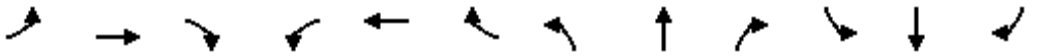
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	47	265	265	331	241	107
Volume Left	47	0	0	0	0	55
Volume Right	0	0	0	0	75	52
cSH	990	1700	1700	1700	1700	389
Volume to Capacity	0.05	0.16	0.16	0.19	0.14	0.28
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	8.8
Control Delay (s)	8.8	0.0	0.0	0.0	0.0	17.7
Lane LOS	A					C
Approach Delay (s)	0.7			0.0		17.7
Approach LOS						C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	9	740	180	661	76	107	84	57
v/c Ratio	0.02	0.39	0.32	0.26	0.33	0.30	0.38	0.18
Control Delay	9.1	9.9	5.0	4.5	27.4	11.3	28.8	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.1	9.9	5.0	4.5	27.4	11.3	28.8	21.1
Queue Length 50th (m)	0.5	25.9	5.6	13.6	8.3	2.6	9.3	5.1
Queue Length 95th (m)	2.8	42.6	13.4	24.4	19.4	14.4	21.1	13.9
Internal Link Dist (m)		220.1		159.5		110.9		132.6
Turn Bay Length (m)	30.0		30.0		20.0		20.0	
Base Capacity (vph)	404	1890	565	2508	538	711	514	735
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.39	0.32	0.26	0.14	0.15	0.16	0.08

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	559	121	166	531	77	70	23	75	77	44	8
Future Volume (vph)	8	559	121	166	531	77	70	23	75	77	44	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.89		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3445		1770	3472		1770	1649		1770	1819	
Flt Permitted	0.40	1.00		0.31	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	746	3445		585	3472		1341	1649		1281	1819	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	608	132	180	577	84	76	25	82	84	48	9
RTOR Reduction (vph)	0	19	0	0	10	0	0	71	0	0	8	0
Lane Group Flow (vph)	9	721	0	180	651	0	76	36	0	84	49	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	34.4	34.4		44.4	44.4		8.8	8.8		8.8	8.8	
Effective Green, g (s)	34.4	34.4		44.4	44.4		8.8	8.8		8.8	8.8	
Actuated g/C Ratio	0.53	0.53		0.69	0.69		0.14	0.14		0.14	0.14	
Clearance Time (s)	5.6	5.6		3.0	5.6		5.6	5.6		5.6	5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	398	1840		532	2393		183	225		175	248	
v/s Ratio Prot		c0.21		c0.04	0.19			0.02			0.03	
v/s Ratio Perm	0.01			0.20			0.06			c0.07		
v/c Ratio	0.02	0.39		0.34	0.27		0.42	0.16		0.48	0.20	
Uniform Delay, d1	7.1	8.8		3.8	3.8		25.4	24.5		25.7	24.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.4	0.1		1.5	0.3		2.1	0.4	
Delay (s)	7.2	9.5		4.2	3.9		27.0	24.9		27.8	25.1	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		9.4			3.9			25.7			26.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	14.2
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX 3

ENVIRONMENTAL MANAGEMENT PLAN





McKeown Avenue Widening and Reconstruction

Environmental Management Plan

August 9, 2023

NORTH BAY
ONTARIO · CANADA
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ECOLOGICAL SERVICES
Innovative solutions for complex challenges

McKeown Avenue Widening and Reconstruction

Environmental Management Plan

The Corporation of the City of North Bay

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RVA 216166

August 9, 2023

McKeown Avenue Widening and Reconstruction
Environmental Management Plan

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Appendix A – Site Photographs

1.0 Introduction

R.V. Anderson Associates Limited (RVA) has been retained by the Corporation of The City of North Bay (the City) to undertake the Environmental Assessment (EA) Addendum and detailed design for the reconstruction and widening of McKeown Avenue between Cartier Street and the Gormanville Road roundabout, including drainage and sewer improvements (the Project) in the City of North Bay, Ontario. A prior Municipal Class EA, Schedule 'C', was undertaken for McKeown Avenue in 1999 with an amendment incorporating additional traffic study data in 2002 (Northland Engineering Ltd. 2002). Due to the time lapse since the original assessment, RVA is preparing an amendment to the EA with a corresponding update to the Environmental Study Report (ESR).

As part of the EA addendum process, the City and RVA completed a virtual Public Information Consultation (PIC) detailing the project alternatives and design concepts, which ended on November 11, 2022. Based on the public comments received, the City decided to extend the Study Area of the Project to include the Champlain Street intersection, located 375 m east of the previous boundary.

In support of the detailed design and anticipated agency permitting and approval requirements, this Environmental Management Plan (EMP), to be incorporated into the ESR, documents the existing natural heritage features within the Study Area, assesses the potential effects of the Project on these features, and provides environmental protection measures and recommendations to minimize or avoid impacts to the natural environment.

1.1 Study Area

The original Study Area for the Project included the McKeown Avenue right-of-way (ROW) as well as adjacent lands 50 m north and south of the road from Cartier Street to the Gormanville Road roundabout. As noted above, the Study Area for was extended to the limits of the Champlain Street intersection following the PIC (Map 1).

1.2 Environmental Management Plan (EMP) Objectives

The EMP has been created as a guide to avoid and/or reduce the negative impacts of the Project on the natural environment. The purpose of this Plan is to present the operational constraints, mitigation measures, and monitoring requirements necessary to comply with environmental permits and approvals. This document shall be utilized and referred to during construction of the Project to ensure environmental commitments are met and the natural heritage features and functions are protected.

The objectives of the EMP include:

- Identify sensitive or protected natural heritage components, including protected flora and fauna, and rare vegetation communities, within the proposed construction limits that may be impacted by the Project;
- Identify applicable environmental legislation and municipal plans and objectives;
- Summarize the environmental impact assessment and document mitigation measures and recommendations to be implemented during construction, including a mitigation and compensation strategy. Measures may include restricted timing windows for vegetation clearing and in-water work to protect migratory birds and fish and their habitat, respectively;
- Summarize potential impacts related to various construction processes and related monitoring requirements, including threshold limits for remedial actions and responsible parties;
- Identify environmental protection clauses to be included in contract documents;
- Identify opportunities and provide recommendations for ecological improvements;
- Educate and inform the contract administrator and contractor of their roles and responsibilities to protect the natural environment; and
- Identify monitoring and record-keeping requirements.

McKeown Avenue Widening and Reconstruction

The Corporation of The City of North Bay

Environmental Management Plan

Map 1: Study Area Overview

0 250 500 Meters

Scale: 1:12,000

Data: 2023-03-16 | Page: 1 of 1

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- Watercourse
- Waterbody

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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2.0 Governing Environmental Policy Framework

The Project will have to comply with various federal, provincial, and municipal environmental regulations and permit approvals. This section discusses relevant legislation and policies that are applicable to the proposed works within the Study Area.

2.1 Federal Legislation

2.1.1 Fisheries Act

The *Fisheries Act* (Government of Canada 1985) is administered by Fisheries and Oceans Canada (DFO) and provides a framework for the proper management and control of fisheries as well as the conservation and protection of fish and fish habitat, including the prevention of pollution. In June of 2019, Canada modernized the *Fisheries Act* with new provisions and stronger protections to better support the sustainability of Canada's fish and fish habitat for future generations. Section 34.4 of the *Fisheries Act* prohibits any work, undertaking or activity (other than fishing) that results in the death of fish; Section 35.1 prohibits the harmful alteration, disruption, or destruction of fish habitat (HADD); and Section 36 prohibits the deposition of deleterious substances.

The *Fisheries Act* requires that projects avoid causing death of fish or HADD of fish habitat unless authorized by DFO or a designated representative. Proponents are responsible for planning and implementing works, undertakings or activities in a manner that avoids harmful impacts to fish and fish habitat. Should proponents believe that their work, undertaking or activity will result in harmful impacts to fish and fish habitat, a Request for Review (RFR) must be submitted, and the DFO will work with them to assess the risk and provide advice and guidance on how to comply with the *Fisheries Act*.

2.1.2 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) was passed in 1917 and updated in 1994 to implement the Migratory Birds Convention, a treaty signed with the United States in 1916 (Government of Canada 1994a). Environment and Climate Change Canada administers the MBCA, which is enforced through the Migratory Birds Regulations. Together the MBCA and Migratory Birds Regulations serve to protect most migratory birds, their nests, and eggs anywhere they are found in Canada (Government of Canada 1994b).

2.1.3 Species at Risk Act

At a federal level, SAR designations for species occurring in Canada are initiated by the completion of a comprehensive Status Report by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Government of Canada 2002).

Species that are included on Schedule 1 as Endangered or Threatened are afforded both individual and critical habitat protection on federal lands under the *Species at Risk Act* (SARA). On private or provincially owned lands, only aquatic species listed as Endangered, Threatened or Extirpated are protected under SARA, unless ordered by the Governor in Council.

2.2 Provincial Legislation

2.2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS, Ministry of Municipal Affairs and Housing (MMAH) 2020) sets the policy direction for regulating development and land use planning in the province. Both provincial and local land-use planning decisions build on the PPS and its relevant policies. This report deals specifically with the policies contained in Part V, Section 2.1 (Natural Heritage) of the PPS which is directed at protection and management of natural heritage systems and features. A natural heritage system is defined by the Province of Ontario as:

A system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions and working landscapes that enable ecological functions to continue (MMAH 2020).

Natural heritage features of significance are described in the Natural Heritage Reference Manual (MNR, 2010) and include:

- significant wetlands;
- significant coastal wetlands;

- other coastal wetlands in Ecoregions 5E, 6E and 7E;
- fish habitat;
- significant woodlands;
- significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
- habitat of endangered and threatened species;
- significant wildlife habitat; and
- significant areas of natural and scientific interest (ANSIs).
- Development and site alteration is not permitted in:
- significant wetlands in Ecoregions 5E, 6E and 7E and significant coastal wetlands;
- significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E, significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River), significant wildlife habitat, significant ANSIs, and coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b), unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions; and
- fish habitat or habitat of endangered and threatened species except in accordance with provincial and federal requirements.

2.2.2 Endangered Species Act

At the provincial level, Species at Risk (SAR) and their habitats are protected under the *Endangered Species Act* (ESA, Government of Ontario 2007) which is administered by the Ministry of Environment, Conservation and Parks (MECP). SAR designations for species in Ontario are initiated by the completion of a comprehensive Status Report by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of the Environment, Conservation and Parks, species are added to the Species at Risk in Ontario (SARO) List (Ontario Regulation [O. Reg.] 230/08) under the ESA. Section 9(1) of the ESA, 2007 prohibits the killing, harming, harassment, capture, taking, possession, transport, collection, buying, selling, leasing, trading, or offering to buy, sell, lease or trade species listed as Extirpated, Endangered, or Threatened on the SARO List. Section 10(1) prohibits damaging or destroying habitat of Endangered or Threatened species on the SARO List and may apply to Extirpated species through special regulations. General habitat protection applies to all Endangered and Threatened species, with some species having 'categorized habitat', which protects areas within specific distances from known records. Some SAR are afforded a more precise habitat protection through a habitat regulation (regulated habitat), as identified in O. Reg. 242/08. Species designated as Special Concern are not protected under the Act.

The ESA, 2007 does include provisions for permits under Section 17(2)(c) that would otherwise contravene the Act. Projects which propose impacts to SAR or their habitat would require a permit or other process (e.g., registration) to proceed without contravening the Act.

2.2.3 Conservation Authorities Act

Section 28(1) of the *Conservation Authorities Act* (Government of Ontario 1990b) empowers Conservation Authorities with the ability to make regulations governing development that can have an impact on watercourses and water bodies, including wetlands. The Study Area is located within the North Bay-Mattawa Conservation Authority (NBMCA) watershed, and sections are regulated under the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, O. Reg. 177/06.

Under O. Reg. 177/06, NBMCA may grant permission to straighten, change, divert, or interfere with the existing channel of a river, creek, stream, or watercourse, or to change or interfere with a wetland under conditions outlined in the regulation (Government of Ontario 1990c).

2.2.4 Invasive Species Act

Invasive species are an emerging concern, both due to impacts to ecosystems as well as land use and infrastructure. In Ontario, the *Invasive Species Act* (ISA, Government of Ontario 2015) sets out rules to prevent and control the spread of invasive species. The ISA recognizes two classes of invasive species: prohibited and restricted. In the case of restricted invasive species, it is illegal to import, deposit, release, breed/grow, buy, sell, lease or trade restricted invasive species. Prohibited species have the same restrictions, but it is also illegal to possess or transport these species.

2.2.5 Fish and Wildlife Conservation Act

The *Fish and Wildlife Conservation Act* (Government of Ontario 1997) sets policies and regulations concerning the use of fish and wildlife resources in Ontario, including fishing and hunting, trapping, wildlife in captivity and the sale and purchase of wildlife and/or parts.

2.3 Municipal Legislation

2.3.1 City of North Bay Official Plan (2012)

Key natural heritage features within the City of North Bay are identified on Schedules 3A and 3B of the City of North Bay Official Plan (2012). These key natural heritage and hydrologic features shall be given paramount consideration on applications, considering their ecological functions and scientific, educational, and health values.

3.0 Existing Conditions

In support of this EMP, a desktop review for the entire Study Area was completed, including updated agency correspondence following Study Area expansion post-PIC. Field investigations were conducted in the appropriate season, however prior to the PIC and resulting Study Area expansion. As a result, the section of McKeown Avenue between Cartier Street and Champlain Street was not surveyed in the field. Both desktop and field reviews gave specific attention to sensitive ecological features and areas of known or candidate SAR that were identified in the prior studies.

3.1 Background Review

The preliminary background review included an examination of the following publicly available sources, including databases, and published reports, as well as agency consultation, for information related to geological and natural environment components within the Study Area.

Table 3.1 – Summary of Background Information Sources Reviewed

Source	Data
Past Studies	• Class Environmental Study Report Addendum– McKeown Avenue (Northland Engineering Limited 2002)
City of North Bay	• City of North Bay Official Plan (2012)
MECP	• Information Request Letter
Ministry of Natural Resources and Forestry (MNRF)	• North Bay District Information Request Letter • Natural Heritage Information Centre (NHIC) database • Land Information Ontario (LIO) Mapping
North Bay-Mattawa Conservation Authority (NBMCA)	• Information Request Letter • Wetland and Regulated Areas Mapping

Fisheries and Oceans Canada (DFO)	• Aquatic SAR Mapping
Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)	• AgMaps
Other Publicly Available Data	• Ontario Breeding Bird Atlas (OBBA, Cadman *et al.* 2007) • Ontario Nature – Ontario Reptile and Amphibian Atlas (ORAA, Ontario Nature 2021) • iNaturalist (screened to include Research Grade and Threatened species) • Ontario Moth Atlas (Kaposi *et al.* 2021) • Ontario Butterfly Atlas (Macnaughton *et al.* 2021) • Ontario Freshwater Fishes Life History Database, Robert J. Eakins (1999-2023)

3.2 Physiography and Soils

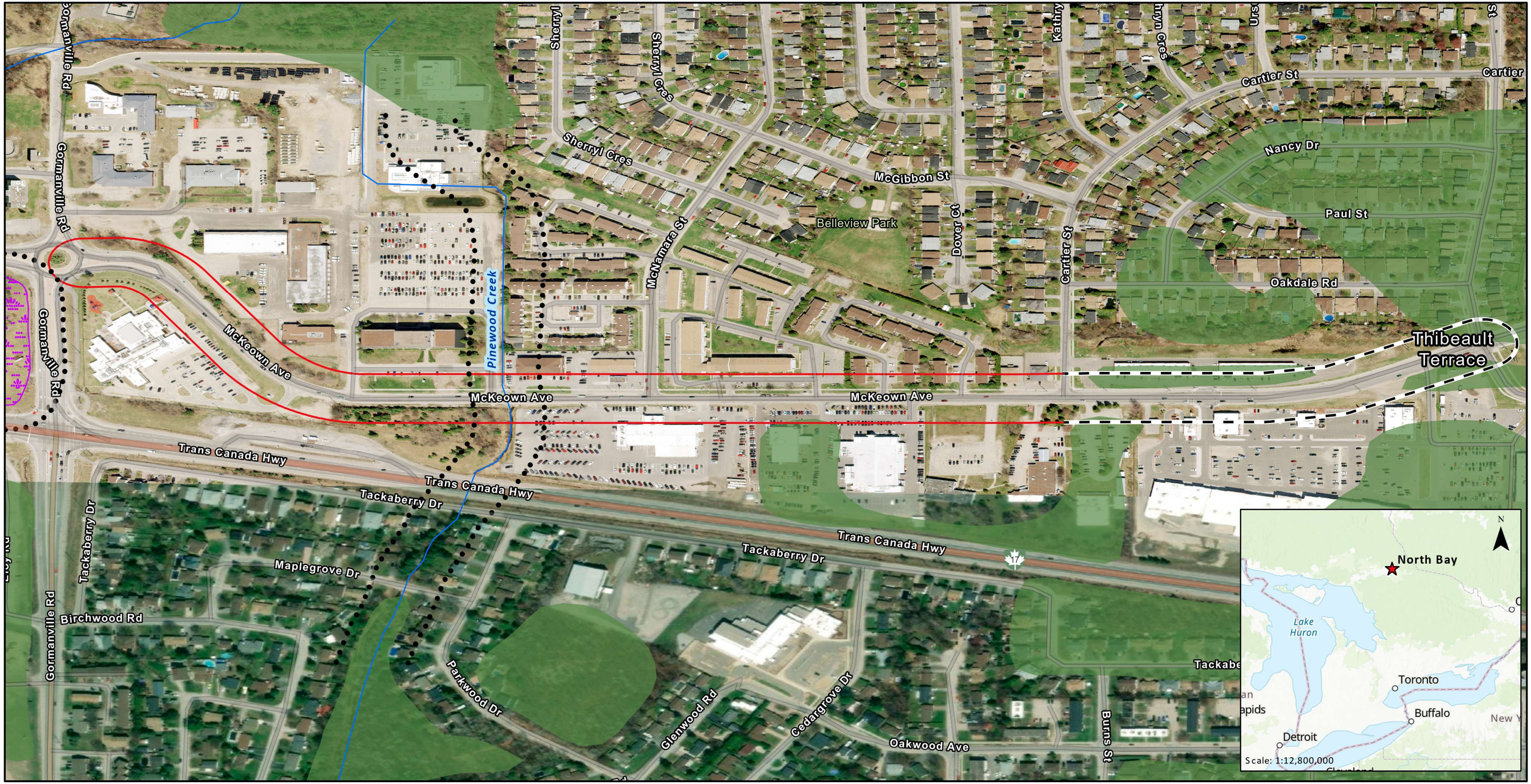
The Study Area is underlain by Precambrian diorite, syenite, and granite bedrock of the Grenville Structural Province formation (OGS 2011). The Study Area is located within the Nippising-Mattawa Lowland physiographic region (Harrison 1972). The lowland is a mosaic of clays and sands, with soils within the Study Area comprised of sandy loam and very fine sandy loams.

3.3 Designated Natural Areas

No PSWs, Areas of Natural and Scientific Interest (ANSI), or other significant natural features were identified within or adjacent to the Study Area (Map 2). A wetland community identified by the NBMCA, but not on provincial mapping, is adjacent to the Study Area to the west (Map 2). Schedule 3A of the City of North Bay Official Plan (2012) does not identify any Environmental Constraint Areas within or adjacent to the Study Area within 120 m.

3.4 Conservation Authority Regulated Areas

O. Reg. 177/06 (the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation) under Section 28 of the *Conservation Authorities Act*, administrated by the NBMCA, applies to a section of the Study Area associated with Pinewood Creek. Under this regulation, any development, site alteration, construction, or placement of fill within the regulated area requires a permit from NBMCA, as does interference with a wetland or any alteration to an existing watercourse channel.



McKeown Avenue Widening and Reconstruction

The Corporation of The City of North Bay

Environmental Management Plan

Map 2: Natural Heritage Features Overview

0 50 100 150 200 Meters

Scale: 1:4,500

Data: 2023-03-16 | Page: 1 of 1

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- Watercourse
- Approximate NBMCA Regulated Area
- NBMCA Wetlands
- Wooded Area

Data Sources: The City of North Bay, RVA, NBMCA, OHN, LIO, ESRI.

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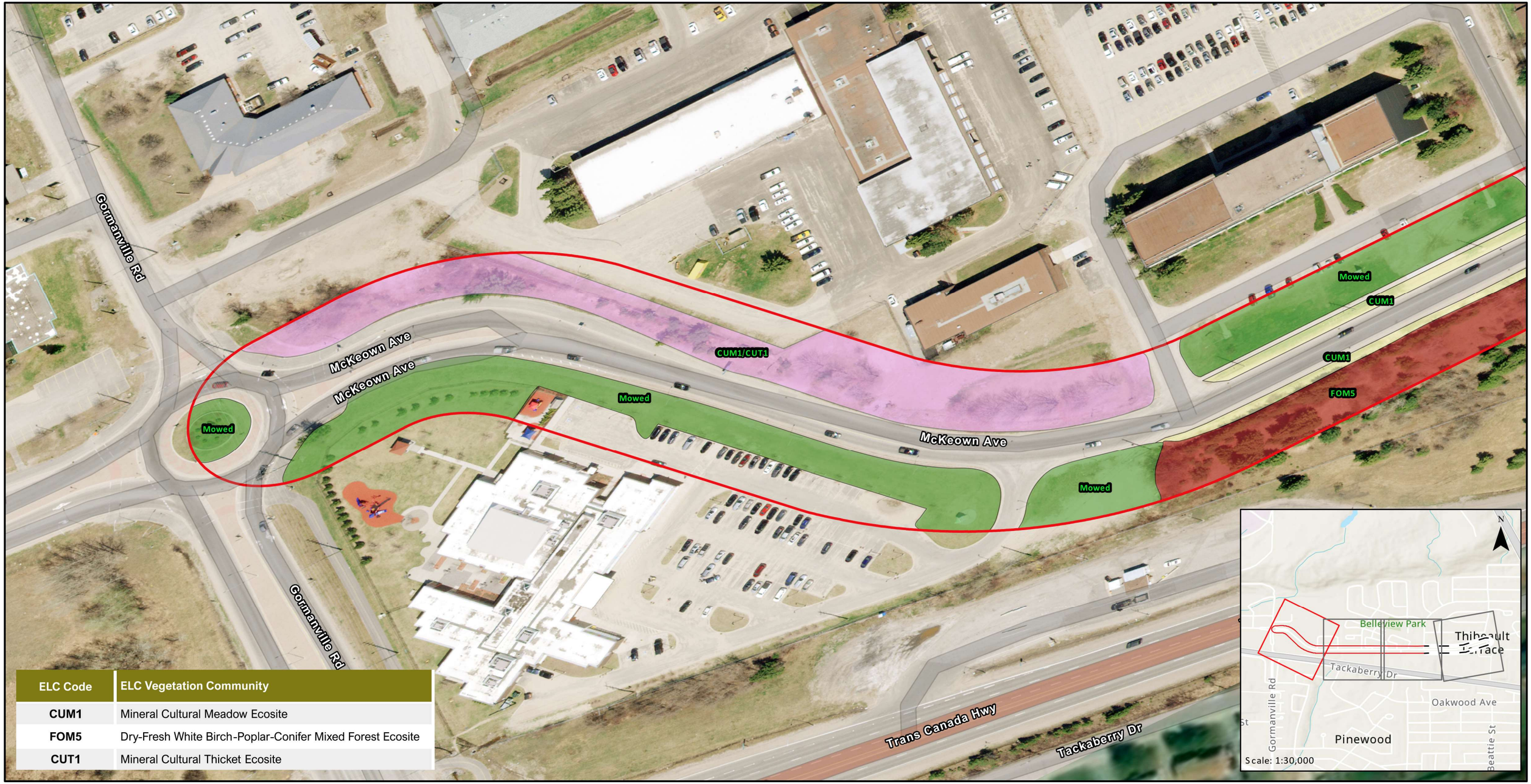
3.5 Vegetation and Vegetation Communities

A one-season floral inventory and Ecological Land Classification (ELC) was completed for the Study Area on August 9, 2022. Field visits were timed to correspond with a summer inventory window to identify as many plant species as possible. ELC was completed as per the protocols detailed in Lee *et al*. (1998). Vegetation surveys were restricted to the ROW within the Study Area and immediately adjacent areas. Surveys were completed during a single field visit by walking transects throughout the roadsides. Areas exhibiting variation in floral or topographical composition, such as ditches or vegetation clumps, were reviewed in further detail. Additional review of aerial and street view imagery, as well as site photographs was completed to assess the vegetative characteristics of communities within the Study Area up to Champlain Street, that were not evaluated during the 2022 field season.

Vegetation communities within the Study Area are described in Table 3.2 and shown on Map 3. The general Study Area is urbanized and commercial in nature, with the remaining vegetation communities all being culturally influenced, save for a forested community present within and adjacent to the Study Area.

Table 3.2 –Ecological Land Classification Vegetation Communities within the Study Area

ELC Code	ELC Vegetation Community	Description
CUM1	Mineral Cultural Meadow Ecosite	Meadow and grassland communities that have a history of anthropogenic influence. Non-native and common floral species are most dominant vegetation form.
FOM5	Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite	Young successional forest communities that have a history of anthropogenic influence. Associated with edge habitats and disturbance.
CUT1	Mineral Cultural Thicket Ecosite	Shrub communities that have a history of anthropogenic influence and management. Associated with hedgerows and edge habitats. Non-native species are more common.



ELC Code	ELC Vegetation Community
CUM1	Mineral Cultural Meadow Ecosite
FOM5	Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite
CUT1	Mineral Cultural Thicket Ecosite

McKeown Avenue Widening and Reconstruction

The Corporation of The City of North Bay

Environmental Management Plan

Map 3: Vegetation Communities Overview

0 25 50 75 100 m

Scale: 1:1,500

Data: 2023-03-16 | Page 1 of 4

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- CUM1
- CUT1
- CUM1/CUT1
- FOM5
- Mowed
- Paved

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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ELC Code	ELC Vegetation Community
CUM1	Mineral Cultural Meadow Ecosite
FOM5	Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite
CUT1	Mineral Cultural Thicket Ecosite

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Map 3: Vegetation Communities Overview

0 25 50 75 100 m

Scale: 1:1,500

Data: 2023-03-16 | Page 2 of 4

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- CUM1
- CUT1
- CUM1/CUT1
- FOM5
- Mowed
- Paved

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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ELC Code	ELC Vegetation Community
CUM1	Mineral Cultural Meadow Ecosite
FOM5	Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite
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McKeown Avenue Widening and Reconstruction

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Map 3: Vegetation Communities Overview

0 25 50 75 100 m

Scale: 1:1,500

Data: 2023-03-16 | Page 3 of 4

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- CUM1
- CUT1
- CUM1/CUT1
- FOM5
- Mowed
- Paved

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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ELC Code	ELC Vegetation Community
CUM1	Mineral Cultural Meadow Ecosite
FOM5	Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite
CUT1	Mineral Cultural Thicket Ecosite

McKeown Avenue Widening and Reconstruction

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Map 3: Vegetation Communities Overview

0 25 50 75 100 m

Scale: 1:1,500

Data: 2023-03-16 | Page 4 of 4

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- CUM1
- CUT1
- CUM1/CUT1
- FOM5
- Mowed
- Paved

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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The most dominant form of vegetation within the Study Area is mowed lawn associated with the road right-of-way (ROW) and the frontages of commercial businesses and residential properties. Following this, the primary vegetation community is classified as Mineral Cultural Meadow (CUM1). This community is dominated by common and non-native forb and grass species in the ground layer and sparse numbers of shrubs and small trees. Areas of the CUM1 have a greater number of shrub species present and are better classified as Mineral Cultural Thicket (CUT1) areas. Shrubs are sparse within this community but those present primarily consisted of Chokecherry (*Prunus virginiana*), young Green Ash (*Fraxinus pennsylvanica*), Tatarian Honeysuckle (*Lonicera tatarica*), and Manitoba Maple (*Acer negundo*).

A woodland community was identified within and adjacent to the Study Area and is best classified as Dry-Fresh White Birch-Poplar-Conifer Mixed Forest Ecosite (FOM5). These communities are comprised of thinner canopies and lower floral species diversity compared to natural forests as they are associated with disturbances. The canopy of the FOM5 community is dominated by White Spruce (*Picea glauca),* White Birch (*Betula papyrifera*), Balsam Poplar (*Populus balsamifera*), and White Pine (*Pinus strobus*). The understorey of the woodland is comprised of Red Raspberry (*Rubus idaeus*) and Chokecherry (*Prunus virginiana*). Ground layer vegetation is comprised of similar species as found in the CUM1 communities but is dominated more by forb species (Goldenrod and Aster species).

3.6 Wildlife and Significant Wildlife Habitat

3.6.1 Wildlife

During field investigations, terrestrial wildlife, including calls and signs, were recorded. Due to the urban nature of the Study Area, it is anticipated that wildlife species in the area are limited to those that tolerate humans and cultural landscapes. Birds recorded have been assumed to be residents/breeding. Table 3.3 lists all wildlife species identified during field investigations.

Table 3.3 – Incidental Terrestrial Wildlife

Common Name	Scientific Name	Provincial Status (S Rank) *
Birds		
American Crow	*Corvus brachyrhynchos*	S5B,SZN
American Goldfinch	*Carduelis tristis*	S5B,SZN
American Robin	*Turdus migratorius*	S5B,SZN
Common Raven	*Corvus corax*	S5
European Starling	*Sturnus vulgaris*	SNA
Mammals		
Eastern Gray Squirrel	*Sciurus carolinensis*	S5

** S Rank: S5 – Secure, S4 – Apparently secure, S3 – Vulnerable, S2 – Imperiled, S1 – Critically imperiled, SNA – Non-native*

3.6.2 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) was assessed based on the collection of targeted and incidental field data and comparisons to thresholds set out in the Significant Wildlife Habitat Criteria Schedule for Ecoregion 5E (OMNR 2015). SWH is protected through the PPS (OMMAH 2020). Based on the vegetation communities within the Study Area, there are candidate habitats for wildlife that are associated with human-modified environments and aquatic habitats.

During site visits within the Study Area, terrestrial wildlife observations, including call and signs, were recorded. Specific habitats surveyed for included gravel roadsides (reptile nesting), mammal burrows (often on slopes), recently disturbed soils, potential cover objects, or other anomalous or unique features or habitat within the Study Area including large dead or decaying (wildlife) trees. Wildlife surveys were conducted in conjunction with floral surveys, described above.

No provincially rare vegetation communities were observed during site investigations nor were any candidate or confirmed point-source areas of wildlife concentration/specialized habitats, such as terrestrial reptile hibernacula, turtle nesting areas, or terrestrial crayfish burrows. Targeted surveys for snag and cavity trees (i.e., in leaf-off conditions) were not included in the scope of this EMP. Roadside trees, including healthy or dead/decaying individuals, may provide SWH for bat maternity colonies, as well as habitat for at-risk bats.

3.7 Fish and Fish Habitat

3.7.1 Aquatic Habitat

There is one surface water feature within the central portion of the Study Area (Map 4). Pinewood Creek is located 118 m west of the McKeown Avenue and McNamara Street intersection and has a cool water thermal regime. Although there is a contributing open grass swale upstream of McKeown Avenue, most of the feature is piped upstream of McKeown Avenue, and daylights downstream of McKeown Avenue, flowing southwards for 1.3 km to its confluence with Lake Nipissing.

An aquatic habitat investigation was completed on August 9, 2022, by RVA Ecological staff within the Study Area. Photographs were taken of the culvert crossing and in-stream habitat and are included in Appendix A. Fish habitat investigations were limited to the ROW and where access was permitted and involved identifying and recording:

- Water chemistry including temperature, dissolved oxygen, pH, and conductivity;
- Habitat information/locations including stream morphology, bed substrate, bank characteristics, stream flow, and depth;
- “Critical” or important habitat areas including potential spawning areas, nursery cover, and feeding areas; and
- Potential constraints, habitat compensation or enhancement opportunities.

3.7.2 Aquatic Habitat Assessment Results

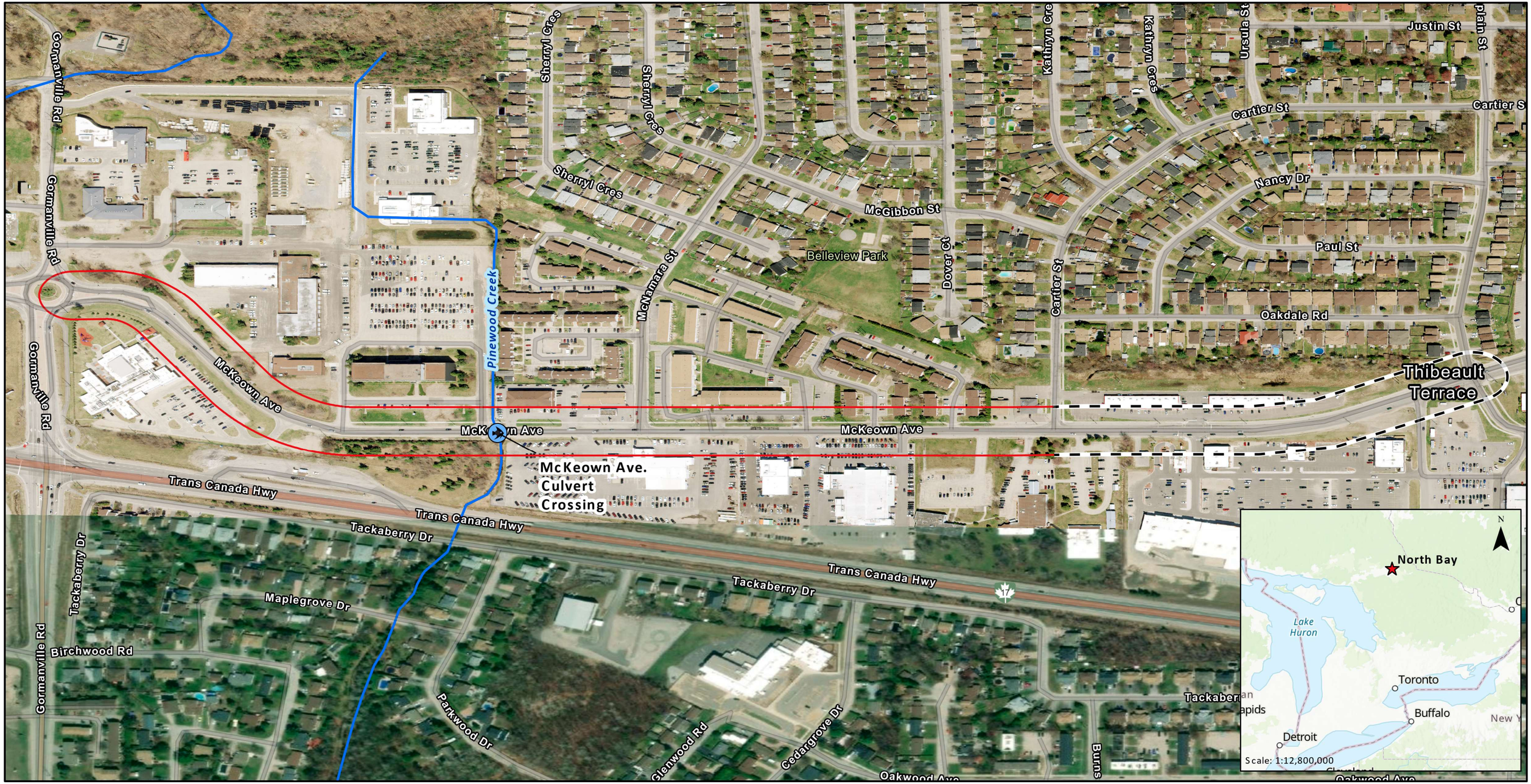
Within the Study Area, Pinewood Creek flows southward underneath McKeown Avenue through a round concrete culvert. There is an open grass swale and piped features upstream of McKeown Avenue that contribute flow to the watercourse. The swale consists of maintained grass throughout with minor standing water. A small high-density polyethylene (HDPE) pipe to convey flow under the roadway and a metal grate at the pipe inlet. At the time of assessment, the grass swale upstream was observed to be mostly dry with very minor standing water. Based on the manholes observed in the vicinity of the watercourse and substantial flow in the open channel downstream, it is assumed that upstream piped drainage was contributing flow to Pinewood Creek during the assessment.

Downstream of the McKeown Avenue crossing, a round concrete pipe was observed to be embedded within sand substrate. There was a pool at the culvert outlet comprised predominately of sand substrate with minor fine gravel. A buried pipe along the southeast side of McKeown Avenue with an outlet into the watercourse was observed along the right upstream bank, immediately downstream of the culvert. An open roadside drainage swale

with standing water was observed along the southwest side of McKeown Avenue with no direct connection to Pinewood Creek.

Downstream of the culvert outlet pool, the channel was comprised predominately of riffle-run sequences with abundant coarse substrate present. One additional pool with fine bed material was observed approximately 60 m downstream of the culvert, prior to the watercourse flowing underneath a chain-link fence toward the Highway 17 crossing. Minor undercut banks were observed throughout the downstream reach, suggesting minor bank erosion, however, it also provided potential cover and habitat for fish. Both banks were steep, but well-vegetated and generally stable overall. Other minor in-stream cover was provided by overhanging vascular macrophytes, overhanging/in-stream woody debris, cobble and boulders. Limited shade was provided by meadow vegetation and shrubs along the right upstream bank, while trees and shrubs associated with the Cultural Woodland along the left upstream bank provided minor shade to the channel.

The aquatic habitat features observed in Pinewood Creek are summarized in Table 3.4. Water quality parameters were also measured and are reported in Table 3.5.



McKeown Avenue Widening and Reconstruction

The Corporation of The City of North Bay

Environmental Management Plan

Map 4: Aquatic Habitat and Culvert Locations Overview

0 50 100 150 200 Meters

Scale: 1:4,500

Data: 2023-03-16 | Page: 1 of 1

RVA: 216166 | Draft By: NMW

N

Legend

- Study Area (post-PIC)
- Original Study Area (50 m buffer)
- Direct Fish Habitat (Cool Water)
- Watercourse

Data Sources: The City of North Bay, RVA, OHN, LIO, ESRI.

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Table 3.4 – Aquatic Habitat in Pinewood Creek – McKeown Avenue Culvert Crossing

Habitat Attribute	Downstream
Flow Regime	Permanent
Thermal Regime	Cool
Flow Velocity (m/s)	0.44
Morphology (%)	Riffle (30%), Run (60%), Pool (10%)
Mean Wetted Depth (m)	Riffle: 0.09, Run: 0.26, Pool: 0.45
Mean Wetted Width (m)	Riffle: 3.62, Run: 1.78, Pool: 3.2
Substrate	Riffle: Gravel[1], Sand Run: Gravel[1], Sand, Cobble, Boulder Pool: Sand[1], Gravel
Bank Stability	Stable
Instream Cover (%)	Overhanging vascular macrophytes (10%), overhanging/in-stream woody debris (2/5%), undercut banks (5%), cobble (1%), boulders (1%)
Riparian Vegetation	Right upstream bank: Goldenrod, Tansy, Reed Canary-grass, Spotted Joe Pye-weed Left upstream bank: Red-osier Dogwood, Balsam Poplar, Goldenrod, Reed Canary - grass
% Stream Shaded	1-29
Migratory Barriers	Dry swale and piped upstream
Evidence of Groundwater	None
Sources of Pollution	Road runoff
Adjacent Land Use	Cultural Woodland, Commercial, Municipal Roadway

[1]Dominant Substrate Observed

Table 3.5 – Water Quality in Pinewood Creek – McKeown Avenue Culvert Crossing

Parameter	Downstream
Temperature (°C)	20
pH	7.75
Conductivity (µS/cm)	847
Dissolved Oxygen (mg/L)	8.13
Air Temperature (°C)	20

Note: Water quality parameters measured in-situ on August 9, 2022

3.7.3 Fish Community

Fish species records from the LIO-ARA database (2010) were available for Pinewood Creek. In addition, to confirm and/or supplement background records, fish community sampling was completed within the Study Area on August 9, 2022, by RVA Ecological staff via backpack electrofisher. DFO aquatic SAR mapping did not indicate any records for Pinewood Creek. Based on available background records and the results of fish community sampling, Pinewood Creek supports non-sensitive, spring-summer spawning, cool water baitfish species. Based on the fish community and information request response from MNRF, the restricted in-water timing window for Pinewood Creek is April 1 – June 15 (in-water work can occur from June 16 – March 31 of any given year).

Fish species that were identified within the Tributary during background review and captured during fish community sampling are detailed below in Table 3.6.

Table 3.6 – Fish Community – Pinewood Creek

Species Name	Scientific Name	Thermal Regime*	ARA Point Data (Pinewood Creek)	RVA August 2022
Brook Stickleback	*Culaea inconstans*	Cool	-	
Central Mudminnow	*Umbra limi*	Cool		
Creek Chub	*Semotilus atromaculatus*	Cool		
Northern Redbelly Dace	*Chrosomus eos*	Cool		

3.8 Species at Risk Screening

Provincially protected SAR can be found throughout Ontario in both documented and undocumented populations. A list of SAR with potential to occur across the Study Area was compiled from background sources listed in Table 3.1 and the habitat requirements for these species were identified using the MNRF's Significant Wildlife Habitat Technical Guide (OMNR 2015) and assessment reports from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The field studies described above were compared to the known habitat preferences and general locations of SAR noted in background review documents to determine the potential that these species or their habitat could occur in the Study Area. From this information, a discussion of the habitat preferences and probability of each species being present within the Study Area was determined following field investigations and is presented in Table 3.7.

Table 3.7 – Species at Risk Probability Assessment

Species Name and Status (ESA / SARA)	Species Records in the Study Area and Habitat Preference	Probability Assessment
Flora		
Black Ash (*Fraxinus nigra*) END / THR	Recorded in the vicinity of the Study Area as part of targeted citizen science surveys. This species utilizes areas of sandy soils in open or somewhat shaded areas including cedar swamps, forested sand dunes, etc. Suitable habitats are present within the Study Area.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.
Birds		
Bobolink (*Dolichonyx oryzivorus*) THR / THR	Historically found in tallgrass prairie and other open meadows, the species now breeds mainly in hayfields. Fallowed fields within the Study Area could provide nesting habitat for this species.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.
Chimney Swift (*Chaetura pelagica*) THR / THR	Recorded in the vicinity of the Study Area as part of targeted citizen science surveys. Chimney Swifts nested in caves and hollow trees prior to European settlement and are today most often associated with chimneys and other manmade structures. Suitable habitat could be present within the Study Area.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.
Golden Eagle (*Aquila chrysaetos*) END / -	In Ontario, breeding Golden Eagles are presently only known from the Hudson Bay Lowlands. No suitable habitat is present within the Study Area.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.
Reptiles		
Eastern Hog-nose Snake THR / THR	This species utilizes a variety of habitats including tall grass prairies, bogs, marshes, shorelines, forests, and alvars. There is suitable habitat for this species within the Study Area.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.
Blanding's Turtle (*Emydoidea blandingii*) THR / THR	There are no citizen science records of Blanding's Turtles within the Study Area or surrounding areas. This species typically inhabits large, heavily vegetated shallow wetlands. There is no suitable habitat for this species in the Study Area.	**Low** – Surveys completed in 2022 within the Study Area did not identify suitable habitat or locate this species.

Species Name and Status (ESA / SARA)	Species Records in the Study Area and Habitat Preference	Probability Assessment
Mammals		
SAR Bats Little Brown Myotis (*Myotis lucifugus*) Northern Long-eared Myotis (*Myotis septentrionalis*) Tri-coloured Bat (*Perimyotis subflavus*) END / END	Outside of known hibernacula, SAR bats are associated with dead and dying trees that provide maternity roost habitat, as well as in some cases attics and other buildings. Potential habitat for these species is limited within the Study Area to the FOM5 community.	**Low –** Suitable treed habitats with the potential to support SAR bats are present in the Study Area, outside of the road right-of-way. Trees within the right-of-way could provide maternity colony habitat for SAR Bats. These habitats are lower quality compared to those within and beyond the Study Area associated with more natural habitats (FOM5) and watercourses.

Note: END – Endangered, THR – Threatened.

Site investigations completed by RVA Ecological staff did not identify any protected or rare species, nor suitable habitat for the listed SAR, within the surveyed original Study Area. As habitats within the overall Study Area (post-PIC) are similar to those surveyed, it is has been assessed that no SAR individuals nor suitable habitat for SAR are present.

4.0 Summary of Proposed Project

The proposed Project involves the reconstruction and widening of McKeown Avenue from Cartier Street to the Gormanville Road roundabout, with additional works proposed from Cartier Street to Champlain Street. Proposed reconstruction works will include:

- Reconstruction of the existing pavement;
- Curbs;
- Boulevards;
- Sanitary sewer; and
- Culvert extension and replacement.

4.1 Project Activities

To complete the Project, several construction activities will be undertaken that have potential to impact the natural heritage features in the Study Area. These activities include:

- Vegetation removal – woody and non-woody vegetation;
- Earth works – excavation, filling, and grading;
- Works in water – dewatering fish habitat, culvert extension/replacements; and
- Use of industrial equipment.

5.0 Impact Assessment and Environmental Protection

The potential impacts to identified natural heritage features as a component of the proposed Project have been assessed above. Potential impacts to the natural environment; fish and wildlife habitats and the communities therein, can be identified as a direct loss of habitat, direct injury to the organism because of construction activities, or indirect changes to the habitat that may occur in the long term and/or over a larger area. The identified impacts are discussed in greater detail in the following section and have been used to develop the Environmental Protection and Mitigation Plan table (Table 5.1). Table 5.1 provides a summarization of the mitigation measures that are required for the proposed Project to minimize and avoid impacts to identified protected and/or sensitive species and features.

5.1 Vegetation and Vegetation Communities Impacts

The proposed road widening works will impact vegetation and vegetation communities. Possible effects on these vegetative features include:

- Vegetation removal; and
- Temporary loss and/or disturbance of vegetation during construction.

5.1.1 Permanent Loss of Vegetation

Vegetation will be permanently removed to support the trunk sanitary sewer installation works. Vegetation along the roadways primarily consists of street trees as well as native and exotic pioneering trees, shrubs, grasses, and forbs. Permanent loss of vegetation cannot be fully mitigated but impacts to vegetation can be minimized and mitigated.

5.1.2 Temporary Disturbance of Vegetation

Areas of vegetation outside of the direct development footprint will be temporarily impacted to accommodate vehicle access and tracking routes, as well as through establishment of

lay-down and equipment storage areas during construction. Construction activity also has the potential to suspend sufficient dust to be harmful to vegetation. Dust on vegetation can reduce plant productivity through reduction in metabolic processes.

5.2 Wildlife and Significant Wildlife Habitat Impacts

The Study Area provides habitat for a variety of common wildlife species and contains areas where wildlife may cross McKeown Avenue to linking habitat. Possible impacts to impact wildlife and wildlife habitat because of the Project may include:

- Site disturbance to wildlife during sensitive periods;
- Loss of habitat through vegetation removal; and
- Temporary disturbance to wildlife movement corridors.

5.2.1 Site Disturbance to Wildlife During Sensitive Periods

Construction activities have the potential to indirectly affect wildlife within the surrounding landscape through vibration along with light and noise pollution. This disturbance will be temporary, and it is anticipated that local wildlife is accustomed to human disturbances. Construction mitigation measures to reduce disturbance to wildlife include:

5.2.2 Loss of Wildlife Habitat

Dead/dying or injured trees within the Study Area may provide habitat for at-risk bats and their active-season maternity colonies. Recent draft guidance from MECP (March 3, 2021) notes that if "a proposed activity or project is expected to adversely affect (e.g., remove, stub, etc.) 'a small number' of potential maternity or day roost trees in treed habitats, but the timing will avoid the bat active season (April 15 to September 5), then there is no need to conduct species at risk bat surveys of treed habitats.

Vegetation clearing also has the potential to impact breeding birds through disturbance of nesting birds and destruction of nests, eggs and young. Most of Canada's birds are protected under the MBCA.

5.2.3 Disturbance to Wildlife Corridors

Potential impacts to wildlife and their habitats during construction can occur through direct injury and habitat loss as well as indirect impacts such as avoidance of areas of active construction and resulting modification to established daily movement patterns. Mitigation measures will focus on minimizing incidental impacts to wildlife and wildlife habitat.

5.3 Fish and Fish Habitat Impacts

The road works will require full replacement and extension of the existing concrete culvert underneath McKeown Avenue which has the potential to impact fish and fish habitat. The proposed culvert replacement is anticipated to impact one watercourse crossing, Pinewood Creek, within the Study Area. Possible effects on this feature, due to the proposed culvert replacement may include:

- Reduction in riparian habitat;
- Disturbance to fish habitat during sensitive lifecycle periods; and
- Damage to fish and fish habitat through release/suspension of sediment or other deleterious substances.

5.3.1 Reduction in Riparian Habitat

The widening of McKeown Avenue and the associated culvert replacement in Pinewood Creek will remove part of the riparian vegetation in the new culvert footprint. In general, culvert replacement works are likely to cause impacts to the surrounding riparian vegetation, and changes to existing slopes.

5.3.2 Disturbance to Fish During Sensitive Lifecycle Periods

The proposed works have potential to disturb fish and fish habitat during sensitive life periods, such as spawning. Fish, including their eggs, juveniles, spawning adults, are protected during all life phases.

5.3.3 Damage to Fish and Fish Habitat through Release of Deleterious Substances

There is the potential for additional impacts to surface drainage, localized impacts to the streambed, fish habitat in potential areas of direct disturbance, and potentially more widespread impacts because of sedimentation and thermal changes because of the proposed works. Mitigation measures will focus on minimizing impacts to fish and fish habitat during sensitive lifecycle periods.

5.4 Additional Environmental Impacts

The road works will require the use of a variety of mobile equipment and machinery. The possible effects on the local environment, due to engine exhaust components, as well as fugitive dust particles, created by these machines may impact the air quality in the construction zone and the surrounding areas. Mitigation measures to ensure ambient air

quality within the Study Area are managed and do not exceed regulatory standards are provided in Table 5.1.

5.5 Environmental Protection and Mitigation Plan Summary

A summary of the identified natural heritage impacts, the proposed mitigations measures, and monitoring requirements is presented in Table 5.1.

Table 5.1 – Environmental Protection and Mitigation Plan Summary

Natural Heritage Feature	Impact	Effect	Environmental Protection and Mitigation Measures	Monitoring (see Section 7.0)
Vegetation and Vegetation Communities	Permanent loss of vegetation	Loss of street trees and roadside vegetation composed mainly of native and exotic pioneering trees, shrubs, grasses, and forbs	• Revegetation of temporarily impacted areas will use non-invasive, native plant species with high wildlife value (fruit-producing shrubs and trees, wildflowers, etc.) which will provide long-term ecological contributions to the local ecosystem. Species and densities will be chosen so that at maturity, plants may reach typical size without interfering with each other or safe operation of the roadway, thus reducing maintenance. • Community-based native tree/shrub programs can be used to offset the loss of woody stems/canopy cover resulting from the Project.	Site Restoration; Landscape Plan
	Temporary disturbance of vegetation	Temporary impacts to predominantly anthropogenic/ cultural vegetation communities	• Limiting areas of temporary construction disturbance (i.e., laydown areas, access routes, trailer locations, etc.) to upland areas within anthropogenic/cultural communities. • Include areas of temporary construction disturbance within design drawings and demarking these areas in the field using high visibility fencing or similar. When appropriate, erosion and sediment fencing will serve as construction barrier fence marked for this dual purpose. • Tree protection fencing along the Tree Protection Zone (TPZ) will be installed for all trees that are to remain within the Project area that may potentially be impacted by construction. • Tree protection fencing will be maintained until all construction and grading is completed. • Use of construction mats, mulch, plywood, or similar materials to reduce soil compaction in areas of temporary heavy traffic (e.g., access routes and laydown areas). Soil compaction has long-term negative impacts on existing and future vegetation growth (e.g., site restoration). • The impacts of dust on the surrounding ecosystem will be mitigated by dust suppression measures such as moistening dry soils with water or other non-chloride dust suppressants as required during construction and adhering to erosion and sediment management measures.	Construction Monitoring
Wildlife and Significant Wildlife Habitat	Site disturbance to wildlife during sensitive periods	Pattern disruption, site avoidance, incidental injury, or death to terrestrial wildlife,	• Education of construction staff regarding the potential of encountering wildlife, and appropriate actions (i.e., allow the animal to leave on its own, contact a wildlife professional, etc.) will be effective mitigation against unintended impacts to turtles and other wildlife. • Grading activities shall be limited to the active season for wildlife if practical, typically May 1 through September 30 to prevent entombment within burrows, tunnels, or other subterranean features. • Construction activities shall be limited to daylight hours as much as possible to reduce disturbance to crepuscular wildlife movement. • Existing areas of passage (culverts) and adjacent areas shall remain passable by wildlife during construction, as is reasonably possible.	General Construction

Wildlife and Significant Wildlife Habitat	Loss of breeding habitat through vegetation removal	Nest abandonment or accidental injury or death to young of breeding birds and bats adjacent to road ROW	• To prevent incidental impacts to nesting birds, (including at-risk and rare species) as well as bat maternity colonies, clearing of unmaintained and/or woody vegetation will be restricted to outside of the migratory bird nesting seasons, generally April 1 through September 5. If vegetation clearing must occur within this window, a qualified ecological professional should be retained to ensure no birds or bats are incidentally harmed by vegetation removals.	Vegetation Clearing
	Disturbance to wildlife movement corridors	Potential disturbance to wildlife movement through the Study Area	• Erosion and Sediment Control (ESC) will be designed and installed to provide the added function of wildlife barrier fencing. • Limiting construction activities to daylight hours as much as possible will reduce the impacts to behaviour changes (avoidance) of local wildlife in response to the project.	General Construction
Fish and Fish Habitat	Reduction in riparian habitat	Loss of riparian vegetation	• Riparian vegetation removal should be kept to a minimum, as required for construction and access only. Vegetation scheduled for removal should have proper clearing techniques implemented to protect and retain the surrounding vegetation and root masses should be left in place for stabilization, where feasible. • Travel paths, stockpile areas and staging areas, within the vicinity of the crossing, should be pre-planned and followed. • Vegetation clearing impacts to the slopes and banks, including adjacent ditches, should be mitigated by erosion and sediment controls (ESCs) (e.g., silt fence, fibre filtration tubes, etc.) in place during construction, and access limitations.	Work Near Water
	Disturbance to fish during sensitive lifecycle periods	Limited spawning or hatching success	• Grading and ditching work near (within 30 m) of watercourse crossings is only permitted between June 15th and March 15th of a given year and at no time shall grading or ditching be permitted below the high-water mark (HWM) (2-year flow level) of the watercourses. • To prevent any deleterious substances from entering the watercourses, operate, store, and maintain all equipment, vehicles and associated materials at a minimum, 30 m away from any watercourse or wetland. • A Spill Response and Action Plan shall be prepared by the contractor in advance of work that describes actions to be taken in the event of a spill, and a spill kit containing appropriate absorbent materials will be always kept on site to be used in the event deleterious materials are released into the watercourse. • To prevent any deleterious substances from entering the watercourses, work should be avoided during rainy and windy periods.	Work Near Water
Fish and Fish Habitat	Damage to fish and fish habitat through release of deleterious substances	Death to fish, smothering of fish habitat (nests or food), distress to fish by abrasion of fish gills	• The contractor shall develop and implement an ESC Plan, in addition to the ESC measures identified in the contract drawings, and shall include: › Installation of effective ESC measures to stabilize all erodible and exposed areas. › Regular inspection and maintenance of the ESC measures during all phases of the project. › ESC measures shall remain in place until all disturbed ground has been permanently stabilized. › Installation of a settling basin and/or filtration system for water flowing onto the site and water being pumped or diverted from the site, including: o Holding back runoff water until suspended sediment has resettled in the settling basin and runoff water is clear, and unwatering gradually to prevent sediment resuspension and bank destabilization.	Work Near Water

			○ Regularly monitor the watercourse for signs of sedimentation during all phases of the work, undertaking or activity and taking corrective action as required. ○ Use biodegradable ESC materials as noted in the contract and drawings and remove any non-biodegradable ESC materials once site is stabilized. ○ Stop work and contain sediment-laden water to prevent dispersal in the watercourse. • All work below the high-water mark of will be completed within an isolated work area, under dry conditions, to ensure sediment generated during construction activities is contained to the worksite. Cofferdams are to be constructed in accordance with the DFO Interim code of practice: temporary cofferdams and diversion channels, following all necessary mitigation and notification requirements. • If the cofferdams enclose wetted areas, prior to any dewatering activities, if required, a qualified Fisheries Specialist will relocate fish trapped within the isolated area to habitat downstream of the isolated work area, under a Licence to Collect Fish for Scientific Purposes (LCFSP) issued by the MNRF. • During all dewatering activities, fish screens will be placed at the end of all pump intakes, in accordance with DFO's Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater, to prevent the potential entrainment and/or impingement of fish and other aquatic animals during dewatering. • Discharge from dewatering will be treated (i.e., via settlement pond, filter bag, flowing through vegetated land, etc.) to remove suspended sediments prior to re-entering the stream. Treated water will be released back into the system in a manner that prevents erosion and sediment inputs in the receiving waterbody. • To prevent any deleterious substances from entering the watercourses: › Maintain all machinery on site in a clean condition and free of fluid leaks. › Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water. › Dispose of all waste materials (including construction, demolition, excavation, commercial logging) above the HWM of nearby waterbodies to prevent entry. › A Spill Response and Action Plan shall be prepared by the contractor in advance of work that describes actions to be taken in the event of a spill, and a spill kit containing appropriate absorbent materials will be always kept on site to be used in the event deleterious materials are released into the watercourse.	
Additional Environmental Impacts	Localized emissions and fugitive particulate release	Temporary reduction of local air quality	• The contractor shall develop and implement an emissions management plan. Mitigation measures should include, but are not limited to: › Ensure the engines and exhaust systems for machinery on site are properly maintained, conducting daily inspections. › Reduce or eliminate idling time to less than 10 minutes to provide environmental benefits. › Use low sulphur diesel or alternative fuels (biodiesel, ethanol, propane, natural gas, or fuel additives) where reasonable. › Water roads, as necessary, with water or other non-chloride dust suppressants, when it is practical to do so. › Limit speed over construction areas to reduce airborne dust. › Minimize drop distances for any stockpiling activities.	General Construction

6.0 Regulatory Approvals and Permits

In Section 2.0 the framework of environmental regulatory legislation applicable to this Project was described. Considering that framework and following the impact assessment, Table 6.1 presents the approvals and permits required for the Project and the status of these applications.

Table 6.1 – Summary of Environmental Regulatory Legislation Requirements

Legislation	Regulation/ Plan/By-law	Permit/Approval	Required? Y/N	Status
Federal Approvals				
Fisheries Act	n/a	Letter of Advice (following submission of Request for Review)	Y	Letter of Advice received
	n/a	*Fisheries Act* Authorization	N	n/a
Migratory Birds Convention Act	n/a	The project must comply with appropriate timing restrictions on vegetation removals, to avoid impacts to birds	n/a	MBCA requirements will be documented in contract documents
Species at Risk Act	n/a	Permits may be issued under Section 73 of SARA to authorize activities that would contravene these prohibitions.	N	No SARA permit is required for the proposed works.
Provincial Approvals				
Provincial Policy Statement	n/a	The project must comply with appropriate setbacks and requirements detailed in the *PPS*	n/a	PPS requirements will be adhered to and documented in all contract documents
Endangered Species Act	n/a	Activities that would contravene the *ESA* may be permitted through issuance of a permit under Section 17(2) of the *ESA*	Y	MECP Letter of Approval received

Legislation	Regulation/ Plan/By-law	Permit/Approval	Required? Y/N	Status
Conservation Authorities Act	Regulation of Development, Interferences with Wetlands, and Alterations to Shorelines and Watercourses	A permit is required for works that are within conservation authority regulation limits	Y	Pending
Fish and Wildlife Conservation Act	n/a	A Licence to Collect Fish for Scientific Purposes (aka a Scientific Collector Permit or SCP) is required to perform fish salvages during construction	Y	To be obtained by the qualified Fisheries Specialist undertaking the work

7.0 Environmental Monitoring

In general, all members of the Contract Administration and Construction teams are responsible for the protection of the environment. In addition, key roles noted below will be required to ensure the above noted Environmental Protection and Mitigation Plan is implemented, and to provide oversight and monitoring of these aspects of the Project.

7.1 Environmental Inspector

The Environmental Inspector will have successfully completed one or more recognized training or certification courses in erosion and sediment control inspection, environmental construction monitoring, or other directly related courses. They will also have demonstrated experience in environmental monitoring and proficiency in reading ESC plans, contract drawings, specifications, and technical reports. This will ensure that the Environmental Inspector shall have the expertise necessary to evaluate the mitigation measures and have the authority to make recommendations to remediate deficiencies in the measures or Plan, as required. The Environmental Inspector shall also have the authority to request that the Construction Supervisor halt work to take corrective actions to remedy non-conforming activities.

The Environmental Inspector will be required to undertake the monitoring activities noted in this EMP, following the appropriate timing and minimum frequencies described in Table 7.1.

7.2 Fisheries Specialist

In addition to the Environmental Inspector, a qualified Fisheries Specialist will be required to monitor any in-water work, including worksite isolation, fish salvage, dewatering, and flow by-pass system set-up, function, and removal. The Fisheries Specialist shall have a degree or diploma from a recognized university or college with a specialization in aquatic biology, aquatic ecology, or another related discipline. They must have demonstrated experience conducting field identification of aquatic species and assessing habitat suitability. If fish salvage is required, a Licence to Collect Fish for Scientific Purposes (LCFSP) must be obtained by the Fisheries Specialist and all conditions therein adhered to during the work.

The Fisheries Specialist will be required to undertake the monitoring activities noted in this EMP, following the appropriate timing and minimum frequencies described in Table 7.1.

7.3 Environmental Inspection During Construction

Environmental monitoring during construction is an essential component of the EMP. Regular monitoring will enable the Environmental Inspector to confirm the protection and mitigation measures are functioning and effective and will enable prompt identification of deficiencies and remediation.

The Environmental Protection and Mitigation Plan Summary provided in Table 5.1 identified several environmental monitoring items. These requirements have been further described, including monitoring frequency and applicable project phase in the following table:

Table 7.1 – Environmental Monitoring Requirements

Monitoring	Inspection Requirements	Frequency and Timing of Inspection
General Construction	Site equipment, construction fencing, construction signage	• As required during construction
ESC	Silt fences, sediment basins, areas of erosion and sedimentation	• Once pre-construction during installation • Weekly monitoring while installed, during construction • One check during removal (post-construction) ○ Additionally as required during construction after major storm events
Vegetation Protection	Construction fencing, tree protection zones	• As required during construction

Monitoring	Inspection Requirements	Frequency and Timing of Inspection
Slope Protection	Erosion control, seeding areas, mulch, sod	• As required during construction after major storm events
Work Near Water	ESC, stockpiles, refueling/equipment storage, and maintenance	• Once per week during construction until work ceases
Work in Fish Habitat	In-water worksite isolation (installation and removal), temporary flow by-pass system (installation, function, removal), fish salvage, fish habitat restoration	• Daily during in-water work[1] • Fish salvage must be performed by Fisheries Specialist as per specifications in LCFSP[1]
Vegetation Clearing	Plant material, soil stabilization measures, bat maternity habitat, bird nest inspection	• If removals cannot occur outside of approved timing windows (April 15 – September 5), inspections completed prior to removals • Inspections are valid for 48 hrs after completion for removals
Site Restoration/ Landscaping	Review trees and other landscaping for proper installation, survival. Review seeded areas for germination, undesirable species.	• During installation and annually for landscaping, seasonally for seeded areas
Inclement Weather	ESC measures, in-water worksite isolation, temporary flow by-pass system	• Daily during/following significant rainfall and snowmelt periods

[1] Must be completed by a Fisheries Specialist

7.4 Environmental Reporting

The Environmental Inspector and/or Fisheries Specialist will document each inspection in an Environmental Monitoring Memo, recording the condition and function of all protection and mitigation measures. A photographic record will be included. Any concerns regarding ineffective measures, construction staging, temporary storage of material, and any other related concerns shall be recorded in the diary. All non-compliance issues and the results of any corrective measures will also be documented in the Environmental Monitoring Memo.

The Contract Administrator or Environmental Inspector will report spills in accordance with federal and/or provincial regulations, as noted in the following section, and notify the Construction Supervisor.

The Environmental Inspector shall immediately notify the Construction Supervisor of any deficiencies in the mitigation measures that require immediate repair or replacement. The Contract Administrator shall also be notified.

8.0 Emergency Response Measures

This section outlines the measures that are required to be followed during all construction phases, to respond to unforeseen events and emergencies. Emergency response measures are designed and implemented to ensure protection of worker and public health, the environment, and infrastructure.

8.1 Hazardous Materials Spills Response

There is the potential for spills of fuel and other hazardous materials during all phases of construction. The primary concern of the spills response is to protect worker and public safety with secondary concern for environmental protections. Rapid containment of any spills is essential for proper management.

Emergency response measures will include (but are not limited to):

- The first person at the scene of a spill is responsible for securing the area and notifying emergency response personnel including the MECP Spills Action Centre at 1-800-268-6060
- All reasonable and safe efforts to contain the spill should be made on site
- A fully stocked supply of spill containment materials will be always present on the construction site, including absorbent materials
- Once emergency response staff are present, control of the spill response will be turned over
- Assistance will be provided by construction staff to emergency response personnel to help contain and cleanup the spilled material and contaminated soil

8.2 Failure of Erosion and Sediment Control Measures

Proper installation and maintenance of erosion and sediment control (ESC) measures during all phases of construction is critical for the protection of adjacent features, surface water, and property. Unanticipated storm events and period of high winds can cause failures or weakening of ESC infrastructure. Effective response to these conditions is crucial to mitigate and minimize the sedimentation of adjacent features and surface water features.

Emergency response measures will include (but are not limited to):

- A fully stocked and accessible supply of ESC materials should always be maintained on site to ensure emergencies can be handled promptly
- If new areas of exposed soils become present on site because of unanticipated storm events, stabilization of these exposed soil areas with seed mixes, mulch, sod, or additional ESC measures will be completed.
- If sediment is released to a watercourse, it should be treated as a 'spill' and the MECP Spills Action Centre should be notified. In addition:
    - The DFO Fish and Fish Habitat Protection Program should be notified at 1-855-852-8320 or FisheriesProtection@dfo-mpo.gc.ca
    - The source of the sediment must be identified, and all effort made to contain and avoid further release
    - Where possible, retention of the sediment-laden water will be completed to avoid spreading in the system via cofferdam or turbidity curtain

8.3 Wildlife Encounters in Work Area

If a species that is protected under the *Endangered Species Act* (ESA) is encountered during site works, all works must cease immediately within the area of the identified species and the Contract Administrator must be notified. Response to encountering a protected species is dependent on the species encountered. Work will not commence until the MECP has been consulted and determine appropriate measures necessary to comply with the *ESA*.

Other wildlife species that are not protected under the *ESA* may be present within work areas during construction. Best management practices and emergency response for these occurrences include:

- Allow wildlife that has entered the work area to leave without being harmed or harassed
- If wildlife individuals become trapped (turtles or amphibians in ESC fencing), removal of the individuals should be completed by a qualified individual
- Common ground nesting species, like Killdeer, often utilize disturbed areas and work sites for nesting. If an active bird nest is found within a work area, activities within the area must cease until young birds have fledged

9.0 Conclusion

This Environmental Management Plan (EMP) documents the existing conditions within the Study Area, supported by field studies completed in 2022, and provides appropriate mitigation measures and monitoring requirements to ensure impacts to natural features are avoided and/or minimized. These studies included a single season review for rare and at-risk species, as well as a wildlife habitat assessment, and incidental wildlife observations.

The Project will have minor impacts on terrestrial and aquatic environment components within the Study Area; however, the overall function of the larger system is not expected to be significantly impacted by the proposed works. Implementation of all mitigation measures detailed in Table 5.1, along with the monitoring requirements provided in Table 7.1, will ensure that any impacts, albeit minor, are avoided within the Study Area during site construction works.

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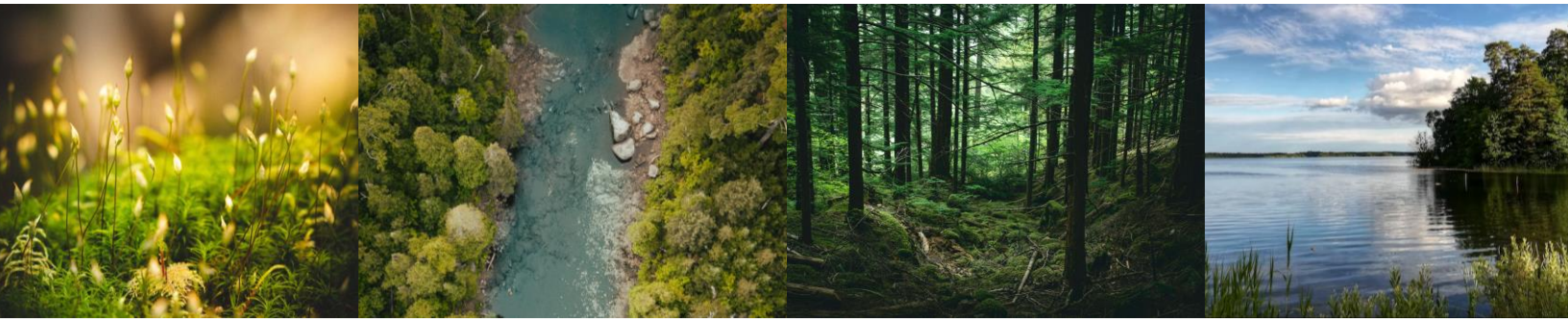
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APPENDIX A

SITE PHOTOGRAPHS





08/09/2022 – Pinewood Creek – Open grass swale with minor standing water north of McKeown Ave, facing north.



08/09/2022 – Pinewood Creek – Small HDPE pipe with grated inlet within grass swale north of McKeown Ave, facing south.



08/09/2022 – Pinewood Creek – Standing on top of the round concrete culvert, facing downstream, south of McKeown Ave.



08/09/2022 – Pinewood Creek – Standing in the middle of channel, facing upstream (north) toward the culvert outlet. Pool present at culvert outlet.



08/09/2022 – Pinewood Creek – Buried pipe outlet along the right upstream (southeast) bank within the watercourse



08/09/2022 – Pinewood Creek – Meadow and deciduous trees and shrubs along the right upstream bank and left upstream bank, respectively.



08/09/2022 – Pinewood Creek – Riffle-run sequence downstream of the culvert outlet pool, facing south.



08/09/2022 – Pinewood Creek – Sand and fine gravel substrate.



08/09/2022 – Pinewood Creek – Coarse gravel and cobble substrate.



08/09/2022 – Pinewood Creek – Run channel morphology with overhanging woody debris and concrete, facing south



08/09/2022 – Pinewood Creek – Minimal shade along the right upstream bank with some shade along the left upstream bank.



08/09/2022 – Pinewood Creek – Pool habitat and riparian shade before flowing under a chain-link fence upstream of Highway 17.



08/09/2022 – Road right-of-way (ROW) showing Mineral Cultural Meadow (CUM1) and gravel shoulder, facing west.



08/09/2022 – Mowed lawn with urban trees typical of McKeown Avenue, facing northwest



08/09/2022 – Mowed roadside ROW and gravel shoulder typical of the McKeown Avenue site, facing east.



08/09/2022 – Mowed lawn and open spaces with sparse numbers of urban street trees typical of the site, Facing southeast



08/09/2022 – Typical view of the Study Area west of the Cartier Street intersection with mowed lawns and roadside trees, looking west.



08/09/2022 – Mineral Cultural Meadow (CUM1) and Mineral Cultural Thicket (CUT1) communities found within the Study Area, looking northwest.

APPENDIX 4

TRAFFIC NOISE IMPACT ASSESSMENT



600 Southgate Drive
Guelph ON Canada
N1G 4P6

Tel: +1.519.823.1311
Fax: +1.519.823.1316
E-mail: solutions@rwdi.com

MEMORANDUM

DATE:	2023-03-10	**RWDI Reference No.:** 2302590
TO:	Connor MacIsaac| RV Anderson	**EMAIL:** cmacIsaac@rvanderson.com
FROM:	Slavi Grozev Alain Carrière	**EMAIL:** Slavi.Grozev@rwdi.com Alain.Carriere@rwdi.com
RE:	**Traffic Noise Impact Assessment McKeown Avenue Reconstruction North Bay, Ontario**	

Dear Connor,

This memorandum details RWDI's updates to the traffic noise impact assessment originally prepared for the McKeown Avenue reconstruction in North Bay (from Gormanville Road to Algonquin Avenue). As part of the original Environmental Assessment (EA), a traffic impact noise assessment was prepared on May 21, 1999 (1999 Noise Report), by Northland Engineering Limited, which did not recommend the need for noise mitigation, and commented that noise mitigation would not be feasible even if recommended. Given the previous report was prepared more than twenty years ago, the Ministry of the Environment, Conservation and Parks (MECP) requested for an updated noise report to reflect the new horizon year 2041 vehicular traffic data, as well as the new road cross-section. This assessment is completed based on the 60% detailed design and the traffic forecasts provided by RV Anderson.

PROJECT DESCRIPTION

The project involves the widening of McKeown Avenue in North Bay, Ontario, from Gormanville Road to Cartier Street to provide a continuous 4-lane cross section. The proposal also utilizes existing sidewalk on the north side the road, with a new-multi-use path to accommodate pedestrians and cyclists on the south side of the road.

The area surrounding McKeown Avenue contains a mixture of commercial, office and residential land uses. The south side of the roadway contains several car dealerships, a few industrial offices and numerous commercial establishments. On the north side of McKeown Avenue, there are several restaurants, the Service Ontario government building and residential townhouse units. It should be noted that the west part of the study area (Gormanville Road to Cartier Street) is primary focus of this assessment update due to major widening construction The east part (Cartier Street to Algonquin Avenue) is already a 4-lane road, but has also been assessed for consistency with the previous 1999 Noise Report.

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APPLICABLE GUIDELINES

A number of guidelines and documents related to assessing road traffic noise impacts have been reviewed. The joint Ministry of the Environment / Ministry of Transportation (MTO) protocol that was used in the 1999 assessment is still the only MECP endorsed document for road traffic noise assessments in Ontario. However, since then, MTO has developed, and revised, a detailed noise guide that is meant to be used for the assessment of noise from provincial roadways. The latest revision isis the MTO Environmental Guide for Noise, 2022 (MTO, 2022). The MTO Environmental Guide for Noise applies to major road construction/highways and not fully applicable to road improvements such as this project. However, it does offer a widely accepted methodology for assessing noise impacts from roadways, which is significantly more detailed than the joint protocol. RWDI also conducted a municipal-level scan of other applicable documents developed by the City of North Bay related to construction and transportation projects. City of North Bay Noise By-Law, 2014 does not provide guidance on evaluating road traffic noise impacts or a criteria to be met for these types of projects. The 1999 Noise Report also quoted LU-131, which has since been superseded by MECP's NPC-300 protocol. The outdoor objective level of 55 dBA is now applicable to new residential developments, not to roadways. As such, the methodology and associated criteria outlined in the MTO Environmental Guide for Noise were used for this assessment. Table 1 outlines the MTO objective and mitigation effort requirements. Note that the objective is based on a 24-hour basis. The same values have been used but on a 16-hour basis to remain consistent with the 1999 Noise Report.

Table 1: Mitigation Effort Required for the Projected Noise Level with the Proposed Improvements above the Ambient

Change in Noise Level Above Ambient / Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dBA change & < 65 dBA	• None
≥ 5 dBA change OR ≥ 65 dBA	• Investigate noise control measures on right-of-way. • Introduce noise control measures within right-of-way and mitigate to ambient if technically, economically and administratively feasible. • Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers

NOISE-SENSITIVE AREAS

Noise Sensitive Areas (NSAs) based on MTO guidance include residential homes, apartment buildings, hospitals and nursing homes. NSAs must have an outdoor living area to be included in the assessment. Receivers within the NSAs have been identified based on the 1999 Noise Report and slightly adjusted by the updated aerial photography of the area. The receiver identifiers (IDs) in the 1999 Noise Report have been reused in the current study for consistency. Receivers are modelled at a height of 1.5 m above local grade as per the 1999 Noise Report.

The scope of the current project includes NSAs R1 – R6. Table 2 summarized the modelled receivers. The locations of the adjusted receivers are presented in **Appendix A**.

Table 2: Modelled Representative Receivers

Representative Receiver ID	Receiver Description
R1	Backyard of townhouse development at 545 McNamara Street, behind the Lucky 13 Convenience Store, which represents the highest levels in the complex. It is shielded by two strip malls (501 and 555 McKeown Avenue).
R2	Courtyard of the New Era townhouse (579 McKeown Avenue) at the northwest corner of McKeown Avenue and McNamara Street, which represents the common outside recreational area. It is shieled by the three-story building on two sides.
R3	Area between the New Era townhouse and Northern Lights Cooperative Home (659 McKeown Ave), which represents a nearby area with some shielding and approximates the levels at the townhouse complex to the north.
R4	The centre of the common area of the backyards and outside areas of the Northern Lights Cooperative Home, which represents the outdoor living areas for the complex. It is shieled by the townhouses on two sides.
R5	The backyard of the residences along Oakdale Avenue. There is some intervening shrubbery which provides some screening.
R6	The backyard of a two-storey house (138 Champlain Street) at the northeast corner of McKeown Avenue and Champlain Street. It is shielded by the two-storey house itself.

ROAD TRAFFIC DATA AND MODELLING

Future road traffic data for 2041 horizon year were provided for McKeown Avenue and main intersecting roads in the study area by RV Anderson. Note that Future No-Build and Build traffic volumes are projected to be the same. The 2041 peak hour volume was the maximum of AM peak, PM peak and Saturday midday volumes, thus representing the potential worst-case traffic volume. The peak hour traffic accounts for approximately 10% of the AADT. Vehicle breakdown percentages and daytime/nighttime split (90%/10%), and vehicle speeds, were based on the 1999 Noise Report. Table 3 summarized the modelled traffic volume. More detailed data are presented in **Appendix B**.

Table 3: 2041 Future Traffic Volumes for the Study Area

Intersection	Link	Direction	2041 AADT [1]	Intersection	Link	Direction	2041 AADT [1]
McNamara & McKeown	North	Southbound	1780	**Champlain & McKeown**	North	Southbound	2050
		Northbound	1300			Northbound	2180
	West	Westbound	5870		South	Southbound	2910
		Eastbound	8620			Northbound	1670
	East	Westbound	5340		West	Westbound	5540
		Eastbound	7830			Eastbound	7730
Cartier St & McKeown	West	Westbound	5480		East	Westbound	6960
		Eastbound	8020			Eastbound	7760
	East	Westbound	5110	**Notes**: [1] AADT stands for the Annual Average Daily Traffic. The future traffic volumes are projected to be the same for No-Build and Build scenarios.			
		Eastbound	7470				

Road traffic sound levels were modelled the STAMSON v5.03 computer program produced by the MOE (MOE, 1996). Distances and receptor locations were obtained from online aerial photographs.

DETERMINATION OF POTENTIAL IMPACTS

The Future Build scenario which will widen McKeown Avenue from Gormanville Road to Cartier Street from two-lane to four-lane has been modelled to include separate eastbound and westbound traffic as sources, per Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) technical guidance. The Future No-Build scenario which will not widen McKeown Avenue has been modelled with combined eastbound and westbound traffic as a single road source, in accordance with the ORNAMENT technical document. Table 4 summarized the predicted Future Build and Future No Build sound levels. The STAMSON outputs can be found in **Appendix C.**

Table 4: Predicted Future Build and No-Build Sound Levels – Unmitigated

Representative Receptor ID	Future Build Sound Level L_{EQ-16h} (dBA)	Future No-Build Sound Level L_{EQ-16h} (dBA)	Mitigation Required?
R1	49.6	49.5	No
R2	44.2	44.2	No
R3	56.3[1]	56.4	No
R4	58.3[2]	58.3	No
R5	49.7	49.7	No
R6	59.0[3]	58.7	No

Notes:

[1] R3 is modelled close to the roadway and without much shielding to represent the townhouse units further to the north.

[2] R4 is modelled at the backyard of the first row of the townhouse units to the north of the roadway instead of the second row modelled in the 1999 Noise Report.

[3] R6 is modelled at the backyard of the first townhouse to the north of the roadway instead of the second townhouse modelled in the 1999 Noise Report.

Compared to the 1999 Noise Report, sound levels have changed by marginal amounts due to new traffic volumes, and adjustments made to the modelling distances and shielding from existing buildings. Other modelling inputs remained the same as the 1999 Noise Report.

Through comparing Future Build and Future No Build results, changes in sound levels from the Project are expected to be insignificant, i.e. not perceptible. Future Build sound levels are all less than 65 dBA; therefore, no mitigation is required. In fact, noise barriers or other on roadway mitigation will not be considered technically feasible as they would not be able to achieve the necessary 5 dB reduction, which was also concluded in 1999 Noise Report.

CLOSING

Traffic noise assessment of the McKeown Avenue Reconstruction has been updated by RWDI. Changes in future sound levels resulting from the Project are expected not to be perceptible. Future sound levels are predicted to be less than 65 dBA at six representative receptors. Noise mitigation measures in the form of noise barriers along McKeown Avenue were concluded not be technically feasible, as it was concluded in 1999 Noise Report.

STATEMENT OF LIMITATIONS

This report dated March 10, 2023 was prepared by RWDI AIR Inc. ("RWDI") for RV Anderson ("Client"). The findings and conclusions presented in this letter have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this letter are based on the information available to RWDI when this letter was prepared. Because the contents of this letter may not reflect the final design of the Project or subsequent changes made after the date of this letter, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this letter have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this letter have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the letter and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this letter carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

APPENDIX A

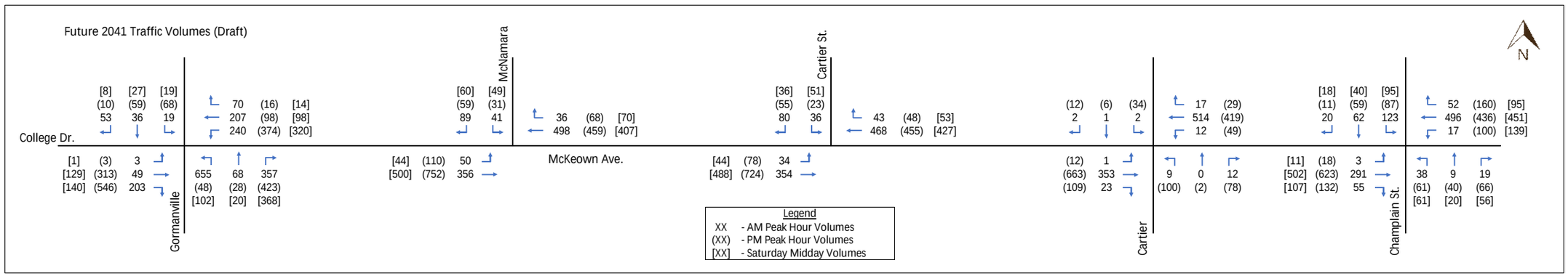


Receiver Locations

McKeown Avenue Reconstruction, North Bay, Ontario

Drawn by:	SVG	Figure:	A.1
Project #:			2302590
Date:	2023-03-10		

APPENDIX B


Future 2041 Traffic Volumes (Draft)
N
College Dr.
McKeown Ave.
Gormanville
McNamara
Cartier St.
Cartier
Champlain St.
[1] [129] [140]
(3) (313) (546)
3 49 203
[8] (10) 53
[27] (59) 36
[19] (68) 19
655 (48) [102]
68 (28) [20]
357 (423) [368]
70 207 240
(16) (98) (374)
[14] [98] [320]
[44] [500]
(110) (752)
50 356
[60] (59) 89
[49] (31) 41
36 498
(68) (459)
[70] [407]
[44] [488]
(78) (724)
34 354
[36] (55) 80
[51] (23) 36
43 468
(48) (455)
[53] [427]
(12) (663) (109)
1 353 23
(12) 2
(6) 1
(34) 2
9 (100)
0 (2)
12 (78)
17 514 12
(29) (419) (49)
[11] [502] [107]
(18) (623) (132)
3 291 55
[18] (11) 20
[40] (59) 62
[95] (87) 123
38 (61) [61]
9 (40) [20]
19 (66) [56]
52 496 17
(160) (436) (100)
[95] [451] [139]
Legend
XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
[XX] - Saturday Midday Volumes

1999 Traffic Volume by Vehicle Type

Roadway Section	sum	cars	medium trucks	large trucks
McKeown from Gormanville Road to McNamara	6,750	6,480	99	171
McKeown Avenue from McNamara to Champlain	8,100	7,767	126	207
McKeown Avenue from Champlain to Algonquin	13,050	12,528	198	324
McNamara Street north of McKeown Avenue	2,601	2,547	27	27
Champlain north of McKeown Avenue	4,033	3,970	27	36
Champlain south of McKeown Avenue	3,186	3,123	27	36
		cars%	medium trucks%	large trucks%
McKeown from Gormanville Road to McNamara	100%	96%	1%	3%
McKeown Avenue from McNamara to Champlain	100%	96%	2%	3%
McKeown Avenue from Champlain to Algonquin	100%	96%	2%	2%
McNamara Street north of McKeown Avenue	100%	98%	1%	1%
Champlain north of McKeown Avenue	100%	98%	1%	1%
Champlain south of McKeown Avenue	100%	98%	1%	1%

2041 Leq-16h Traffic Volume by Vehicle Type

Roadway Section	vehicles	cars	medium trucks	large trucks
McNamara&McKeown Westlink (WB)	5,283	5,072	77	134
McNamara&McKeown Westlink (EB)	7,758	7,448	114	197
McNamara&McKeown Eastlink (WB)	4,806	4,608	75	123
McNamara&McKeown Eastlink (EB)	7,047	6,757	110	180
CartierSt&McKeown Westlink (WB)	4,932	4,729	77	126
CartierSt&McKeown Westlink (EB)	7,218	6,921	112	184
CartierSt&McKeown Eastlink (WB)	7,758	7,439	121	198
CartierSt&McKeown Eastlink (EB)	6,723	6,447	105	172
Champlain&McKeown Westlink (WB)	4,986	4,781	78	127
Champlain&McKeown Westlink (EB)	6,957	6,671	108	178
Champlain&McKeown Eastlink (WB)	6,264	6,013	95	156
Champlain&McKeown Eastlink (EB)	6,984	6,705	106	173
McNamara&McKeown Northlink	2,772	2,714	29	29
Champlain&McKeown Northlink	3,807	3,748	25	34
Champlain&McKeown Southlink	4,122	4,040	35	47

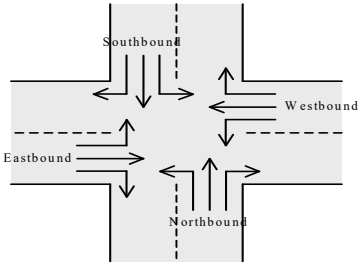
	Northbound			Eastbound			Southbound			Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM				50	356		41		89		498	36
PM				110	752		31		59		459	68
Saturday Midday				44	500		49		60		407	70

AADT Conversion Factor	10%
Daytime Split	90%

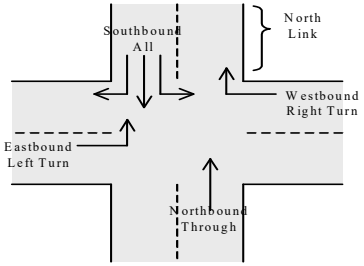
North Link SB	
AM	130
PM	90
Saturday Midday	109
Max AADT	1300
Daytime Traffic	1170

North Link NB	
AM	86
PM	178
Saturday Midday	114
Max AADT	1780
Daytime Traffic	1602

West Link WB	
AM	587
PM	518
Saturday Midday	467
Max AADT	5870
Daytime Traffic	5283



General Turning Movement Diagram



Turning Movements That Contribute To Total Volume on the North Link

East Link WB	
AM	534
PM	527
Saturday Midday	477
Max AADT	5340
Daytime Traffic	4806

West Link EB	
AM	406
PM	862
Saturday Midday	544
Max AADT	8620
Daytime Traffic	7758

East link EB	
AM	397
PM	783
Saturday Midday	549
Max AADT	7830
Daytime Traffic	7047

South Link SB	
AM	0
PM	0
Saturday Midday	0
Max AADT	0
Daytime Traffic	0

South Link NB	
AM	0
PM	0
Saturday Midday	0
Max AADT	0
Daytime Traffic	0

APPENDIX C

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:09:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R1_2041n.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west1
---------------------------------
Car traffic volume  : 12519 veh/TimePeriod
Medium truck volume :   191 veh/TimePeriod
Heavy truck volume  :   330 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west1
-------------------------------
Angle1   Angle2           :   0.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  20.00 deg   Angle2 : 50.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: mck west2
---------------------------------
Car traffic volume  : 12519 veh/TimePeriod
Medium truck volume :   191 veh/TimePeriod
Heavy truck volume  :   330 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west2
-------------------------------
Angle1   Angle2           : -50.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : -20.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: mcn north
---------------------------------
Car traffic volume  :  2714 veh/TimePeriod
Medium truck volume :    29 veh/TimePeriod
Heavy truck volume  :    29 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 3: mcn north
------------------------------
Angle1   Angle2           :   0.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  15.00 deg   Angle2 : 45.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Results segment # 1: mck west1
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.42 !         1.42

ROAD (45.97 + 34.05 + 0.00) = 46.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     20   0.66  65.62   0.00 -10.05  -9.60   0.00   0.00   0.00  45.97
-------------------------------------------------------------------------------
    20     50   0.31  65.62   0.00  -7.92  -8.07   0.00   0.00 -15.58  34.05
-------------------------------------------------------------------------------

Segment Leq : 46.24 dBA

FF
Results segment # 2: mck west2
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.42 !         1.42

ROAD (0.00 + 34.05 + 45.97) = 46.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -50    -20   0.31  65.62   0.00  -7.92  -8.07   0.00   0.00 -15.58  34.05
-------------------------------------------------------------------------------
   -20      0   0.66  65.62   0.00 -10.05  -9.60   0.00   0.00   0.00  45.97
-------------------------------------------------------------------------------

Segment Leq : 46.24 dBA

FF
Results segment # 3: mcn north
------------------------------

Source height = 1.01 m
```

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.01	1.50	1.27	1.27

ROAD (35.61 + 28.86 + 0.00) = 36.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	15	0.66	57.01	0.00	-10.57	-10.82	0.00	0.00	0.00	35.61
15	45	0.43	57.01	0.00	-9.14	-8.08	0.00	0.00	-10.93	28.86

Segment Leq : 36.45 dBA

Total Leq All Segments: 49.47 dBA

FF

TOTAL Leq FROM ALL SOURCES: 49.47

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:10:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_2041N.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west
-------------------------------
Car traffic volume  : 12519 veh/TimePeriod
Medium truck volume :   191 veh/TimePeriod
Heavy truck volume  :   330 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west
------------------------------
Angle1   Angle2           :  50.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  75.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: mck east
-------------------------------
Car traffic volume  : 11366 veh/TimePeriod
Medium truck volume :   184 veh/TimePeriod
Heavy truck volume  :   303 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck east
------------------------------
Angle1   Angle2           : -65.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  75.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 50.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 3: mcn north
---------------------------------
Car traffic volume  :  2714 veh/TimePeriod
Medium truck volume :    29 veh/TimePeriod
Heavy truck volume  :    29 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mcn north
------------------------------
Angle1   Angle2           : -40.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
```

```
Surface                    :      1       (Absorptive ground surface)
Receiver source distance   :  85.00 m
Receiver height            :   1.50 m
Topography                 :      2       (Flat/gentle slope; with barrier)
Barrier angle1             : -40.00 deg   Angle2 : 40.00 deg
Barrier height             :   8.00 m
Barrier receiver distance  :  30.00 m
Source elevation           :   0.00 m
Receiver elevation         :   0.00 m
Barrier elevation          :   0.00 m
Reference angle            :   0.00

FF
Results segment # 1: mck west
------------------------------

Source height = 1.26 m

ROAD (0.00 + 43.13 + 0.00) = 43.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    50     75   0.66  65.62   0.00 -11.65 -10.84   0.00   0.00   0.00  43.13
-------------------------------------------------------------------------------

Segment Leq : 43.13 dBA

FF
Results segment # 2: mck east
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.41 !         1.41

ROAD (0.00 + 37.40 + 0.00) = 37.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65     50   0.19  65.25   0.00  -8.33  -2.11   0.00   0.00 -17.41  37.40
-------------------------------------------------------------------------------

Segment Leq : 37.40 dBA

FF
Results segment # 3: mcn north
------------------------------

Source height = 1.01 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.01 !        1.50 !        1.33 !         1.33

ROAD (0.00 + 26.61 + 0.00) = 26.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -40     40   0.19  57.01   0.00  -9.00  -3.59   0.00   0.00 -17.80  26.61
-------------------------------------------------------------------------------

Segment Leq : 26.61 dBA

Total Leq All Segments: 44.23 dBA
```

FF

TOTAL Leq FROM ALL SOURCES: 44.23

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:10:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_2041N.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck east
-------------------------------
Car traffic volume  : 11366 veh/TimePeriod
Medium truck volume :   184 veh/TimePeriod
Heavy truck volume  :   303 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck east
------------------------------
Angle1   Angle2           : -75.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck east
------------------------------

Source height = 1.26 m

ROAD (0.00 + 56.37 + 0.00) = 56.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75     75   0.66  65.25   0.00  -7.16  -1.72   0.00   0.00   0.00  56.37
-------------------------------------------------------------------------------

Segment Leq : 56.37 dBA

Total Leq All Segments: 56.37 dBA

FF



TOTAL Leq FROM ALL SOURCES:       56.37
FF
FF
```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:10:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_2041n.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west
-------------------------------
Car traffic volume  : 11651 veh/TimePeriod
Medium truck volume :   189 veh/TimePeriod
Heavy truck volume  :   311 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west
------------------------------
Angle1   Angle2           :  45.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  45.00 deg   Angle2 : 75.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  10.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 2: mck west
--------------------------------
Car traffic volume  : 11651 veh/TimePeriod
Medium truck volume :   189 veh/TimePeriod
Heavy truck volume  :   311 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west
------------------------------
Angle1   Angle2           : -45.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 3: mck west
--------------------------------
Car traffic volume  : 11651 veh/TimePeriod
Medium truck volume :   189 veh/TimePeriod
Heavy truck volume  :   311 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck west
------------------------------
Angle1   Angle2           : -75.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
```

```
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  25.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -75.00 deg   Angle2 : -45.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  10.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: mck west
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.41 !         1.41

ROAD (0.00 + 35.82 + 0.00) = 35.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    45     75   0.25  65.36   0.00  -2.87  -8.57   0.00   0.00 -18.10  35.82
-------------------------------------------------------------------------------

Segment Leq : 35.82 dBA

Results segment # 2: mck west
------------------------------

Source height = 1.26 m

ROAD (0.00 + 58.22 + 0.00) = 58.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     45   0.66  65.36   0.00  -3.83  -3.32   0.00   0.00   0.00  58.22
-------------------------------------------------------------------------------

Segment Leq : 58.22 dBA

Results segment # 3: mck west
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.41 !         1.41

ROAD (0.00 + 35.82 + 0.00) = 35.82 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75    -45   0.25  65.36   0.00  -2.87  -8.57   0.00   0.00 -18.10  35.82
-------------------------------------------------------------------------------

Segment Leq : 35.82 dBA

Total Leq All Segments: 58.27 dBA
```

FF

TOTAL Leq FROM ALL SOURCES: 58.27

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:11:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_2041n.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck east
-------------------------------
Car traffic volume  : 13886 veh/TimePeriod
Medium truck volume :   225 veh/TimePeriod
Heavy truck volume  :   370 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck east
------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 100.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: mck west
-------------------------------
Car traffic volume  : 11452 veh/TimePeriod
Medium truck volume :   186 veh/TimePeriod
Heavy truck volume  :   305 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west
------------------------------
Angle1   Angle2           : -70.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 114.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck east
------------------------------

Source height = 1.26 m

ROAD (0.00 + 47.51 + 0.00) = 47.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     70   0.66  66.12   0.00 -13.71  -4.89   0.00   0.00   0.00  47.51
-------------------------------------------------------------------------------

Segment Leq : 47.51 dBA

FF
Results segment # 2: mck west
------------------------------

Source height = 1.26 m

ROAD (0.00 + 45.74 + 0.00) = 45.74 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70      0   0.66  65.28   0.00 -14.65  -4.89   0.00   0.00   0.00  45.74
-------------------------------------------------------------------------------

Segment Leq : 45.74 dBA

Total Leq All Segments: 49.72 dBA

FF



TOTAL Leq FROM ALL SOURCES:       49.72
FF
FF

```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:11:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6_2041N.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west
-------------------------------
Car traffic volume  : 11452 veh/TimePeriod
Medium truck volume :   186 veh/TimePeriod
Heavy truck volume  :   305 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west
------------------------------
Angle1   Angle2           :  40.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  23.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  40.00 deg   Angle2 : 70.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: mck east1
---------------------------------
Car traffic volume  : 12718 veh/TimePeriod
Medium truck volume :   201 veh/TimePeriod
Heavy truck volume  :   329 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck east1
-------------------------------
Angle1   Angle2           :   0.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  23.50 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  10.00 deg   Angle2 : 40.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: mck east2
---------------------------------
Car traffic volume  : 12718 veh/TimePeriod
Medium truck volume :   201 veh/TimePeriod
Heavy truck volume  :   329 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 3: mck east2
-------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  23.50 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 4: cha north
---------------------------------
Car traffic volume  :  3748 veh/TimePeriod
Medium truck volume :    25 veh/TimePeriod
Heavy truck volume  :    34 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: cha north
-------------------------------
Angle1   Angle2           : -60.00 deg   60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -60.00 deg   Angle2 : 60.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 5: cha south
---------------------------------
Car traffic volume  :  4040 veh/TimePeriod
Medium truck volume :    35 veh/TimePeriod
Heavy truck volume  :    47 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: cha south
-------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck west
-----------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
```

```
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.47 !         1.47

ROAD (0.00 + 34.78 + 0.00) = 34.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    40     70   0.31  65.28   0.00  -2.55  -8.56   0.00   0.00 -19.39  34.78
-------------------------------------------------------------------------------

Segment Leq : 34.78 dBA

Results segment # 2: mck east1
------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.47 !         1.47

ROAD (49.85 + 35.17 + 0.00) = 50.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.66  65.65   0.00  -3.24 -12.57   0.00   0.00   0.00  49.85
-------------------------------------------------------------------------------
    10     40   0.31  65.65   0.00  -2.55  -7.93   0.00   0.00 -20.00  35.17
-------------------------------------------------------------------------------

Segment Leq : 50.00 dBA

Results segment # 3: mck east2
------------------------------

Source height = 1.26 m

ROAD (0.00 + 57.95 + 0.00) = 57.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.66  65.65   0.00  -3.24  -4.47   0.00   0.00   0.00  57.95
-------------------------------------------------------------------------------

Segment Leq : 57.95 dBA

Results segment # 4: cha north
------------------------------

Source height = 0.97 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.97 !        1.50 !        1.45 !         1.45

ROAD (0.00 + 31.20 + 0.00) = 31.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -60     60   0.32  58.01   0.00  -4.84  -2.04   0.00   0.00 -19.94  31.20
-------------------------------------------------------------------------------

Segment Leq : 31.20 dBA
```

Results segment # 5: cha south

Source height = 1.03 m

ROAD (0.00 + 37.67 + 0.00) = 37.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.66	58.81	0.00	-6.11	-15.03	0.00	0.00	0.00	37.67

Segment Leq : 37.67 dBA

Total Leq All Segments: 58.66 dBA

TOTAL Leq FROM ALL SOURCES: 58.66

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:13:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west WB
----------------------------------
Car traffic volume  :  5072 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   134 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west WB
---------------------------------
Angle1   Angle2           :   0.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  57.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  20.00 deg   Angle2 : 50.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: mck west EB
-----------------------------------
Car traffic volume  :  7448 veh/TimePeriod
Medium truck volume :   114 veh/TimePeriod
Heavy truck volume  :   197 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west EB
---------------------------------
Angle1   Angle2           :   0.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  64.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  20.00 deg   Angle2 : 50.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: mck west WB2
------------------------------------
Car traffic volume  :  5072 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   134 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 3: mck west WB2
----------------------------------
Angle1   Angle2           : -50.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  57.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : -20.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 4: mck west EB2
------------------------------------
Car traffic volume  :  7448 veh/TimePeriod
Medium truck volume :   114 veh/TimePeriod
Heavy truck volume  :   197 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mck west EB2
----------------------------------
Angle1   Angle2           : -50.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : -20.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :  20.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 5: mcn north
---------------------------------
Car traffic volume  :  2714 veh/TimePeriod
Medium truck volume :    29 veh/TimePeriod
Heavy truck volume  :    29 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: mcn north
-------------------------------
Angle1   Angle2           :   0.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  15.00 deg   Angle2 : 45.00 deg
Barrier height            :   4.00 m
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
```

Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: mck west WB

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.42	1.42

ROAD (42.47 + 30.33 + 0.00) = 42.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.66	61.70	0.00	-9.62	-9.60	0.00	0.00	0.00	42.47
20	50	0.31	61.70	0.00	-7.58	-8.07	0.00	0.00	-15.72	30.33

Segment Leq : 42.73 dBA

Results segment # 2: mck west EB

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.43	1.43

ROAD (43.31 + 31.61 + 0.00) = 43.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.66	63.37	0.00	-10.46	-9.60	0.00	0.00	0.00	43.31
20	50	0.31	63.37	0.00	-8.24	-8.07	0.00	0.00	-15.46	31.61

Segment Leq : 43.60 dBA

Results segment # 3: mck west WB2

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.42	1.42

ROAD (0.00 + 34.13 + 42.47) = 43.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-50	-20	0.43	61.70	0.00	-8.27	-8.18	0.00	0.00	-11.12	34.13
-20	0	0.66	61.70	0.00	-9.62	-9.60	0.00	0.00	0.00	42.47

```
Segment Leq : 43.07 dBA

FF
Results segment # 4: mck west EB2
---------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.43 !         1.43

ROAD (0.00 + 35.25 + 43.20) = 43.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -50    -20   0.43  63.37   0.00  -9.09  -8.18   0.00   0.00 -10.86  35.25
-------------------------------------------------------------------------------
   -20      0   0.66  63.37   0.00 -10.57  -9.60   0.00   0.00   0.00  43.20
-------------------------------------------------------------------------------

Segment Leq : 43.85 dBA

FF
Results segment # 5: mcn north
------------------------------

Source height = 1.01 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.01 !        1.50 !        1.27 !         1.27

ROAD (35.61 + 28.86 + 0.00) = 36.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     15   0.66  57.01   0.00 -10.57 -10.82   0.00   0.00   0.00  35.61
-------------------------------------------------------------------------------
    15     45   0.43  57.01   0.00  -9.14  -8.08   0.00   0.00 -10.93  28.86
-------------------------------------------------------------------------------

Segment Leq : 36.45 dBA

Total Leq All Segments: 49.57 dBA

FF



TOTAL Leq FROM ALL SOURCES:       49.57
FF
FF
```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:14:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west WB
----------------------------------
Car traffic volume  :  5072 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   134 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west WB
---------------------------------
Angle1   Angle2           :  50.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  72.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: mck west EB
----------------------------------
Car traffic volume  :  7448 veh/TimePeriod
Medium truck volume :   114 veh/TimePeriod
Heavy truck volume  :   197 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west EB
---------------------------------
Angle1   Angle2           :  50.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  79.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 3: mck east WB
----------------------------------
Car traffic volume  :  4608 veh/TimePeriod
Medium truck volume :    75 veh/TimePeriod
Heavy truck volume  :   123 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck east WB
---------------------------------
Angle1   Angle2           : -65.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  72.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 50.00 deg
Barrier height            :   8.00 m
```

```
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 4: mck east EB
-----------------------------------
Car traffic volume  :  6757 veh/TimePeriod
Medium truck volume :   110 veh/TimePeriod
Heavy truck volume  :   180 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mck east EB
---------------------------------
Angle1   Angle2           : -65.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  79.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 50.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 5: mcn north
---------------------------------
Car traffic volume  :  2714 veh/TimePeriod
Medium truck volume :    29 veh/TimePeriod
Heavy truck volume  :    29 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: mcn north
-------------------------------
Angle1   Angle2           : -40.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  85.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -40.00 deg   Angle2 : 40.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  30.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: mck west WB
--------------------------------

Source height = 1.26 m

ROAD (0.00 + 39.55 + 0.00) = 39.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
```

```
     50     75   0.66  61.70   0.00 -11.31 -10.84   0.00   0.00   0.00  39.55
-------------------------------------------------------------------------------

Segment Leq : 39.55 dBA

FF
Results segment # 2: mck west EB
--------------------------------

Source height = 1.26 m

ROAD (0.00 + 40.56 + 0.00) = 40.56 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     50     75   0.66  63.37   0.00 -11.98 -10.84   0.00   0.00   0.00  40.56
-------------------------------------------------------------------------------

Segment Leq : 40.56 dBA

FF
Results segment # 3: mck east WB
--------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+---------------
       1.26 !        1.50 !        1.40 !         1.40

ROAD (0.00 + 33.58 + 0.00) = 33.58 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65     50   0.19  61.33   0.00  -8.09  -2.11   0.00   0.00 -17.56  33.58
-------------------------------------------------------------------------------

Segment Leq : 33.58 dBA

FF
Results segment # 4: mck east EB
--------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+---------------
       1.26 !        1.50 !        1.41 !         1.41

ROAD (0.00 + 35.03 + 0.00) = 35.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65     50   0.19  62.99   0.00  -8.57  -2.11   0.00   0.00 -17.28  35.03
-------------------------------------------------------------------------------

Segment Leq : 35.03 dBA

FF
Results segment # 5: mcn north
------------------------------

Source height = 1.01 m

Barrier height for grazing incidence
------------------------------------
```

```
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+---------------
       1.01 !        1.50 !        1.33 !         1.33

ROAD (0.00 + 26.61 + 0.00) = 26.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -40     40   0.19  57.01   0.00  -9.00  -3.59   0.00   0.00 -17.80  26.61
-------------------------------------------------------------------------------

Segment Leq : 26.61 dBA

Total Leq All Segments: 44.20 dBA

FF



TOTAL Leq FROM ALL SOURCES:       44.20
FF
FF

```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:14:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck east WB
----------------------------------
Car traffic volume  :  4608 veh/TimePeriod
Medium truck volume :    75 veh/TimePeriod
Heavy truck volume  :   123 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck east WB
---------------------------------
Angle1   Angle2           : -75.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  37.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: mck east EB
----------------------------------
Car traffic volume  :  6757 veh/TimePeriod
Medium truck volume :   110 veh/TimePeriod
Heavy truck volume  :   180 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck east EB
---------------------------------
Angle1   Angle2           : -75.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  44.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck east WB
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 53.11 + 0.00) = 53.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75     75   0.66  61.33   0.00  -6.51  -1.72   0.00   0.00   0.00  53.11
-------------------------------------------------------------------------------

Segment Leq : 53.11 dBA

FF
Results segment # 2: mck east EB
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 53.52 + 0.00) = 53.52 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75     75   0.66  62.99   0.00  -7.76  -1.72   0.00   0.00   0.00  53.52
-------------------------------------------------------------------------------

Segment Leq : 53.52 dBA

Total Leq All Segments: 56.33 dBA

FF



TOTAL Leq FROM ALL SOURCES:       56.33
FF
FF

```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:15:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west WB1
----------------------------------
Car traffic volume  :  4729 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   126 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west WB1
----------------------------------
Angle1   Angle2           :  45.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  22.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  45.00 deg   Angle2 : 75.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  10.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 2: mck west WB2
----------------------------------
Car traffic volume  :  4729 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   126 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west WB2
----------------------------------
Angle1   Angle2           : -45.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  22.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 3: mck west WB3
----------------------------------
Car traffic volume  :  4729 veh/TimePeriod
Medium truck volume :    77 veh/TimePeriod
Heavy truck volume  :   126 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck west WB3
----------------------------------
Angle1   Angle2           : -75.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
```

```
Surface                    :      1       (Absorptive ground surface)
Receiver source distance   :  22.00 m
Receiver height            :   1.50 m
Topography                 :      2       (Flat/gentle slope; with barrier)
Barrier angle1             : -75.00 deg   Angle2 : -45.00 deg
Barrier height             :   7.00 m
Barrier receiver distance  :  10.00 m
Source elevation           :   0.00 m
Receiver elevation         :   0.00 m
Barrier elevation          :   0.00 m
Reference angle            :   0.00

RR
Road data, segment # 4: mck west EB1
-----------------------------------
Car traffic volume  :  6921 veh/TimePeriod
Medium truck volume :   112 veh/TimePeriod
Heavy truck volume  :   184 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mck west EB1
-----------------------------------
Angle1   Angle2            :  45.00 deg   75.00 deg
Wood depth                 :      0       (No woods.)
No of house rows           :      0
Surface                    :      1       (Absorptive ground surface)
Receiver source distance   :  29.00 m
Receiver height            :   1.50 m
Topography                 :      2       (Flat/gentle slope; with barrier)
Barrier angle1             :  45.00 deg   Angle2 : 75.00 deg
Barrier height             :   7.00 m
Barrier receiver distance  :  10.00 m
Source elevation           :   0.00 m
Receiver elevation         :   0.00 m
Barrier elevation          :   0.00 m
Reference angle            :   0.00

RR
Road data, segment # 5: mck west EB2
-----------------------------------
Car traffic volume  :  6921 veh/TimePeriod
Medium truck volume :   112 veh/TimePeriod
Heavy truck volume  :   184 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: mck west EB2
-----------------------------------
Angle1   Angle2            : -45.00 deg   45.00 deg
Wood depth                 :      0       (No woods.)
No of house rows           :      0
Surface                    :      1       (Absorptive ground surface)
Receiver source distance   :  29.00 m
Receiver height            :   1.50 m
Topography                 :      1       (Flat/gentle slope; no barrier)
Reference angle            :   0.00

RR
Road data, segment # 6: mck west EB3
-----------------------------------
Car traffic volume  :  6921 veh/TimePeriod
Medium truck volume :   112 veh/TimePeriod
Heavy truck volume  :   184 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 6: mck west EB3
----------------------------------
Angle1   Angle2           : -75.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  29.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -75.00 deg   Angle2 : -45.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  10.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Results segment # 1: mck west WB1
---------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.39 !         1.39

ROAD (0.00 + 32.27 + 0.00) = 32.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    45     75   0.25  61.44   0.00  -2.07  -8.57   0.00   0.00 -18.53  32.27
-------------------------------------------------------------------------------

Segment Leq : 32.27 dBA

FF
Results segment # 2: mck west WB2
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 55.36 + 0.00) = 55.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     45   0.66  61.44   0.00  -2.76  -3.32   0.00   0.00   0.00  55.36
-------------------------------------------------------------------------------

Segment Leq : 55.36 dBA

FF
Results segment # 3: mck west WB3
---------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.39 !         1.39

ROAD (0.00 + 32.27 + 0.00) = 32.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
```

```
    -75    -45   0.25  61.44   0.00  -2.07  -8.57   0.00   0.00 -18.53  32.27
-------------------------------------------------------------------------------

Segment Leq : 32.27 dBA

FF
Results segment # 4: mck west EB1
---------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.42 !         1.42

ROAD (0.00 + 33.18 + 0.00) = 33.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    45     75   0.25  63.09   0.00  -3.57  -8.57   0.00   0.00 -17.77  33.18
-------------------------------------------------------------------------------

Segment Leq : 33.18 dBA

FF
Results segment # 5: mck west EB2
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 55.02 + 0.00) = 55.02 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -45     45   0.66  63.09   0.00  -4.75  -3.32   0.00   0.00   0.00  55.02
-------------------------------------------------------------------------------

Segment Leq : 55.02 dBA

FF
Results segment # 6: mck west EB3
---------------------------------

Source height = 1.26 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.26 !        1.50 !        1.42 !         1.42

ROAD (0.00 + 33.18 + 0.00) = 33.18 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75    -45   0.25  63.09   0.00  -3.57  -8.57   0.00   0.00 -17.77  33.18
-------------------------------------------------------------------------------

Segment Leq : 33.18 dBA

Total Leq All Segments: 58.25 dBA

FF



TOTAL Leq FROM ALL SOURCES:       58.25
FF
```

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:15:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck east WB
----------------------------------
Car traffic volume  :  7439 veh/TimePeriod
Medium truck volume :   121 veh/TimePeriod
Heavy truck volume  :   198 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck east WB
---------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  97.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: mck east EB
----------------------------------
Car traffic volume  :  6447 veh/TimePeriod
Medium truck volume :   105 veh/TimePeriod
Heavy truck volume  :   172 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck east EB
---------------------------------
Angle1   Angle2           :   0.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 104.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 3: mck west WB
----------------------------------
Car traffic volume  :  4781 veh/TimePeriod
Medium truck volume :    78 veh/TimePeriod
Heavy truck volume  :   127 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 3: mck west WB
---------------------------------
Angle1   Angle2           : -70.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 111.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
FF
Road data, segment # 4: mck west EB
-----------------------------------
Car traffic volume  :  6671 veh/TimePeriod
Medium truck volume :   108 veh/TimePeriod
Heavy truck volume  :   178 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mck west EB
---------------------------------
Angle1   Angle2           : -70.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 118.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck east WB
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 45.06 + 0.00) = 45.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     70   0.66  63.41   0.00 -13.46  -4.89   0.00   0.00   0.00  45.06
-------------------------------------------------------------------------------

Segment Leq : 45.06 dBA

FF
Results segment # 2: mck east EB
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 43.94 + 0.00) = 43.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     70   0.66  62.79   0.00 -13.96  -4.89   0.00   0.00   0.00  43.94
-------------------------------------------------------------------------------

Segment Leq : 43.94 dBA

FF
Results segment # 3: mck west WB
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 42.16 + 0.00) = 42.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -70      0   0.66  61.48   0.00 -14.43  -4.89   0.00   0.00   0.00  42.16
-------------------------------------------------------------------------------

Segment Leq : 42.16 dBA

FF
Results segment # 4: mck west EB
---------------------------------

Source height = 1.26 m
```

ROAD (0.00 + 43.18 + 0.00) = 43.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	0	0.66	62.94	0.00	-14.87	-4.89	0.00	0.00	0.00	43.18

Segment Leq : 43.18 dBA

Total Leq All Segments: 49.73 dBA

TOTAL Leq FROM ALL SOURCES: 49.73

```
STAMSON 5.0        NORMAL REPORT        Date: 10-03-2023 11:15:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6_2041b.te          Time Period: 16 hours
Description:


Road data, segment # 1: mck west WB
----------------------------------
Car traffic volume  :  4781 veh/TimePeriod
Medium truck volume :    78 veh/TimePeriod
Heavy truck volume  :   127 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: mck west WB
---------------------------------
Angle1   Angle2           :  40.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  40.00 deg   Angle2 : 70.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 2: mck west EB
----------------------------------
Car traffic volume  :  6671 veh/TimePeriod
Medium truck volume :   108 veh/TimePeriod
Heavy truck volume  :   178 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: mck west EB
---------------------------------
Angle1   Angle2           :  40.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  40.00 deg   Angle2 : 70.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: mck east WB1
----------------------------------
Car traffic volume  :  6013 veh/TimePeriod
Medium truck volume :    95 veh/TimePeriod
Heavy truck volume  :   156 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 3: mck east WB1
----------------------------------
Angle1   Angle2           :   0.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.00 m
Receiver height           :   6.00 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  10.00 deg   Angle2 : 40.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 4: mck east EB1
------------------------------------
Car traffic volume  :  6705 veh/TimePeriod
Medium truck volume :   106 veh/TimePeriod
Heavy truck volume  :   173 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 4: mck east EB1
----------------------------------
Angle1   Angle2           :   0.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  10.00 deg   Angle2 : 40.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 5: mck east WB2
------------------------------------
Car traffic volume  :  6013 veh/TimePeriod
Medium truck volume :    95 veh/TimePeriod
Heavy truck volume  :   156 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 5: mck east WB2
----------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 6: mck east EB2
------------------------------------
```

```
Car traffic volume  :  6705 veh/TimePeriod
Medium truck volume :   106 veh/TimePeriod
Heavy truck volume  :   173 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 6: mck east EB2
--------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  27.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 7: cha north
--------------------------------
Car traffic volume  :  3748 veh/TimePeriod
Medium truck volume :    25 veh/TimePeriod
Heavy truck volume  :    34 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 7: cha north
--------------------------------
Angle1   Angle2           : -60.00 deg   60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -60.00 deg   Angle2 : 60.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

FF
Road data, segment # 8: cha south
--------------------------------
Car traffic volume  :  4040 veh/TimePeriod
Medium truck volume :    35 veh/TimePeriod
Heavy truck volume  :    47 veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 8: cha south
--------------------------------
Angle1   Angle2           : -70.00 deg   -60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  35.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: mck west WB
--------------------------------
```

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.46	1.46

ROAD (0.00 + 31.81 + 0.00) = 31.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.31	61.48	0.00	-1.63	-8.56	0.00	0.00	-19.48	31.81

Segment Leq : 31.81 dBA

FF

Results segment # 2: mck west EB

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	1.50	1.47	1.47

ROAD (0.00 + 31.72 + 0.00) = 31.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	70	0.31	62.94	0.00	-3.34	-8.56	0.00	0.00	-19.32	31.72

Segment Leq : 31.72 dBA

FF

Results segment # 3: mck east WB1

Source height = 1.26 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.26	6.00	5.29	5.29

ROAD (47.93 + 44.73 + 0.00) = 49.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	10	0.53	62.41	0.00	-1.91	-12.56	0.00	0.00	0.00	47.93
10	40	0.17	62.41	0.00	-1.46	-7.87	0.00	0.00	-8.34	44.73

Segment Leq : 49.63 dBA

FF

Results segment # 4: mck east EB1

Source height = 1.25 m

Barrier height for grazing incidence

```
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.25 !        1.50 !        1.47 !         1.47

ROAD (46.06 + 31.60 + 0.00) = 46.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.66  62.87   0.00  -4.24 -12.57   0.00   0.00   0.00  46.06
-------------------------------------------------------------------------------
    10     40   0.31  62.87   0.00  -3.34  -7.93   0.00   0.00 -20.00  31.60
-------------------------------------------------------------------------------

Segment Leq : 46.22 dBA

FF
Results segment # 5: mck east WB2
---------------------------------

Source height = 1.26 m

ROAD (0.00 + 55.87 + 0.00) = 55.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.66  62.41   0.00  -2.07  -4.47   0.00   0.00   0.00  55.87
-------------------------------------------------------------------------------

Segment Leq : 55.87 dBA

FF
Results segment # 6: mck east EB2
---------------------------------

Source height = 1.25 m

ROAD (0.00 + 54.16 + 0.00) = 54.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      0   0.66  62.87   0.00  -4.24  -4.47   0.00   0.00   0.00  54.16
-------------------------------------------------------------------------------

Segment Leq : 54.16 dBA

FF
Results segment # 7: cha north
------------------------------

Source height = 0.97 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.97 !        1.50 !        1.45 !         1.45

ROAD (0.00 + 31.20 + 0.00) = 31.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -60     60   0.32  58.01   0.00  -4.84  -2.04   0.00   0.00 -19.94  31.20
-------------------------------------------------------------------------------

Segment Leq : 31.20 dBA

FF
Results segment # 8: cha south
------------------------------
```

Source height = 1.03 m

ROAD (0.00 + 37.67 + 0.00) = 37.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-60	0.66	58.81	0.00	-6.11	-15.03	0.00	0.00	0.00	37.67

Segment Leq : 37.67 dBA

Total Leq All Segments: 58.98 dBA

TOTAL Leq FROM ALL SOURCES: 58.98

APPENDIX 5

TRAFFIC AIR QUALITY IMPACT ASSESSMENT



600 Southgate Drive
Guelph ON Canada
N1G 4P6

Tel: +1.519.823.1311
Fax: +1.519.823.1316
E-mail: solutions@rwdi.com

MEMORANDUM

DATE:	2023-07-21	**RWDI Reference No.:** 2302590
TO:	Connor MacIsaac| RV Anderson	**EMAIL:** cmacIsaac@rvanderson.com
FROM:	Tara Bailey Alain Carrière	**EMAIL:** Tara.Bailey@rwdi.com Alain.Carriere@rwdi.com
RE:	**Traffic Air Quality Impact Assessment McKeown Avenue Reconstruction North Bay, Ontario**	

Dear Connor,

This memorandum details RWDI's qualitative air quality assessment for the McKeown Avenue reconstruction in North Bay (from Gormanville Road to Champlain Street). As part of the original Environmental Assessment (EA) for McKeown Avenue improvements between Algonquin Avenue and Gormanville Road, a qualitative air quality assessment was prepared that noted the proposed reconstruction would result in lower fuel consumption and therefore result in marginal improvement to existing air quality conditions. The Ministry of the Environment, Conservation and Parks (MECP) requested that a current qualitative assessment be prepared that includes a discussion of existing conditions, nearby sensitive receptors and the projects potential impacts on present and future receptors, potential impacts from construction and operation, and potential mitigation measures. The assessment is described in the following sections.

1. PROJECT DESCRIPTION

The project involves the widening of McKeown Avenue in North Bay, Ontario, from Gormanville Road to Champlain Street to provide a continuous 4-lane cross section and left turn lanes at the Champlain St, McNamara and Cartier Street intersections. The proposal also utilizes existing sidewalk on the north side the road, with a new-multi-use path to accommodate pedestrians and cyclists on the south side of the road.

The area surrounding McKeown Avenue contains a mixture of commercial, office and residential land uses. The south side of the roadway contains several car dealerships, a few industrial offices and numerous commercial establishments. On the north side of McKeown Avenue, there are several restaurants, the Service Ontario government building and residential townhouse units. It should be noted that the west part of the study area (Gormanville Road to Cartier Street) is primary focus of this assessment update due to major widening construction.

CANADA'S BEST MANAGED COMPANIES Platinum member

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2. OVERVIEW OF APPROACH

A qualitative assessment was completed for this scope of work for both operational and construction impacts from the project. The approach to assessing air quality impacts associated with operation of the project, after construction is complete, consisted of reviewing projected future traffic volumes for McKeown Road, reviewing the proximity and orientation of the road relative to existing and planned sensitive land uses, and reviewing the existing air quality conditions. Further information is provided in the sections below.

2.1 Traffic Information

Future road traffic data for 2041 horizon year were provided for McKeown Avenue and main intersecting roads in the study area by RV Anderson. Note that Future No-Build and Build traffic volumes are projected to be the same. The 2041 peak hour volume was the maximum of AM peak, PM peak and Saturday midday volumes, thus representing the potential worst-case traffic volume. The peak hour traffic accounts for approximately 10% of the AADT. **Table 1** summarizes the traffic volumes. More detailed data are presented in **Appendix A**.

Table 1: Traffic Volumes for the Study Area

Intersection	Link	Direction	Existing AADT [1]	2041 AADT [2]
McNamara & McKeown	North	Southbound	1540	1780
		Northbound	1120	1300
	West	Westbound	4350	5870
		Eastbound	6880	8620
	East	Westbound	4430	5340
		Eastbound	6200	7830
Cartier St & McKeown	West	Westbound	4220	5480
		Eastbound	6410	8020
	East	Westbound	4400	5110
		Eastbound	6170	7470
Champlain & McKeown	North	Southbound	N/A [3]	2050
		Northbound		2180
	South	Southbound		2910
		Northbound		1670
	West	Westbound		5540
		Eastbound		7730
	East	Westbound		6960
		Eastbound		7760

Note: [1] AADT stands for the Annual Average Daily Traffic.
[2] The future traffic volumes are projected to be the same for No-Build and Build scenarios.
[3] Existing traffic volumes were provided to Cartier Street, which is the current study area.

2.2 Contaminants of Interest

Vehicular traffic produces a variety of air contaminants as a result of fuel combustion inside the engine, evaporation of fuel from the tank, brake and tire wear, and re-suspension (also known as re-entrainment) of loose particles on the road surface (silt) as the vehicle travels over the road surface. The following key contaminants have commonly been assessed in air quality studies for Ontario roadway EA's: nitrogen dioxide, carbon monoxide, inhalable particulate matter (PM_{10}), respirable particulate matter ($PM_{2.5}$), benzene, 1,3-butadiene, formaldehyde, acetaldehyde and acrolein.

2.3 Applicable Guidelines

The Province of Ontario's Ministry of the Environment, Conservation and Parks (MECP) has established criteria for concentrations of airborne contaminants (MECP, 2020). The Ambient Air Quality Criteria (AAQC's) are effects-based levels in air, based on health and/or other effects. They are used in environmental assessments, special air monitoring studies, and assessments of general air quality to determine the potential for adverse effects. The AAQC's are not enforceable standards but are desirable objectives that municipalities should strive to attain.

In addition to provincial AAQC's, the federal Environment and Climate Change Canada (ECCC) has established Canadian Ambient Air Quality Standards (CAAQS) (ECCC, 2017). These are health-based air quality objectives for pollutant concentrations in outdoor air. These objectives are being phased in, with the final and most stringent objective becoming active in the year 2025. Since this assessment is considering the future 2041 scenario, the thresholds applicable for that period have been presented.

The air quality criteria and standards used to assess potential local project impacts are summarized in **Table 2** for the contaminants of interest.

Table 2: Summary of Relevant Air Quality Thresholds

Pollutant	Criterion (µg/m³)	Averaging Period	Source of Threshold Value
$PM_{2.5}$	27	24-hour	CAAQS 2020
	8.8	Annual	CAAQS 2020
NO_2	400	1-hour	AAQC
	200	24-hour	AAQC
	79	1-hour	CAAQS 2025
	22.6	Annual	CAAQS 2025
Acrolein	4.5	1-hour	AAQC
	0.4	24-hour	AAQC
PM_{10}	50	24-hour	AAQC
CO	36,200	1-hour	AAQC
	15,700	8-hour	AAQC
Benzo(a)pyrene	5.0E-05	24-hour	AAQC
	1.0E-05	Annual	AAQC
Acetaldehyde	500	0.5-hour	AAQC
	500	24-hour	AAQC
Formaldehyde	65	24-hour	AAQC
Benzene	2.3	24-hour	AAQC
	0.45	Annual	AAQC
1,3-Butadiene	10	24-hour	AAQC
	2	Annual	AAQC

2.4 Existing Ambient Air Quality Measurements

Historical ambient air quality monitoring data from stations within the ECCC National Air Pollution Surveillance (NAPS) Program and MECP ambient air monitoring station network were used to determine background concentrations for the contaminants of interest. In selecting the most appropriate monitoring station(s), consideration was given to whether the station was in a similar land use setting to that of the study area and the availability of the data for the contaminant. The most recent raw data between 2016 and 2020 were downloaded and analyzed to determine the appropriate percentiles, annual mean and maximums.

Table 3 summarizes the MECP and NAPS ambient air monitoring stations that were used in the assessment and a list of the monitored contaminants. These monitoring stations are the ones with recent data available that are most representative of the study area. They provide a reasonable representation of existing air quality conditions. The study area consists primarily of residential and commercial with some office and institutional uses. The sources from commercial and institutional uses that would contribute to background concentrations in the area would primarily be emissions from natural gas fired heating equipment.

Table 3: Ambient Monitoring Station Information

NAPS ID	MECP ID	Station Name	Location	Contaminants	Year
62001	75010	Chippewa St. – DND_North Bay	540 Chippewa St W/ Dept of National Defence	NO_2, $PM_{2.5}$, PM_{10}	2016-2020
62601	N/A	Simcoe	Experimental Farm	Acrolein, Benzo(a)pyrene, Acetaldehyde, Formaldehyde	2014-2017
60104	51001	Ottawa Downtown	Rideau & Wurtemburg	CO	2016-2020
65101	48006	Eagle St & McCaffrey Rd., Newmarket	Eagle St & McCaffrey Rd	Benzene, 1,3-Butadiene	2016-2020

2.5 Receptors

A receptor is any location that may experience an undesirable impact due to air emissions associated with the project. The Ontario Ministry of Transportation's (MTO) Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (MTO, 2020) provides a useful categorization of receptors into two key categories.

1. Sensitive Receptors: i.e. residential dwellings; and
2. Critical Receptors: i.e. retirement homes, hospitals, childcare centres, schools and similar institutional buildings.

Based on the study area, the receptors within the study area are sensitive receptors as all are considered residential. The residential receptors include the residential area near McNamara St., Northern Lights Cooperative Home, and residential neighbourhood at McKeown and Cartier St. The receptor areas are shown in the Figure in **Appendix B**.

3. FINDINGS

3.1 Existing Air Quality Conditions

Table 4 summarizes the ambient air measurements from the air quality monitoring stations previously listed in **Table 3.**

Table 4: Summary of Background Air Quality

Contaminant	Averaging Period	Background Concentration [1] [µg/m³]	Description	Threshold [µg/m³]	Percent of Threshold (%)
NO_2	1-hour	20.9	90th Percentile	400	5%
	1-hour	20.9	90th Percentile	79	26%
	24-hour	19.3	90th Percentile	200	10%
	Annual	9.4	Annual Average	22.6	41%
$PM_{2.5}$	24-hour	8.4	90th Percentile	27	31%
	Annual	4.8	Annual Average	8.8	55%
Acrolein	1-hour [2]	0.08	90th Percentile	4.5	2%
	24-hour	0.03	90th Percentile	0.4	7%
PM_{10}	24-hour	8.4	90th Percentile	27	31%
CO	1-hour	325	90th Percentile	36,200	1%
	8-hour	340	90th Percentile	15,700	2%
Benzo(a)pyrene	24-hour	4.2E-05	90th Percentile	5.0E-05	83%
	Annual	2.2E-05	Annual Average	1.0E-05	215%
Acetaldehyde	0.5-hour [2]	2.94	90th Percentile	500	1%
	24-hour	0.99	90th Percentile	500	0.2%
Formaldehyde	24-hour	1.24	90th Percentile	65	2%
Benzene	24-hour	0.5	90th Percentile	2.3	22%
	Annual	0.33	Annual Average	0.45	74%
1,3-Butadiene	24-hour	0.03	90th Percentile	10	0.3%
	Annual	0.01	Annual Average	2	1%

Notes: [1] For each contaminant, the most recent, applicable available data were used to calculate an average value to represent existing conditions. The 1-hour, 0.5-hour and 24-hour values were calculated based on the 90th percentiles over the available years. The values for the annual averaging period were calculated using the annual concentrations averaged over the available years.
[2] 1-hr average and 0.5-hour average converted from 24-hour average background value following Section 4.4 of the Air Dispersion Modelling Guideline for Ontario.

As can be seen from **Table 4**, background concentrations for the contaminants of interest are below the AAQCs and CAAQS for all except Benzo(a)pyrene which is above its annual AAQC.

3.2 Future Air Quality Conditions - Operations

The Future Build scenario includes the widening of McKeown Avenue from Gormanville Road to Cartier Street bringing that section to a four-lane road from a two-lane. The Future No-Build scenario does not include the widening with McKeown Avenue remaining a two-lane roadway. As noted previously,

there is no change between the predicted Future No-Build traffic volumes and the Future Build traffic volumes, therefore the proposed widening of McKeown Avenue is not expected to result in an increase in traffic, leading to insignificant differences in air quality conditions between the Future Build and Future No-Build scenarios. It is also noted that the widening project will improve the level of service for the roadway resulting in better traffic movement and delay service, particularly for the south side street movements. This improvement in service results in less emissions from idling and queuing of vehicles on the roadway.

In addition, the proposed design will include an asphalt trail for multi-use active transportation on the south side and a sidewalk on the north side. These pathways will promote active transportation within the study area in accordance with The City of North Bay's 2019 Active Transportation Master Plan.

The expansion of the roadway will involve the addition of one lane in each direction. This will require removal of some of the existing boulevard on the north side of McKeown and potentially having traffic 3.5 m closer to the sensitive receptors than the current existing condition. However, this change in distance is not expected to have a significant impact on the air quality at the sensitive receptors. Therefore, since there is no change in traffic levels between the Future Build and No-Build scenarios and the implementation of multiple active transportation pathways adjacent to the roadway, the project is not expected to cause undesirable levels of air pollutants at any nearby sensitive/critical receptors, and no mitigation measures are recommended for the operational phase of the project.

3.3 Impacts During Construction

Construction activities involve heavy equipment that generates air pollutants and dust; however, these impacts are temporary in nature. The emissions are highly variable, difficult to predict, and depend on the specific activities that are taking place and the effectiveness of the mitigation measures. The best manner to deal with these emissions is through diligent implementation of operating procedures such as application of dust suppressants, reduced travel speeds for heavy vehicles, efficient staging of activities and minimization of haul distances, covering up stockpiles, etc. It is recommended that to minimize potential air quality impacts during construction, the construction tendering process should include requirements for implementation of an emissions management plan. Such a plan would set out established best management practices for dust and other emissions. Some of the best practices include the following, but not limited to:

- Use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fuelled trucks to reduce emissions from construction equipment.
- Regular cleaning of construction sites and access roads to remove construction-caused debris and dust.

- Dust suppression on unpaved haul roads and other traffic areas susceptible to dust, subject to the area being free of sensitive plant, water or other ecosystems that may be affected by dust suppression chemicals.
- Covered loads when hauling fine-grained materials.
- Prompt cleaning of paved streets/roads where tracking of soil, mud or dust has occurred.
- Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads.
- Covered stockpiles of soil, sand and aggregate as necessary.
- Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces.

4. CLOSING

During the operational phase of the project, vehicle emissions as a result of the proposed roadway improvements are not expected to have a significant impact on future air quality levels as there is no increase in vehicle traffic predicted as a result of the improvements as well as the improved level of services predicted as a result. The implementation of the project with the design elements allowing for alternative transportation methods also indicates the potential for air quality impacts to be minimized through promotion of active transportation alternatives. Impacts of construction activities on air quality are expected to be temporary in nature and can be mitigated through implementation of an emissions management plan.

5. STATEMENT OF LIMITATIONS

This report was prepared by RWDI AIR Inc. ("RWDI") for RV Anderson ("Client"). The findings and conclusions presented in this letter have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this letter are based on the information available to RWDI when this letter was prepared. Because the contents of this letter may not reflect the final design of the Project or subsequent changes made after the date of this letter, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this letter have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this letter have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the letter and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this letter carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

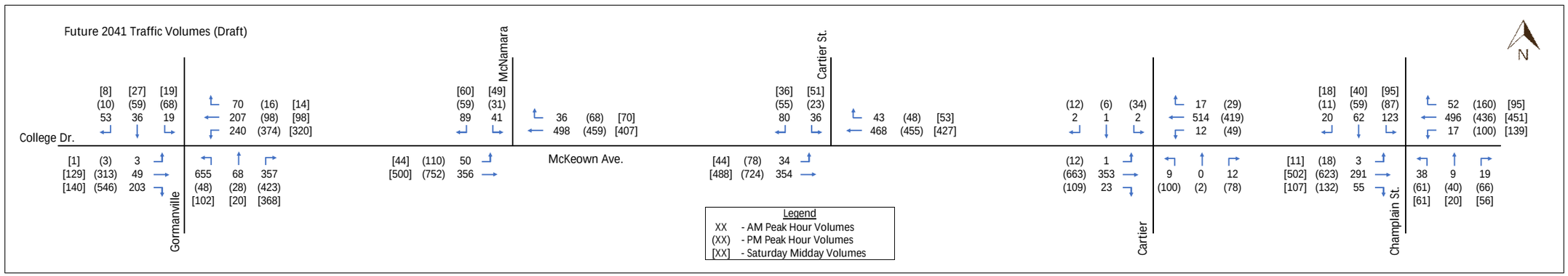
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2. Environment and Climate Change Canada (ECCC), 2022. *National Air Pollution Surveillance Program*. Retrieved from https://data-donnees.ec.gc.ca/data/air/monitor/national-air-pollution-surveillance-naps-program/?lang=en

3. Environment and Climate Change Canada (ECCC), 2017. *Canadian Ambient Air Quality Standards.* Canada. Retrieved from http://airquality-qualitedelair.ccme.ca/en/0

APPENDIX A


Future 2041 Traffic Volumes (Draft)
N
College Dr.
McKeown Ave.
Gormanville
McNamara
Cartier St.
Cartier
Champlain St.
[1] [129] [140]
(3) (313) (546)
3 49 203
[8] (10) 53
[27] (59) 36
[19] (68) 19
655 (48) [102]
68 (28) [20]
357 (423) [368]
70 207 240
(16) (98) (374)
[14] [98] [320]
[44] [500]
(110) (752)
50 356
[60] (59) 89
[49] (31) 41
36 498
(68) (459)
[70] [407]
[44] [488]
(78) (724)
34 354
[36] (55) 80
[51] (23) 36
43 468
(48) (455)
[53] [427]
(12) (663) (109)
1 353 23
(12) 2
(6) 1
(34) 2
9 (100)
0 (2)
12 (78)
17 514 12
(29) (419) (49)
[11] [502] [107]
(18) (623) (132)
3 291 55
[18] (11) 20
[40] (59) 62
[95] (87) 123
38 (61) [61]
9 (40) [20]
19 (66) [56]
52 496 17
(160) (436) (100)
[95] [451] [139]
Legend
XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes
[XX] - Saturday Midday Volumes

APPENDIX B



Receiver Locations

McKeown Avenue Reconstruction, North Bay, Ontario

Drawn by:	SVG	Figure:	A.1
Project #:			2302590
Date:	2023-03-10		

APPENDIX 6

CULTURAL HERITAGE REPORT



Cultural Heritage Report:
Existing Conditions and Preliminary Impact Assessment

McKeown Avenue Reconstruction
Municipal Class Environmental Assessment Addendum

City of North Bay
District of Nipissing, Ontario

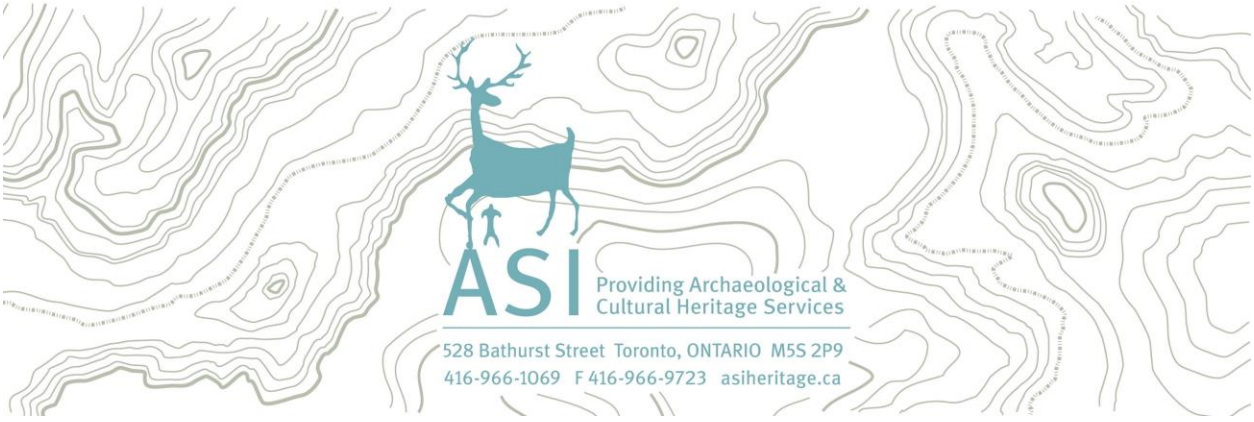
Final Report

Prepared for:

R.V. Anderson and Associates Limited
43 Church Street, Suite 104
St. Catharines ON L2R 7E1

Archaeological Services Inc. File: 22CH-193

February 2023 (Finalized April 2023)



Executive Summary

Archaeological Services Inc. was contracted by R.V. Anderson Associates Limited, on behalf of the City of North Bay, to conduct a Cultural Heritage Report as part of the McKeown Avenue Reconstruction Schedule C Class Environmental Assessment Addendum. The project involves the widening of McKeown Avenue to four lanes from the Gormanville Roundabout to Cartier Street, adding a multi-use pathway on the south side of the roadway for the length of the study area, the addition of streetlights at the McNamara Street intersection, and the replacement of the current stormwater and sanitary sewer systems, curbs and sidewalks. The McKeown Avenue Reconstruction project footprint consists of an approximately 1.2-kilometre section of McKeown Road from the Gormanville Road roundabout approach to immediately east of Champlain Street.

The purpose of this report is to present an inventory of known and potential built heritage resources and cultural heritage landscapes, identify existing conditions of the project study area, provide a preliminary impact assessment, and propose appropriate mitigation measures.

The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with a rural history dating back to the early twentieth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no known built heritage resources (B.H.R.s) or cultural heritage landscapes (C.H.L.s) within the study area. No additional potential B.H.R.s or C.H.L.s were identified during background research and field review.

Based on the results of the assessment, the following recommendations have been developed:

1. Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential B.H.R.s and C.H.L.s.

2. This report should be submitted to the City of North Bay and the Ministry of Citizenship and Multiculturalism for review and comment, and any other local heritage stakeholders that may have an interest in this project. The final report should be submitted to the City of North Bay for their records.

Report Accessibility Features

This report has been formatted to meet the Information and Communications Standards under the *Accessibility for Ontarians with Disabilities Act*, 2005 (A.O.D.A.). Features of this report which enhance accessibility include: headings, font size and colour, alternative text provided for images, and the use of periods within acronyms. Given this is a technical report, there may be instances where additional accommodation is required in order for readers to access the report's information. If additional accommodation is required, please contact Annie Veilleux, Manager of the Cultural Heritage Division at Archaeological Services Inc., by email at aveilleux@asiheritage.ca or by phone 416-966-1069 ext. 255.

Project Personnel

- **Senior Project Manager**: Lindsay Graves, M.A., C.A.H.P., Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division
- **Project Coordinator:** Jessica Bisson, B.F.A. (Hon.), Dipl. Heritage Conservation, Cultural Heritage Technician, Project Administrator – Cultural Heritage Division
- **Project Manager**: John Sleath, M.A., Cultural Heritage Specialist, Project Manager - Cultural Heritage Division
- **Field Review**: John Sleath
- **Report Production**: Leora Bebko, M.M.St., Cultural Heritage Technician, Technical Writer and Researcher – Cultural Heritage Division
- **Graphics Production**: Andrew Clish, B.E.S., Senior Archaeologist - Planning Assessment Division
- **Report Reviewer(s)**: Lindsay Graves and John Sleath

Qualified Persons Involved in the Project

Lindsay Graves, M.A., C.A.H.P.
Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division

The Senior Project Manager for this Cultural Heritage Report is **Lindsay Graves** (M.A., Heritage Conservation), Senior Cultural Heritage Specialist and Assistant Manager for the Cultural Heritage Division. She was responsible for: overall project scoping and approach; development and confirmation of technical findings and study recommendations; application of relevant standards, guidelines and regulations; and implementation of quality control procedures. Lindsay is academically trained in the fields of heritage conservation, cultural anthropology, archaeology, and collections management and has over 15 years of experience in the field of cultural heritage resource management. This work has focused on the assessment, evaluation, and protection of built heritage resources and cultural heritage landscapes. Lindsay has extensive experience undertaking archival research, heritage survey work, heritage evaluation and heritage impact assessment. She has also contributed to cultural heritage landscape studies and heritage conservation plans, led heritage commemoration and interpretive programs, and worked collaboratively with multidisciplinary teams to sensitively plan interventions at historic sites/places. In addition, she is a leader in the completion of heritage studies required to fulfil Class Environmental Assessment processes and has served as Project Manager for over 100 heritage assessments during her time at A.S.I. Lindsay is a member of the Canadian Association of Heritage Professionals.

John Sleath, M.A.
Cultural Heritage Specialist, Project Manager - Cultural Heritage Division

The Project Manager for this Cultural Heritage Report is **John Sleath** (MA), who is a Cultural Heritage Specialist and Project Manager within the Cultural Heritage Division with ASI. He was responsible for the day-to-day management activities, including scoping of research activities and site surveys and drafting of study

findings and recommendations. John has worked in a variety of contexts within the field of cultural heritage resource management for the past 14 years, as an archaeologist and as a cultural heritage professional. An exposure to both land-based and underwater archaeology and above ground cultural heritage assessments has provided John with a holistic understanding of heritage in a variety of contexts. In 2015 John began working in the Cultural Heritage Division researching and preparing a multitude of cultural heritage assessment reports and for which he was responsible for a variety of tasks including: completing archival research, investigating built heritage and cultural heritage landscapes, report preparation, historical map regression, and municipal consultation. Since 2018 John has been a project manager responsible for a variety of tasks required for successful project completion. This work has allowed John to engage with stakeholders from the public and private sector, as well as representatives from local municipal planning departments and museums. John has conducted hundreds of cultural heritage assessments across Ontario, with a focus on transit and rail corridor infrastructure including bridges and culverts.

Leora Bebko, M.M.St.
Cultural Heritage Technician, Technical Writer and Researcher - Cultural Heritage Division

The Cultural Heritage Technicians for this project is **Leora Bebko** (M.M.St.), who is a Cultural Heritage Technician and Technical Writer and Researcher within the Cultural Heritage Division. She was responsible for preparing and contributing research and technical reporting. In Leora's career as a cultural heritage and museum professional she has worked extensively in public programming and education within built heritage spaces. Leora is particularly interested in the ways in which our heritage landscapes can be used to facilitate public engagement and interest in our region's diverse histories. While completing her Master of Museum Studies she was able to combine her interest in heritage architecture and museums by focusing on the historic house museum and the accessibility challenges they face. As a thesis project, Leora co-curated the award-winning exhibit *Lost & Found: Rediscovering Fragments of Old Toronto* on the grounds of Campbell House Museum. Since completing her degree, she has worked as a

historical interpreter in a variety of heritage spaces, learning a range of traditional trades and has spent considerable time researching heritage foodways and baking in historic kitchens. In 2022, she joined ASI's Cultural Heritage team as a Cultural Heritage Technician.

Glossary

Built Heritage Resource (B.H.R.)
Definition: "…a building, structure, monument, installation or any manufactured remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Indigenous community. built heritage resources are located on property that may be designated under Parts IV or V of the *Ontario Heritage Act*, or that may be included on local, provincial, federal and/or international registers" (Ministry of Municipal Affairs and Housing, 2020, p. 41).

Cultural Heritage Landscape (C.H.L.)
Definition: "…a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may include features such as buildings, structures, spaces, views, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association. Cultural heritage landscapes may be properties that have been determined to have cultural heritage value or interest under the *Ontario Heritage Act*, or have been included on federal and/or international registers, and/or protected through official plan, zoning by-law, or other land use planning mechanisms" (Ministry of Municipal Affairs and Housing, 2020, p. 42).

Known Built Heritage Resource or Cultural Heritage Landscape
Definition: A known built heritage resource or cultural heritage landscape is a property that has recognized cultural heritage value or interest. This can include a property listed on a Municipal Heritage Register, designated under Part IV or V of the *Ontario Heritage Act*, or protected by a heritage agreement, covenant or easement, protected by the *Heritage Railway Stations Protection Act or the Heritage Lighthouse Protection Act*, identified as a Federal Heritage Building, or located within a U.N.E.S.C.O. World Heritage Site (Ministry of Tourism, Culture and Sport, 2016).

Impact
Definition: Includes negative and positive, direct and indirect effects to an identified built heritage resource and cultural heritage landscape. Direct impacts include destruction of any, or part of any, significant heritage attributes or features and/or unsympathetic or incompatible alterations to an identified resource. Indirect impacts include, but are not limited to, creation of shadows, isolation of heritage attributes, direct or indirect obstruction of significant views, change in land use, land disturbances (Ministry of Tourism Culture and Sport, 2006b). Indirect impacts also include potential vibration impacts (See Section 2.5 for complete definition and discussion of potential impacts).

Mitigation
Definition: Mitigation is the process of lessening or negating anticipated adverse impacts to built heritage resources or cultural heritage landscapes and may include, but are not limited to, such actions as avoidance, monitoring, protection, relocation, remedial landscaping, and documentation of the cultural heritage landscape and/or built heritage resource if to be demolished or relocated (Ministry of Tourism Culture and Sport, 2006a).

Potential Built Heritage Resource or Cultural Heritage Landscape
Definition: A potential built heritage resource or cultural heritage landscape is a property that has the potential for cultural heritage value or interest. This can include properties/project area that contain a parcel of land that is the subject of a commemorative or interpretive plaque, is adjacent to a known burial site and/or cemetery, is in a Canadian Heritage River Watershed, or contains buildings or structures that are 40 or more years old (Ministry of Tourism, Culture and Sport, 2016).

Significant
Definition: With regard to cultural heritage and archaeology resources, significant means “resources that have been determined to have cultural heritage value or interest. Processes and criteria for determining cultural heritage value or interest are established by the Province under the authority of the *Ontario Heritage Act.*

While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation" (Ministry of Municipal Affairs and Housing, 2020, p. 51).

Vibration Zone of Influence

Definition: Area within a 50 metre buffer of construction-related activities in which there is potential to affect an identified built heritage resource or cultural heritage landscape. A 50 metre buffer is applied in the absence of a project-specific defined vibration zone of influence based on existing secondary source literature and direction (Carman et al., 2012; Crispino & D'Apuzzo, 2001; P. Ellis, 1987; Rainer, 1982; Wiss, 1981). This buffer accommodates the additional threat from collisions with heavy machinery or subsidence (Randl, 2001).

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1.0 Introduction

Archaeological Services Inc. (A.S.I.) was contracted by R.V. Anderson Associates Limited, on behalf of the City of North Bay, to conduct a Cultural Heritage Report as part of the McKeown Avenue Reconstruction Schedule C Class Environmental Assessment Addendum. The purpose of this report is to present an inventory of known and potential built heritage resources and cultural heritage landscapes, identify existing conditions of the project study area, provide a preliminary impact assessment, and propose appropriate mitigation measures.

1.1 Project Overview

The McKeown Avenue Reconstruction Schedule C Class Environmental Assessment Addendum involves the widening of McKeown Avenue to four lanes from the Gormanville Roundabout to Cartier Street, adding a multi-use pathway on the south side of the roadway for the length of the study area, the addition of streetlights at the McNamara Street intersection, and the replacement of the current stormwater and sanitary sewer systems, curbs and sidewalks . The original McKeown Avenue Schedule 'C' Class Environmental Assessment Environmental Study Report was filed in 1999. Given it has been over 10 years since the original Environmental Study Report was filed, the City of North Bay initiated this Environmental Assessment Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred in the area since 1999, including traffic volumes and patterns, development and regulations.

The McKeown Avenue Reconstruction project footprint consists of an approximately 1.2-kilometre section of McKeown Road from the Gormanville Road roundabout approach to immediately east of Champlain Street.

1.2 Description of Study Area

This Cultural Heritage Report will focus on the project footprint with an additional 50 metre buffer (Figure 1). This project study area has been defined as inclusive of those lands that may contain built heritage resources or cultural heritage landscapes that may be subject to direct or indirect impacts as a result of the proposed undertaking. Properties within the study area are located in the City or North Bay.

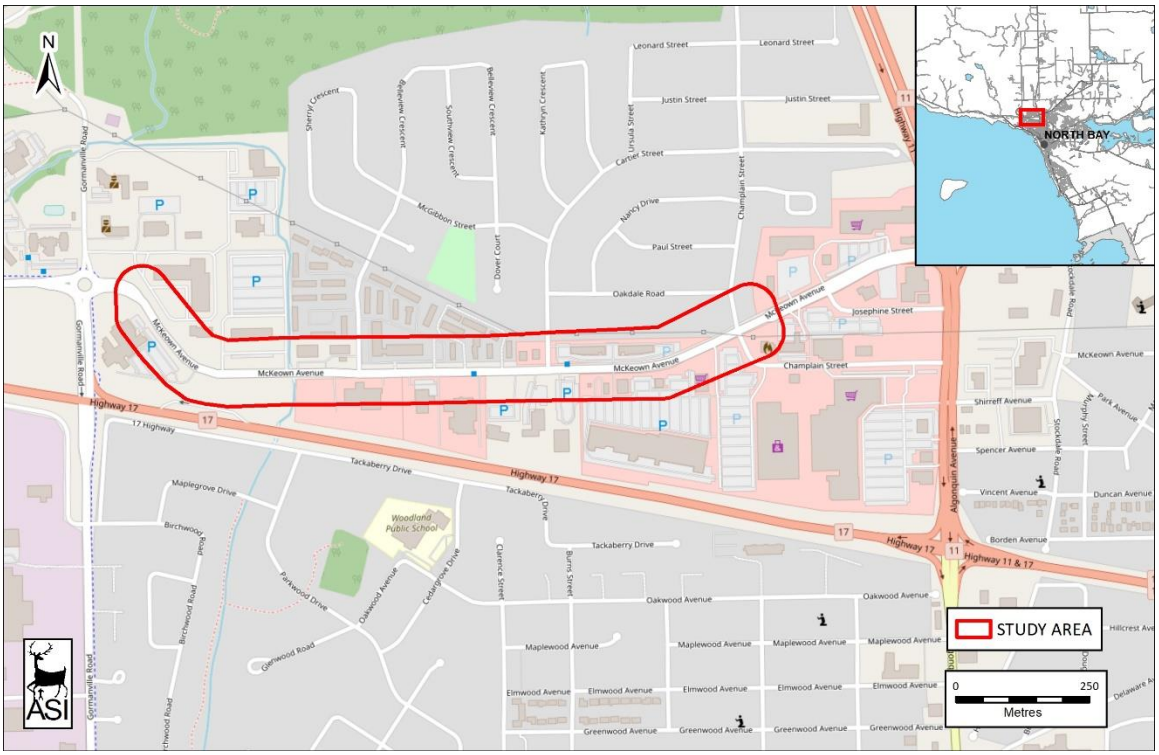


Figure 1: Location of the study area (Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (C.C.-By-S.A.))

2.0 Methodology

The following sections provide a summary of regulatory requirements and municipal and regional heritage policies that guide this cultural heritage assessment. In addition, an overview of the process undertaken to identify known and potential built heritage resources and cultural heritage landscapes is

provided, along with a description of how the preliminary impact assessment will be undertaken.

2.1 Regulatory Requirements

The *Ontario Heritage Act* (O.H.A.) (Ontario Heritage Act, R.S.O. c. O.18, 1990 [as Amended in 2022], 1990) is the primary piece of legislation that determines policies, priorities and programs for the conservation of Ontario's heritage. There are many other provincial acts, regulations and policies governing land use planning and resource development that support heritage conservation, including:

- The *Planning Act* (Planning Act, R.S.O. 1990, c. P.13, 1990), which states that "conservation of features of significant architectural, cultural, historical, archaeological or scientific interest" is a "matter of provincial interest". The *Provincial Policy Statement* (Ministry of Municipal Affairs and Housing, 2020), issued under the *Planning Act*, links heritage conservation to long-term economic prosperity and requires municipalities and the Crown to conserve significant built heritage resources and cultural heritage landscapes.

- The *Environmental Assessment Act* (Environmental Assessment Act, R.S.O., 1990), which defines "environment" to include cultural conditions that influence the life of humans or a community. Cultural heritage resources, which includes archaeological resources, built heritage resources and cultural heritage landscapes, are important components of those cultural conditions.

The Ministry of Citizenship and Multiculturalism (hereafter "The Ministry") is charged under Section 2.0 of the O.H.A. with the responsibility to determine policies, priorities, and programs for the conservation, protection, and preservation of the heritage of Ontario. The *Standards and Guidelines for Conservation of Provincial Heritage Properties* (Ministry of Tourism Culture and Sport, 2010) (hereinafter "*Standards and Guidelines")* apply to properties the

Government of Ontario owns or controls that have "cultural heritage value or interest" (C.H.V.I.). The *Standards and Guidelines* provide a series of guidelines that apply to provincial heritage properties in the areas of identification and evaluation; protection; maintenance; use; and disposal. For the purpose of this report, the *Standards and Guidelines* provide points of reference to aid in determining potential heritage significance in identification of built heritage resources and cultural heritage landscapes. While not directly applicable for use in properties not under provincial ownership, the *Standards and Guidelines* are regarded as best practice for guiding heritage assessments and ensure that additional identification and mitigation measures are considered.

Similarly, the *Ontario Heritage Tool Kit* (Ministry of Culture, 2006) provides a guide to evaluate heritage properties. To conserve a built heritage resource or cultural heritage landscape, the *Ontario Heritage Tool Kit* states that a municipality or approval authority may require a heritage impact assessment and/or a conservation plan to guide the approval, modification, or denial of a proposed development.

2.2 Municipal/Regional Heritage Policies

The study area is located within the City of North Bay in the District of Nipissing. Policies relating to built heritage resources and cultural heritage landscapes were reviewed from the following sources:

- *City of North Bay Consolidated Official Plan* (City of North Bay, 2018b)
- *City of North Bay Official Plan Appendix B5 Cedar Heights Park Plan* (City of North Bay, 2018a)
- *The Growth Plan for Northern Ontario* (Province of Ontario, 2019)

2.3 Identification of Built Heritage Resources and Cultural Heritage Landscapes

This Cultural Heritage Report follows guidelines presented in the *Ontario Heritage Tool Kit* (Ministry of Culture, 2006) and *Criteria for Evaluating Potential*

for Built Heritage Resources and Cultural Heritage Landscapes (Ministry of Tourism, Culture and Sport, 2016). The objective of this report is to present an inventory of known and potential built heritage resources and cultural heritage landscapes, and to provide a preliminary understanding of known and potential built heritage resources and cultural heritage landscapes located within areas anticipated to be directly or indirectly impacted by the proposed project.

In the course of the cultural heritage assessment process, all potentially affected built heritage resources and cultural heritage landscapes are subject to identification and inventory. Generally, when conducting an identification of built heritage resources and cultural heritage landscapes within a study area, three stages of research and data collection are undertaken to appropriately establish the potential for and existence of built heritage resources and cultural heritage landscapes in a geographic area: background research and desktop data collection; field review; and identification.

Background historical research, which includes consultation of primary and secondary source research and historical mapping, is undertaken to identify early settlement patterns and broad agents or themes of change in a study area. This stage in the data collection process enables the researcher to determine the presence of sensitive heritage areas that correspond to nineteenth- and twentieth-century settlement and development patterns. To augment data collected during this stage of the research process, federal, provincial, and municipal databases and/or agencies are consulted to obtain information about specific properties that have been previously identified and/or designated as having cultural heritage value. Typically, resources identified during these stages of the research process are reflective of particular architectural styles or construction methods, associated with an important person, place, or event, and contribute to the contextual facets of a particular place, neighbourhood, or intersection.

A field review is then undertaken to confirm the location and condition of previously identified built heritage resources and cultural heritage landscapes.

The field review is also used to identify potential built heritage resources and cultural heritage landscapes that have not been previously identified on federal, provincial, or municipal databases or through other appropriate agency data sources.

During the cultural heritage assessment process, a property is identified as a potential built heritage resources or cultural heritage landscape based on research, the Ministry screening tool, and professional expertise and best practice. In addition, use of a 40-year-old benchmark is a guiding principle when conducting a preliminary identification of built heritage resources and cultural heritage landscapes. While identification of a resource that is 40 years old or older does not confer outright heritage significance, this benchmark provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from having cultural heritage value or interest.

2.4 Background Information Review

To make an identification of previously identified known or potential built heritage resources and cultural heritage landscapes within the study area, the following sections present the resources that were consulted as part of this Cultural Heritage Report.

2.4.1 Review of Existing Heritage Inventories

A number of resources were consulted in order to identify previously identified built heritage resources and cultural heritage landscapes within the study area. These resources, reviewed on 2 February, 2023, include:

- The City of North Bay's List of Recognized Heritage Sites (City of North Bay, 2020);
- Historical maps (including historical atlases, topographic maps, and aerial photography);
- The *Ontario Heritage Act Register* (Ontario Heritage Trust, n.d.b);
- The *Places of Worship Inventory* (Ontario Heritage Trust, n.d.c);

- The inventory of Ontario Heritage Trust easements (Ontario Heritage Trust, n.d.a);
- The Ontario Heritage Trust's *An Inventory of Provincial Plaques Across Ontario*: a PDF of Ontario Heritage Trust Plaques and their locations (Ontario Heritage Trust, 2018);
- Inventory of known cemeteries/burial sites in the Ontario Genealogical Society's online databases (Ontario Genealogical Society, n.d.);
- Canada's Historic Places website: available online, the searchable register provides information on historic places recognized for their heritage value at the local, provincial, territorial, and national levels (Parks Canada, n.d.a);
- Directory of Federal Heritage Designations: a searchable on-line database that identifies National Historic Sites, National Historic Events, National Historic People, Heritage Railway Stations, Federal Heritage Buildings, and Heritage Lighthouses (Parks Canada, n.d.b);
- Canadian Heritage River System: a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage (Canadian Heritage Rivers Board and Technical Planning Committee, n.d.); and,
- United Nations Educational, Scientific and Cultural Organization (U.N.E.S.C.O.) World Heritage Sites (U.N.E.S.C.O. World Heritage Centre, n.d.).

2.4.2 Review of Previous Heritage Reporting

Additional cultural heritage studies undertaken within parts of the study area were also reviewed. These include:

- Stage 1-2 Archaeological Assessment North Bay MTO Property (Archaeological Services Incorporated, 2008b)
- Due Diligence Archaeological Review of the Proposed Lowe's North Bay Commercial Development (Archaeological Services Incorporated, 2008a).

2.4.3 Community Information Gathering

The following individuals, groups, and/or organizations were contacted to gather information on known and potential built heritage resources and cultural heritage landscapes, active and inactive cemeteries, and areas of identified Indigenous interest within the study area:

- Peter Carello, Senior Planner, City of North Bay (email communication 7 February 2023). Email correspondence confirmed that there are no properties with cultural heritage recognition within the study area.
- The Ministry of Citizenship and Multiculturalism (email communication 7 and 8 February 2023). Email correspondence confirmed that there are no properties designated by the Minister and no known Provincial Heritage Properties within the study area.
- The Ontario Heritage Trust (email communications 7 and 8 February 2023). A response indicated that there are no conservation easements or Trust-owned properties within the study area.
- At project start-up in January 2023, A.S.I. made a request to the proponent that any engagement with Indigenous communities undertaken as part of this project include a discussion about known or potential built heritage resources or cultural heritage landscapes that are of interest to the respective communities. Details of the project and notice of the intention to complete archaeological and cultural heritage assessments of the study area was sent by the proponent to the following Indigenous communities and organizations: Nipissing First Nation, Dokis First Nation, M.N.O. Region 5-North Bay Métis Council, Métis Nation of Ontario, Anishinabek Nation, and the North Bay Indian Friendship Centre. Additional correspondence is ongoing, and will include a request for additional information on any areas or features of cultural heritage value or interest (R.V. Anderson and Associates email communication, 25 January 2023). No feedback had been received by the time of draft report submission, however any future information will be incorporated into the final report.

2.5 Preliminary Impact Assessment Methodology

To assess the potential impacts of the undertaking, identified built heritage resources and cultural heritage landscapes are considered against a range of possible negative impacts, based on the *Ontario Heritage Tool Kit InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (Ministry of Tourism Culture and Sport, 2006b). These include:

Direct impacts:

- Destruction of any, or part of any, significant heritage attributes or features; and
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance.

Indirect impacts:

- Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship;
- Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features;
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces; and
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.

Indirect impacts from construction-related vibration have the potential to negatively affect built heritage resources and cultural heritage landscapes depending on the type of construction methods and machinery selected for the project and proximity and composition of the identified resources. Potential vibration impacts are defined as having potential to affect an identified built

heritage resources and cultural heritage landscapes where work is taking place within 50 metre of features on the property. A 50 metre buffer is applied in the absence of a project-specific defined vibration zone of influence based on existing secondary source literature and direction provided from the Ministry (Carman et al., 2012; Crispino & D'Apuzzo, 2001; P. Ellis, 1987; Rainer, 1982; Wiss, 1981). This buffer accommodates any additional or potential threat from collisions with heavy machinery or subsidence (Randl, 2001).

Several additional factors are also considered when evaluating potential impacts on identified built heritage resources and cultural heritage landscapes. These are outlined in a document set out by the Ministry of Culture and Communications (now Ministry of Citizenship and Multiculturalism) and the Ministry of the Environment entitled *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992). While this document has largely been superseded in some respects by more current policies and legislation, the guidance provided that continues to be of relevance to this specific project includes the following definitions:

- Magnitude: the amount of physical alteration or destruction which can be expected;
- Severity: the irreversibility or reversibility of an impact;
- Duration: the length of time an adverse impact persists;
- Frequency: the number of times an impact can be expected;
- Range: the spatial distribution, widespread or site specific, of an adverse impact; and
- Diversity: the number of different kinds of activities to affect a heritage resource.

The proposed undertaking should endeavor to avoid adversely affecting known and potential built heritage resources and cultural heritage landscapes and interventions should be managed in such a way that identified features are conserved. When the nature of the undertaking is such that adverse impacts are unavoidable, it may be necessary to implement alternative approaches or

mitigation strategies that alleviate the negative effects on identified built heritage resources and cultural heritage landscapes. Mitigation is the process of lessening or negating anticipated adverse impacts and may include, but are not limited to, such actions as avoidance, monitoring, protection, relocation, remedial landscaping, and documentation of the built heritage resource or cultural heritage landscape if to be demolished or relocated.

Various works associated with infrastructure improvements have the potential to affect built heritage resources and cultural heritage landscapes in a variety of ways, and as such, appropriate mitigation measures for the undertaking need to be considered.

3.0 Summary of Historical Development Within the Study Area

This section provides a brief summary of historical research. A review of available primary and secondary source material was undertaken to produce a contextual overview of the study area, including a general description of physiography, Indigenous land use, and Euro-Canadian settlement.

3.1 Physiography

The study area is situated within the Laurentian Highland subdivision of the Canadian Shield physiographic region of Ontario (Chapman & Putnam, 1984).

The Laurentian Highland Subdivision of the Canadian Shield is generally made up 1-1.7-billion-year-old rocks, largely metamorphosed granites and gneiss, that have been faulted, uplifted, and eroded. One million years ago, glaciation scraped portions of the surface bare, while depositing rock, sand, and gravel in other areas. These areas acted as moraines and created a disrupted drainage system resulting in an area characterized by many lakes and rivers. Ice from this period also carved very deep valleys leading southward from the Shield which were then filled with sand, gravel, and other materials as the ice sheets melted (10,000-18,000 years ago). Following this period, downcutting from rivers and

postglacial uplift resulted in the formation of terraces and plains inside river valleys (Drummond, 2006).

The Laurentian Highlands are within the southern limits of Canada's subarctic Boreal Forest. These forests attracted many early European settlers to the area for the abundant hunting and trapping and later for the booming lumber industry (Drummond, 2006).

3.2 Indigenous Land Use and Settlement

Northern Ontario was occupied by human populations much later than the south. The Laurentide glacier would have retreated above the Study Area by approximately 10,500-10,000 before present (B.P.) (Karrow & Warner, 1990). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000 B.P., the environment had progressively warmed and populations now occupied less extensive territories (C. J. Ellis & Deller, 1990).

Between approximately 10,000-5,500 B.P., the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 B.P.; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest evidence for cemeteries dates to approximately 4,500-3,000 B.P. and is indicative of increased social organization, investment of labour into social infrastructure, and the establishment of socially prescribed territories (Brown, 1995; C. J. Ellis et al., 1990, 2009). By approximately 3,500 B.P., copper implements become common in the areas surrounding Lake Superior, and there is evidence of the exchange of copper into southern Ontario (Wright, 2001).

Between 3,000-2,500 B.P., populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 B.P. and exchange and interaction networks broaden at this time (Spence et al., 1990, pp. 136, 138) and by approximately 2,000 B.P., evidence exists for small community camps, focusing on the seasonal harvesting of resources (Spence et al., 1990, pp. 155, 164). As is clear in the detailed ethnographies of Anishinaabeg populations, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

Remains from Laurel-period (2,200–1,200 B.P.) archaeological sites show a strong riverine and lake adaptation. The subsistence strategies during this period involved, like the Archaic period, a wide range of faunal and floral resources. Seasonal gatherings of people for subsistence and social purposes began to occur during this period, resulting in the appearance of large settlements at prime fishing locations. A Middlesex burial mound occurs in the Killarney area northeast of Georgian Bay, and later Laurel mounds are known from the Rainy River area of northwestern Ontario, indicating a strongly developed mortuary practice influenced by the Hopewell groups of the Ohio valley. The grave offerings associated with these burials continued to place an emphasis upon the exotic origin of raw materials. These developments suggest that changes first evidenced in the preceding Early Woodland period continued to develop and be expanded upon.

Before the European arrival, extensive exchange systems had already developed between the Anishinaabe and Cree of north-central and northeastern Ontario and the Huron-Wendat and other Iroquoian groups to the south. The end of the Late Woodland period in northern Ontario is marked by the appearance of European Trade goods circa 1600 C.E.

The study area is within the lands of the Robinson-Huron Treaty 61. In 1850, the Robinson-Huron treaty was signed in Baawating (Sault Ste. Marie) by the Lake Huron Chiefs and leaders of the Anishinaabeg signatory First Nations ceding the Lake Huron shoreline, including the islands, from Matchedash Bay to Batchewana Bay, and inland as far as the height of land, for resource extraction and settlement (Surtees, 1986). One of the signatories was Anishinaabe Chief Shingwaukonse (Little Pine) (1773-1854), veteran of the War of 1812 who had helped establish Garden River First Nation. While settlement was restricted to the established reserves, "the full and free privilege to hunt over the territory [then] ceded by them and to fish in the waters thereof as they have heretofore been in the habit of doing" was retained in the Treaty for the first time in treaty making history, as well as cash payment for annuities (Surtees, 1971, 1986).

During the negotiations of the Robinson Treaty, the Métis lost much of their rights, particularly regarding their land, despite having strong support from Chief Shingwaukonse from Garden River. However, regardless of the Crown's treatment of the Métis, the Ojibway continued to regard the Métis as having the same rights as them (Lytwyn, 1998; Préfontaine, 2003). It was also generally assumed that in spite of the Robinson Treaty, the Métis would continue to have the right to hunt and fish. This was evident in the nineteenth century census data which showed the occupation of many Métis as hunters, fishermen, trappers and traders. Although mostly removed from the core due to the inability to own land, the Métis continued to live on the outskirts of Sault Ste. Marie (Lytwyn 1998).

3.3 Historical Euro-Canadian Township Survey and Settlement

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into

the hinterlands. Early transportation routes followed existing Indigenous trails that typically followed the highlands adjacent to various creeks and rivers (ASI, 2006). Early European settlements occupied similar locations as Indigenous settlements as they were generally accessible by trail or water routes and would have been in locations with good soil and suitable topography to ensure adequate drainage.

Historically, the study area is located in the Former Independent Township of Widdifield in parts of Lots 21 and 22, Concession B and C.

3.3.1 Township of Widdifield

The independent Township of Widdifield was first surveyed in 1883 by Alexander Niven. It was named for Joseph H. Widdifield, the Member of Provincial Parliament for the riding of York North in the 1870s and 1880s. One of the first recorded European settlers to arrive in the Township in 1884 was G.W. Bartlett, who later became superintendent of Algonquin Park. In order to organize the Township in 1885, 20 voters from neighbouring Ferris Township were "borrowed" to meet the requisite number of 60—the law at the time specified the number of required voters but not from where they must come (Gard, 1909; Mika & Mika, 1983).

The first Reeve of the Township of Widdifield was George Fee and C.W. Thompson was its first Clerk. North Bay officially separated from the township in 1891 when the village incorporated as a town. In 1968, what remained of Widdifield Township was amalgamated with West Ferris and the Town of North Bay to create the City of North Bay in 1968 (Gard, 1909; Taschner, 2023).

3.3.2 City of North Bay

The study area is now located within the City of North Bay. The community of North Bay was established around the old 'Nipissing Passageway', part of the northern route travelled by fur traders, missionaries, and explorers for more than 200 years. Etienne Brulé visited the region in 1610, followed by Father

LeCaron and Samuel de Champlain in 1615. Trading posts were established in the area, but Euro-Canadian settlement did not progress until the arrival of the Canadian Pacific Railway (C.P.R.) in 1882 (Mika & Mika, 1983).

In 1881, John Ferguson visited the area and decided that the north bay of Lake Nipissing was a promising spot for settlement. He was to play a considerable role in the town's development and even inadvertently contributed its name by directing a shipment of building material to be sent to him at the "north bay". Business enterprises began to sprout around the railway yards, and the construction of the C.P.R. to North Bay in 1890 resulted in a population surge. (Mika & Mika, 1983).

With the construction of the Temiskaming and Northern Ontario Railway (now Ontario Northland Railway) in 1905, its southern terminus of North Bay became the gateway to the resource-rich north. With rail connections, North Bay became a distribution centre and the vital link between the northern resources and the markets to the south and west (Mika & Mika, 1983).

3.4 Review of Historical Mapping

The 1889 Rand, McNally & Company's map of Ontario (Rand, McNally & Co., 1889) was examined to determine the presence of historical features within the study area during the nineteenth century (Figure 2). Historically, the study area is located in the Former Independent Township of Widdifield in parts of Lots 21 and 22, Concession B and C.

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases. For instance, they were often financed by subscription limiting the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases. The use of historical map sources to reconstruct or predict the location of former features within the modern landscape generally begins by using common reference points between the various sources. The historical maps are geo-referenced to provide the most accurate determination of the

location of any property on a modern map. The results of this exercise can often be imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including differences of scale and resolution, and distortions introduced by reproduction of the sources.

The scale of the 1889 map does not allow for very much detail, showing only the railway and a general outline of the Town of North Bay. In this mapping, the study area is depicted as being right on the northeastern edge of the town. The Town of North Bay has a railway stop (Figure 2).

In addition to nineteenth-century mapping, historical topographic mapping and aerial photographs from the twentieth century were examined. This report presents maps from 1905, 1943, 1965, 1977, and 1986 (Figure 3 to Figure 7).

The 1905 Plan of the Town of North Bay depicts the study area outside of the town limits to the north. The Town of North Bay is shown to be laid out in town lots. Railway infrastructure, including a roundhouse can be see along the shoreline of Lake Nipissing (Figure 3). The 1943 topographic map shows the study area to be within a rural context. A trail is depicted following an alignment similar to McKeown Avenue throughout much of the study area. The track runs in a straight east-west alignment and does not angle northward at the ends of the study area as McKeown Avenue does today. Gormanville Road/Monastery Road follows a similar alignment to the present (without the roundabout), intersecting with the wagon track south of the western end of the study area. A structure is depicted just outside the study area to the east and just north of the study area near the centre. The area in which the study area sits is labeled as “Gateway” in this mapping (Figure 4).

In the 1965 topographic map, McKeown Avenue is labeled as such and follows a similar alignment to previous mapping. The road is depicted as a single-lane, loose or unstabilized surface, all weather road. A loose-surface, dry weather road extends north of McKeown Avenue at the west end of the study area. Only one structure is depicted within the study area, but there are several just to the east on McKeown Avenue. Highway 17 (also labeled as the Trans-Canada

Highway) passes just south of the study area. There is a diversion for a weigh scale on Highway 17, right near the southern border of the study area (Figure 5).

The 1977 topographic map shows some development within the study area, particularly along the south side of McKeown Avenue. Two roads, leading to a large structure now connect to McKeown Avenue at the west side of the study area and a third road extends north, connecting McKeown Avenue to the Thibeault Terrace development. McKeown Avenue is depicted as two-lanes or more and the weigh scale on Highway 17 is depicted in the same location as previous mapping (Figure 6). Topographic mapping from 1986 shows little development within the study area, though the Thibeault Terrace development to the north has grown considerably. At the west end of the study area, McKeown Avenue is shown to angle north toward Gormanville Road, following its present alignment. At the east end of the study area, the road continues in the same alignment as previous mapping. The road is now depicted as a two-lane, hard surface, all-season road. The two roadways at the west end of the study area are no longer depicted, however another roadway has been added heading north to Thibeault Terrace, west of the previous access road. Both of these access roads are two-lane, loose or stabilized, all-season roads. The weigh scale is depicted in the same location as in previous mapping and there is now a structure shown between the diversion and the highway (Figure 7).



Figure 2: The study area overlaid on the 1889 Rand, McNally & Company's map of Ontario number two (Base Map: Rand, McNally & Co., 1889).

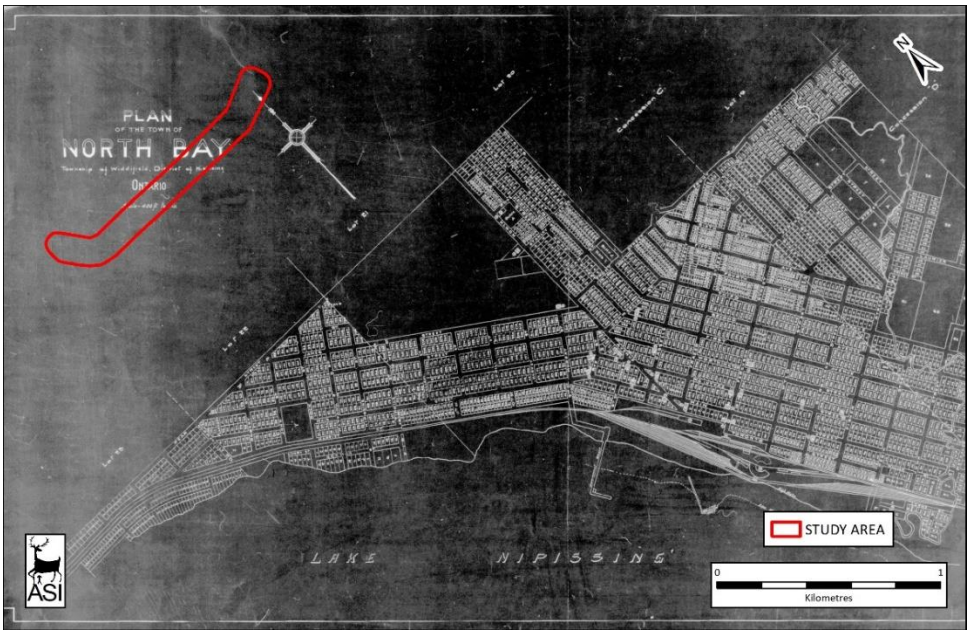


Figure 3: The study area overlaid on the 1905 Plan of the Town of North Bay (Base Map: Clarke, 1905).



Figure 4: The study area overlaid on the 1943 topographic map of North Bay (Base Map: Department of National Defence, 1943).

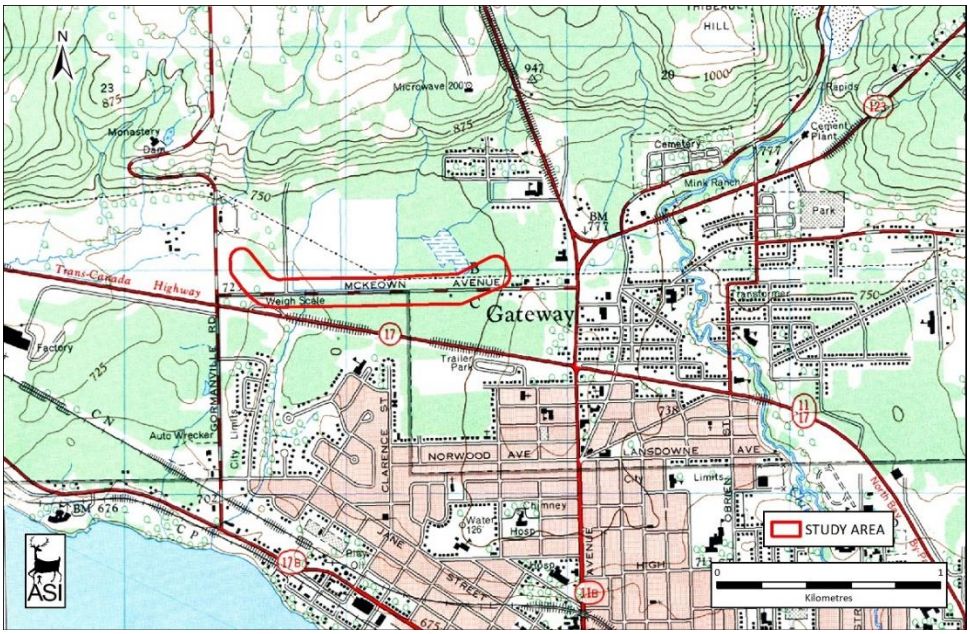


Figure 5: The study area overlaid on the 1965 topographic map of North Bay (Base Map: Department of Mines and Technical Surveys, 1965)

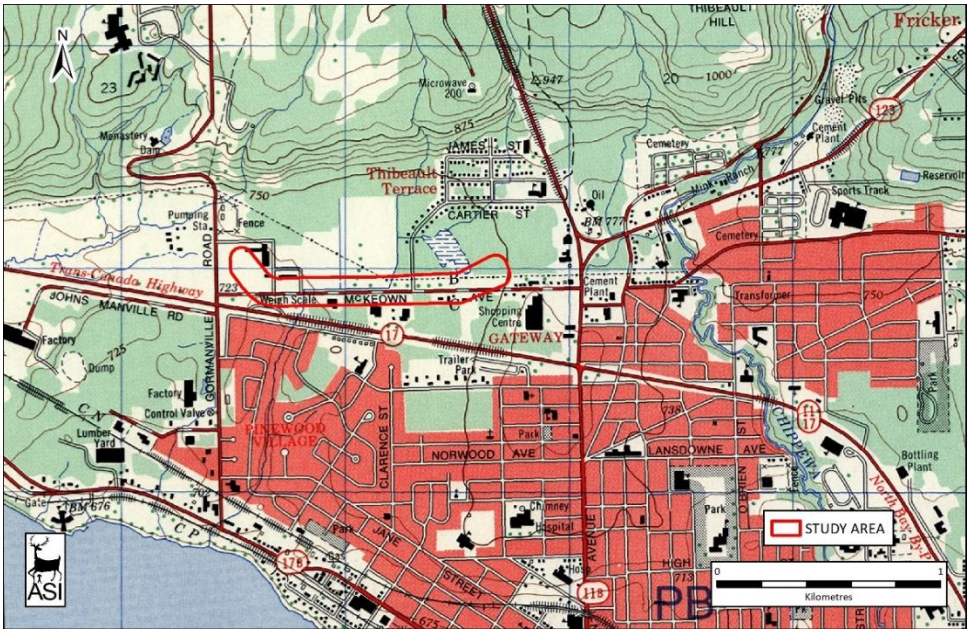


Figure 6: The study area overlaid on the 1977 topographic map of North Bay (Base Map: Department of Energy, Mines and Resources, 1977).

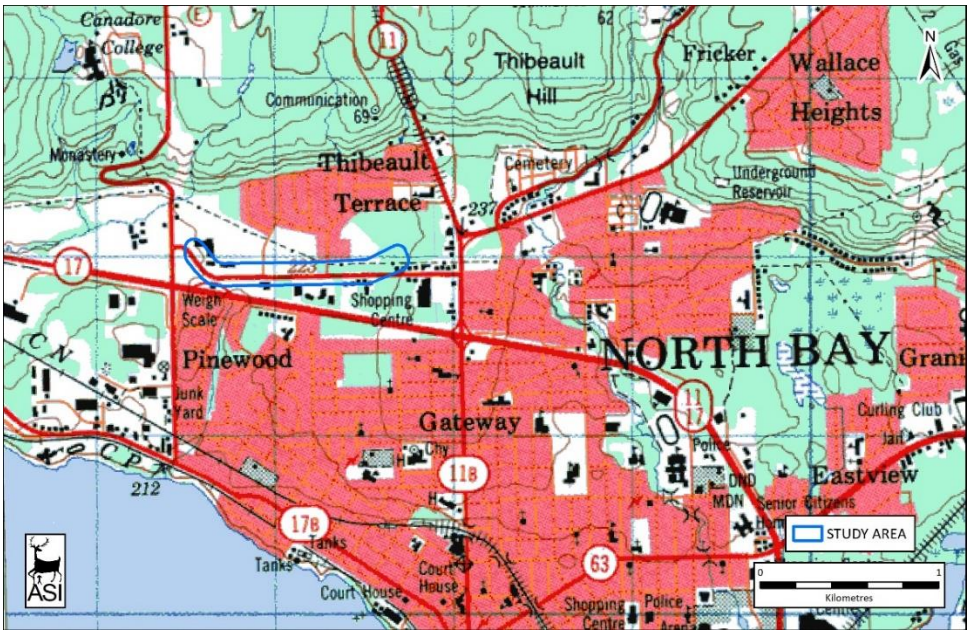


Figure 7: The study area overlaid on the 1986 topographic map of North Bay (Base Map: Energy, Mines and Resources Canada, 1986).

4.0 Existing Conditions

A field review of the study area was undertaken by John Sleath of Archaeological Services Incorporated (A.S.I.), on 16 February 2023 to document the existing conditions of the study area from existing rights-of-way. The existing conditions of the study area are described below and captured in Plate 1 to Plate 5.

4.1 Description of Field Review

McKeown Avenue is a paved road that is generally bound by a mixture of commercial and residential properties and follows a largely east-west alignment. At the western end of the study area McKeown Avenue angles northwest to connect to the Gormanville Road roundabout. The entrance and exit ramp of the roundabout are divided by a median (Plate 1). East of the roundabout for approximately 300 metres, McKeown Avenue is a two-lane road with a sidewalk on the north side that directly abuts the roadway and institutional buildings on both sides (Plate 2). To the east, the sidewalk is set back from the roadway by a boulevard with hydro polls and intermittent bus stops. Continuing east to Cartier Street, McKeown Avenue is bound on the north side by a mix of commercial and residential developments and on the south by car dealerships. McNamara Street and Cartier Street terminate at McKeown Avenue in T-intersections (Plate 3). East from Cartier Street to Champlain Street, McKeown Avenue widens to four lanes. There is a sidewalk on the south side of McKeown Avenue that directly abuts the roadway and both sides are occupied by commercial developments (Plate 4). Streetlights control the entrance to a large commercial development approximately 100 metres east of Cartier Street. The intersection with Champlain Street is also controlled by streetlights (Plate 5).



Plate 1: McKeown Avenue, looking southeast from the Gormanville Roundabout (A.S.I., 2023).



Plate 2: McKeown Avenue, looking east (A.S.I., 2023).



Plate 3: McKeown Avenue, looking west from the intersection with Cartier Street (A.S.I., 2023).



Plate 4: McKeown Avenue, looking northeast from the intersection with Cartier Street (A.S.I., 2023).



Plate 5: McKeown Avenue, looking southwest from the intersection with Champlain Street (A.S.I., 2023).

4.2 Identification of Known and Potential Built Heritage Resources and Cultural Heritage Landscapes

Based on the results of the background research and field review, no known or potential cultural heritage landscapes (C.H.L) or built heritage resources (B.H.R.) were identified within the study area.

5.0 Preliminary Impact Assessment

The following sections provide more detailed information regarding the proposed project undertaking and analysis of the potential impacts on identified built heritage resources and cultural heritage landscapes.

5.1 Description of Proposed Undertaking

The proposed undertaking for the McKeown Avenue Reconstruction Municipal Class Environmental Assessment Addendum study area consists of the widening of McKeown Avenue to four lanes from the Gormanville Roundabout to Cartier Street, adding a multi-use pathway on the south side of the roadway for the length of the study area, the addition of streetlights at the McNamara Street intersection, and the replacement of the current stormwater and sanitary sewer systems, curbs and sidewalks. The McKeown Avenue Reconstruction project footprint consists of an approximately 1.2-kilometre section of McKeown Road from the Gormanville Road roundabout approach to immediately east of Champlain Street (Figure 8 to Figure 12).

5.2 Analysis of Potential Impacts

As no known or potential built heritage resources or cultural heritage landscapes were identified, no adverse direct or indirect impacts are anticipated as a result of the undertaking.

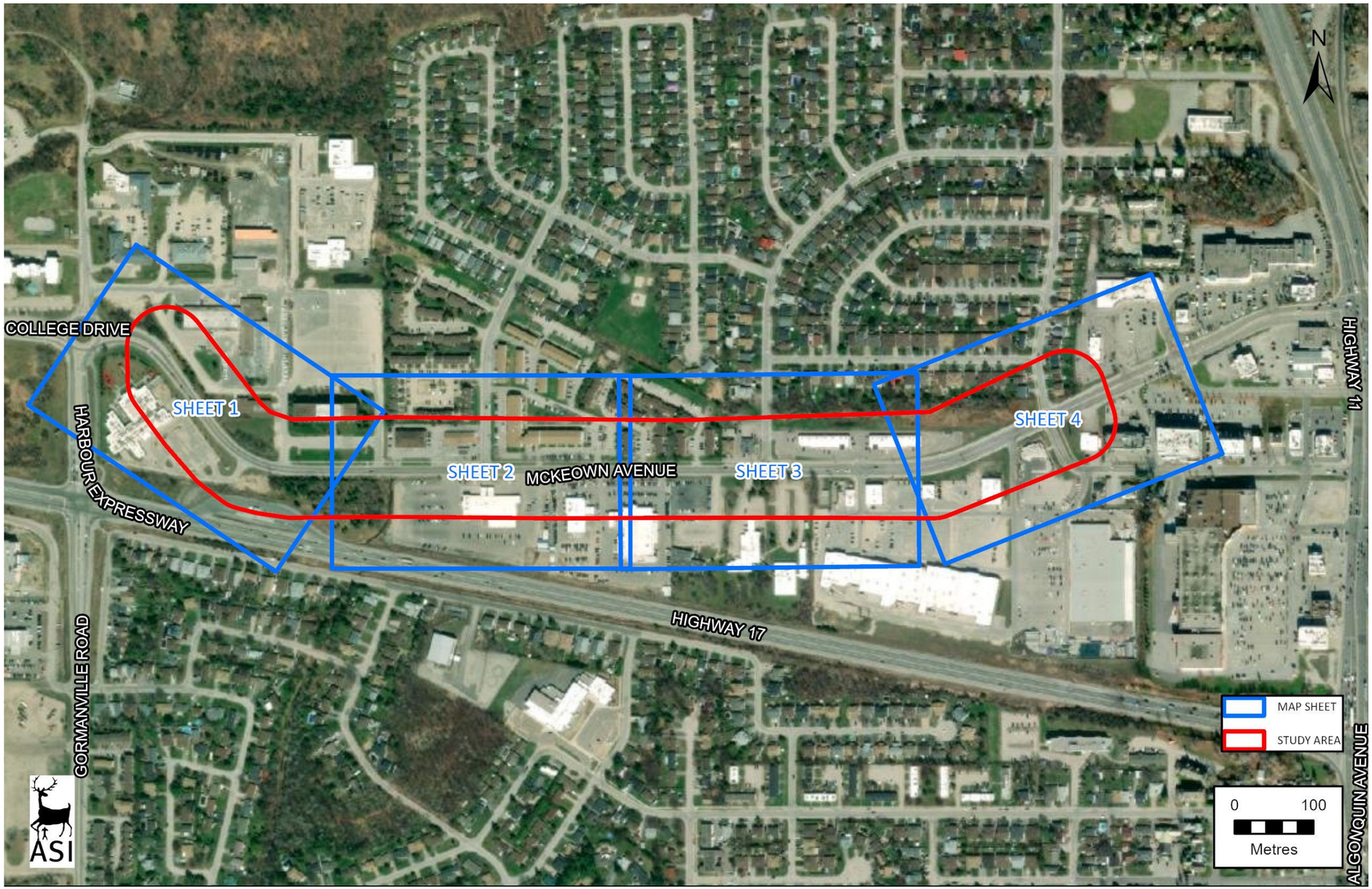


Figure 8: Map showing preliminary design and plate locations (Key Sheet)

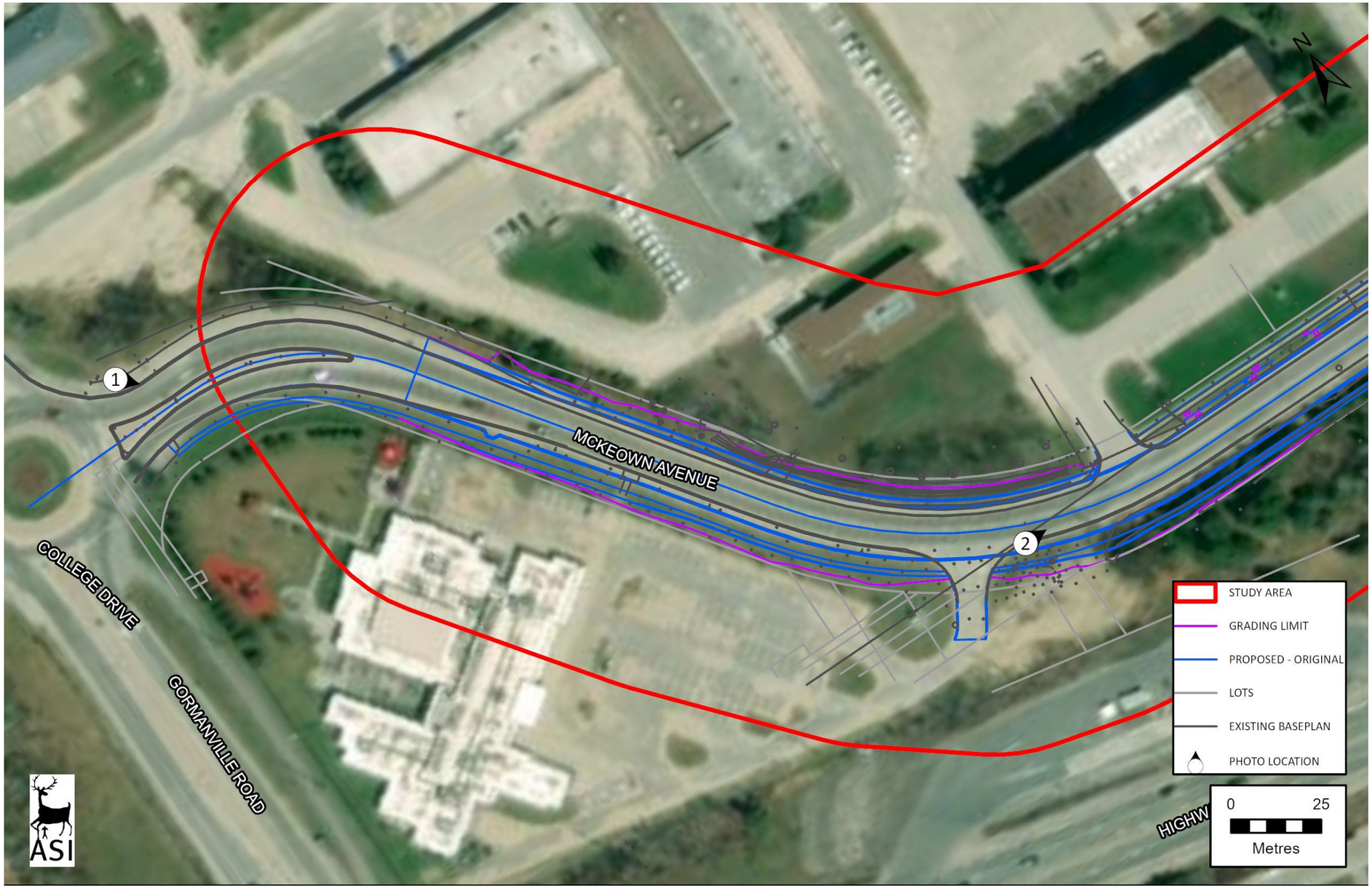


Figure 9: Map showing preliminary design and plate locations (Sheet 1)

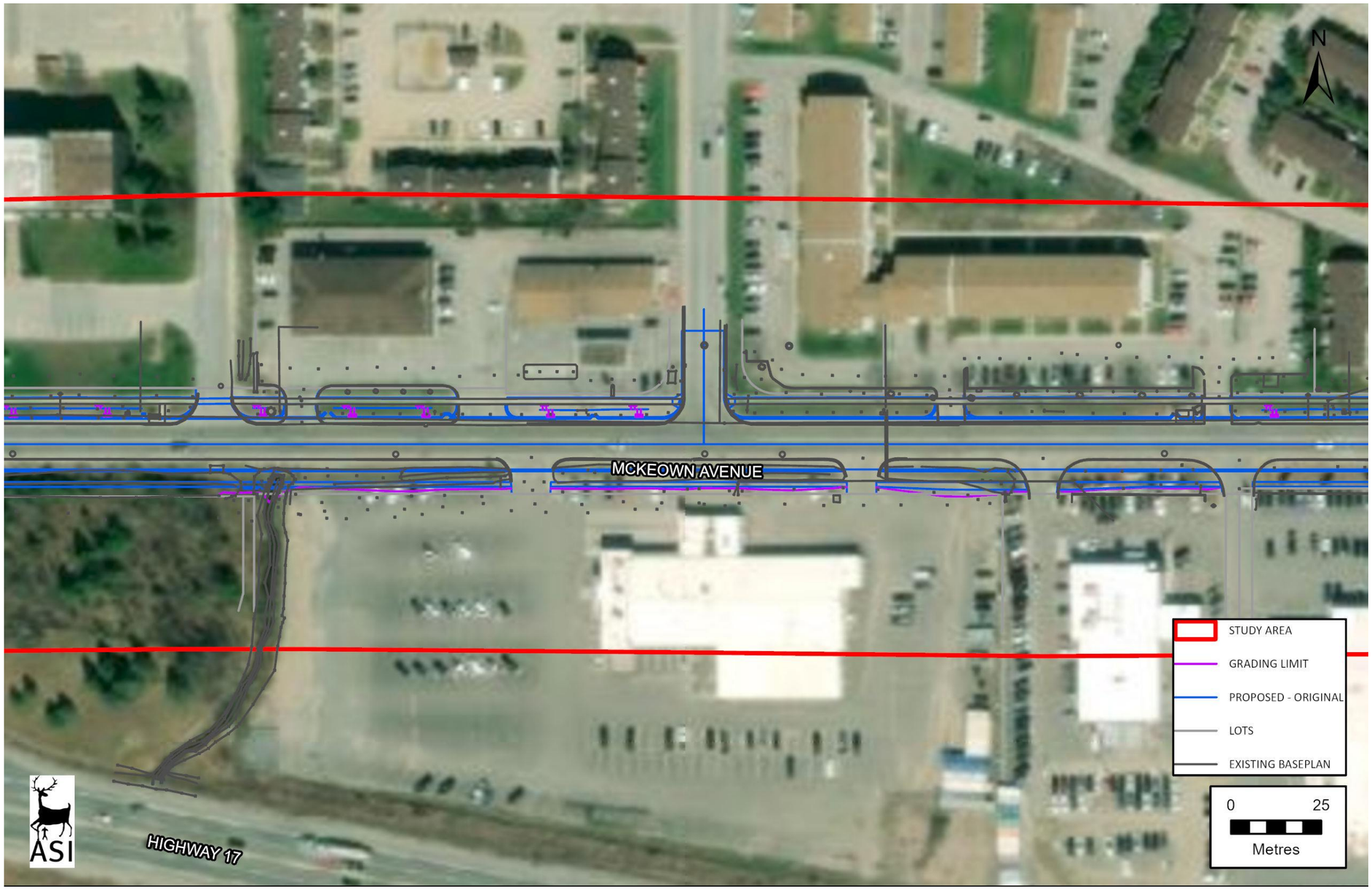


Figure 10: Map showing preliminary design and plate locations (Sheet 2)

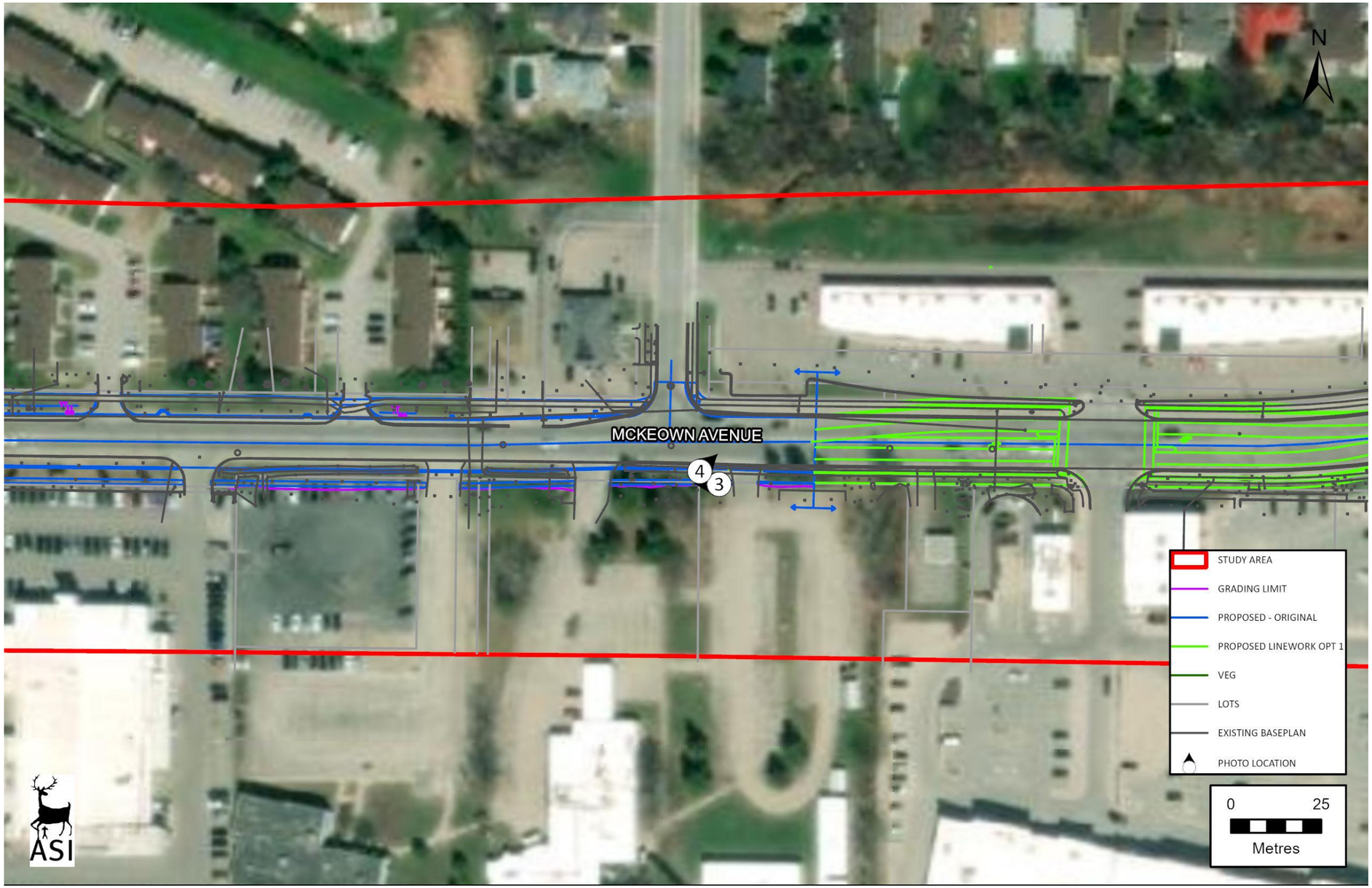


Figure 11: Map showing preliminary design and plate locations (Sheet 3)

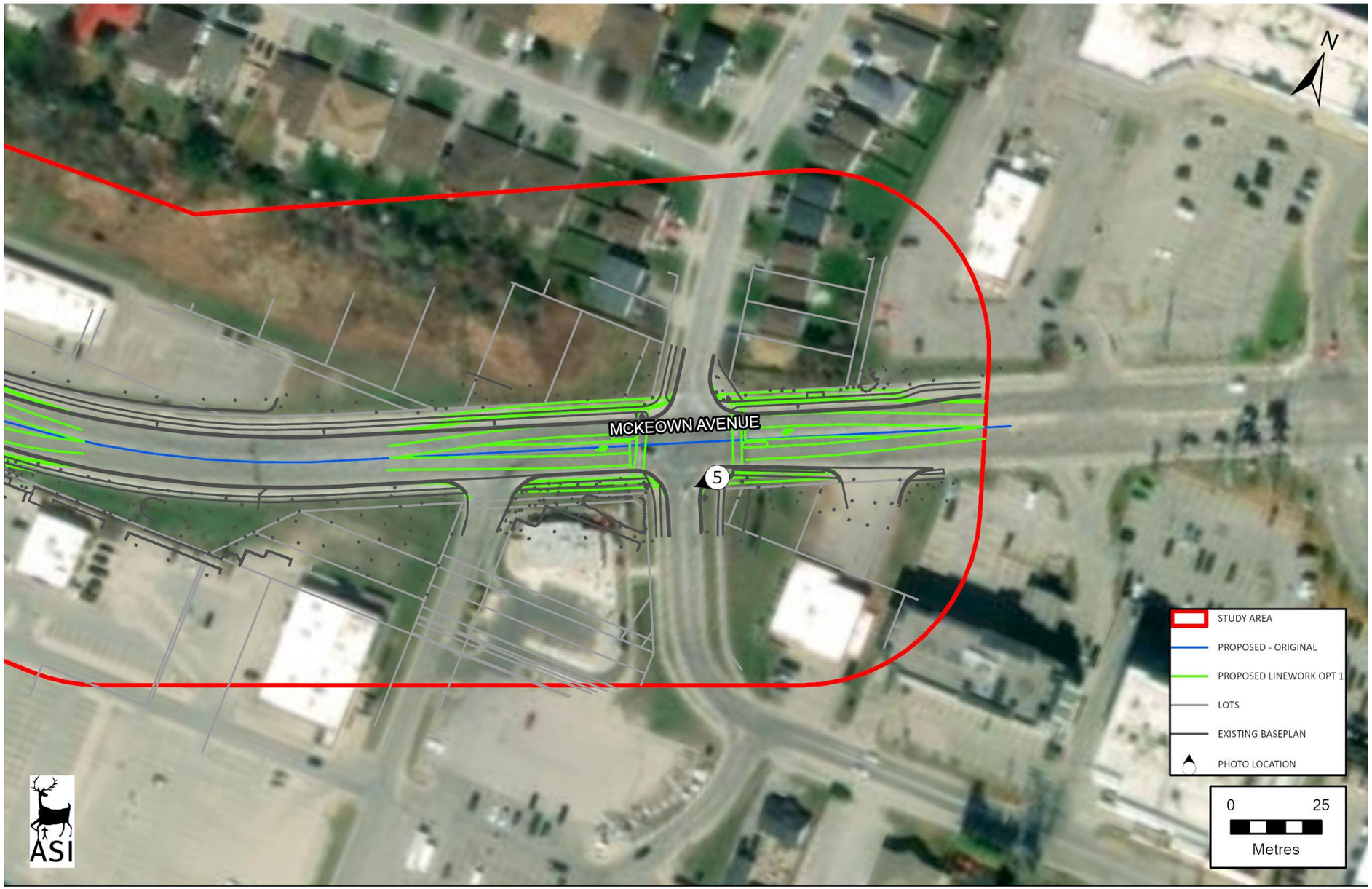


Figure 12: Map showing preliminary design and plate locations (Sheet 4)

6.0 Results and Mitigation Recommendations

The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with a rural land use history dating back to the early twentieth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no known built heritage resources (B.H.R.s) and no known cultural heritage landscapes (C.H.L.s) in the McKeown Avenue Reconstruction Municipal Class Environmental Assessment Addendum study area. No additional potential B.H.R.s or C.H.L.s were identified during the background information review and fieldwork.

6.1 Key Findings

No B.H.R.s or C.H.L.s were identified within the study area.

6.2 Recommendations

Based on the results of the assessment, the following recommendations have been developed:

1. Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential B.H.R.s and C.H.L.s.

2. This report should be submitted to the City of North Bay and the Ministry of Citizenship and Multiculturalism for review and comment, and any other local heritage stakeholders that may have an interest in this project. The final report should be submitted to the City of North Bay for their records.

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APPENDIX 7

STAGE 1 ARCHAEOLOGICAL REPORT



Stage 1 Archaeological Assessment McKeown Avenue Reconstruction (Lots 21-22, Concessions B-C, Geographical Widdifield Township) City of North Bay, District of Nipissing

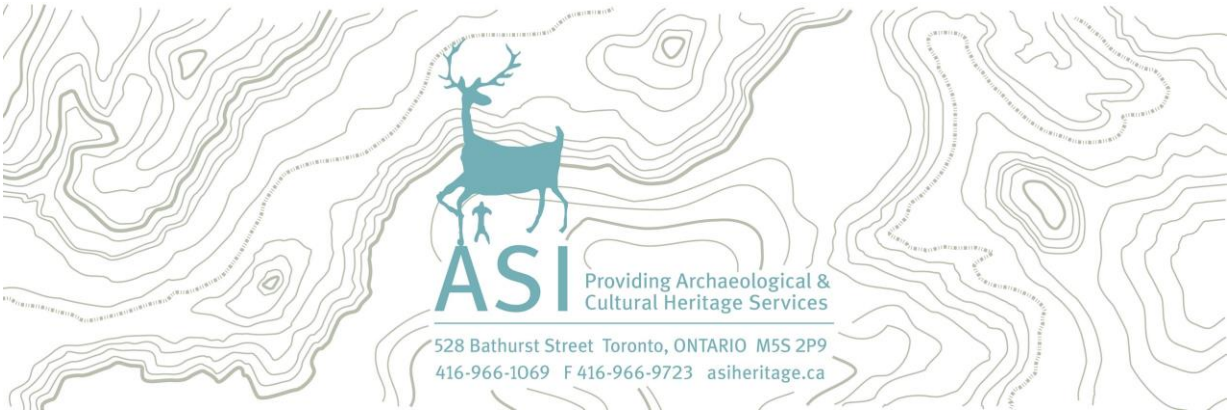
Original Report

Prepared for:

R.V. Anderson Associates Limited
43 Church Street, Suite 104
St. Catharines Ontario L2R 7E1

Archaeological Licence: P094 (Merritt)
PIF P094-0344-2023
Archaeological Services Inc. File: 22EA-299

May 5, 2023



Executive Summary

Archaeological Services Inc. was contracted by R.V. Anderson Associates Limited, on behalf of the Corporation of City of North Bay, to conduct a Stage 1 Archaeological Assessment as part of the McKeown Avenue Reconstruction project in the City of North Bay. This project involves proposed reconstruction of McKeown Avenue from Gormanville Road roundabout approach to Champlain Street. This includes the widening of McKeown Avenue to four lanes, adding a multi-use pathway on the southside and the replacement of current stormwater and sanitary sewer systems.

The Stage 1 Study Area is a 50-metre buffer from the centreline of McKeown Avenue, from east of Gormanville Road roundabout approach to Champlain Street.

The Stage 1 background study determined seven previously registered archaeological sites are located within one kilometre of the Study Area, none of which are located within 50 metres. Part of the Study Area is within 50 metres from a modern water source and, if impacted, will require Stage 2 test pit survey as per Section 2.1.5 Standard 1. The proposed project impacts are within the disturbed McKeown Road right-of-way. The property inspection determined that the remainder of the Study Area does not require further assessment.

The following recommendations are made:

1) Parts of the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals as per S & G Section *2.1.5 Alternative Strategies for Special Survey Conditions: Test Pit Survey in Northern Ontario and on Canadian Shield Terrain*. Stage 2 is required prior to any proposed construction activities on these lands;

2) Part of the Study Area is beyond 150 metres from any features indicating archaeological potential and does not require Stage 2 Archaeological Assessment as per S & G Section 2.1.5, Standard 1.;

3) The remainder of the Study Area do not retain archaeological potential on account of deep and extensive land disturbance or being previously assessed. These lands do not require further archaeological assessment; and,

4) Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

Project Personnel

- **Senior Project Manager**: Lisa Merritt, MSc. (P094) Partner, Director, Environmental Assessment Division
- **Project Manager**: Eliza Brandy, MA (R1109), Associate Archaeologist, Project Manager, Environmental Assessment Division
- **Project Director**: Lisa Merritt
- **Division Coordinator**: Katrina Thach, BA Hons. (R1225), Associate Archaeologist, Division Coordinator, Environmental Assessment Division
- **Project Administrator**: Catherine Kitchen, BA, Archaeologist, Project Administrator, Environmental Assessment Division
- **Field Director**: Blake Williams, MLitt (P383), Lead Archaeologist, Project Manager, Environmental Assessment Division
- **Report Preparation**: Danielle Bella, BA Hons., Archaeologist, Technical Writer, Environmental Assessment Division
- **Graphics**: Robin Latour, MPhil, PDip, Associate Archaeologist, Geomatics Specialist, Operations Division; Jonas Fernandez, MSc (R281), Lead Archaeologist, Manager - Geomatics, Operations Division; Carolyn Nettleton, BA, Archaeologist, GIS Technician, Operation Division
- **Report Review**: Lisa Merritt; Eliza Brandy

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1.0 Project Context

Archaeological Services Inc. (ASI) was contracted by R.V. Anderson Associates Limited, on behalf of the Corporation of City of North Bay, to conduct a Stage 1 Archaeological Assessment as part of the McKeown Avenue Reconstruction project in the City of North Bay. This project involves proposed reconstruction of McKeown Avenue from Gormanville Road roundabout approach to Champlain Street. This includes the widening of McKeown Avenue to four lanes, adding a multi-use pathway on the southside and the replacement of current stormwater and sanitary sewer systems (see Appendix A for proposed designs).

The Stage 1 Study Area is a 50-metre buffer from the centreline of McKeown Avenue, from east of Gormanville Road roundabout approach to Champlain Street (Figure 1).

All activities carried out during this assessment were completed in accordance with the *Ontario Heritage Act* (Ontario Heritage Act, R.S.O. c. O.18, 1990, as amended in 2019) and the 2011 *Standards and Guidelines for Consultant Archaeologists* (S & G), administered by the Ministry of Citizenship and Multiculturalism (MCM 2011).

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act, RSO* (Environmental Assessment Act, R.S.O. c. E.18, 1990 as amended 2021) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted in accordance with the Municipal Engineers' Association document *Municipal Class Environmental Assessment* (2023, as amended 2015).

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted by R.V. Anderson & Associates Limited on January 25, 2023.

1.1.1 Treaties

The Study Area is within the Robinson-Huron Treaty 61. In 1850, the Robinson-Huron treaty was signed in Baawating (Sault Ste. Marie) by the Lake Huron Chiefs and leaders of the Anishinaabeg signatory First Nations ceding the Lake Huron shoreline, including the islands, from Matchedash Bay to Batchewana Bay, and inland as far as the height of land, for resource extraction and settlement (Surtees, 1986). One of the signatories was Anishinaabe Chief Shingwaukonse (Little Pine) (1773-1854), veteran of the War of 1812 who had helped establish Garden River First Nation. While settlement was restricted to the established reserves, "the full and free privilege to hunt over the territory [then] ceded by them and to fish in the waters thereof as they have heretofore been in the habit of doing" was retained in the Treaty for the first time in treaty making history, as well as cash payment for annuities (Surtees, 1971, 1986).

During the negotiations of the Robinson Treaty, the Métis lost much of their rights, particularly regarding their land, despite having strong support from Chief Shingwaukonse from Garden River. However, regardless of the Crown's treatment of the Métis, the Ojibway continued to regard the Métis as having the same rights as them (Lytwyn, 1998; Préfontaine, 2003). It was also generally assumed that in spite of the Robinson Treaty, the Métis would continue to have the right to hunt and fish. This was evident in the nineteenth century census data which showed the occupation of many Métis as hunters, fishermen, trappers and traders. Although mostly removed from the core due to the inability to own land, the Métis continued to live on the outskirts of Sault Ste. Marie (Lytwyn 1998).

1.2 Historical Context

1.2.1 Indigenous Land Use and Settlement

Northern Ontario was occupied by human populations much later than the south. The Laurentide glacier would have retreated above the Study Area by approximately 10,500-10,000 before present (B.P.) (Karrow & Warner, 1990, p. Fig 2.9, 2.11). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000

B.P., the environment had progressively warmed and populations now occupied less extensive territories (Ellis & Deller, 1990, pp. 62–63).

Between approximately 10,000-5,500 B.P., the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 B.P.; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest evidence for cemeteries dates to approximately 4,500-3,000 B.P. and is indicative of increased social organization, investment of labour into social infrastructure, and the establishment of socially prescribed territories (Brown, 1995, p. 13; Ellis et al., 1990, 2009). By approximately 3,500 B.P., copper implements become common in the areas surrounding Lake Superior, and there is evidence of the exchange of copper into southern Ontario (Wright 2001:261, 262).

Between 3,000-2,500 B.P., populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 B.P. and exchange and interaction networks broaden at this time (Spence et al., 1990, pp. 136, 138) and by approximately 2,000 B.P., evidence exists for small community camps, focusing on the seasonal harvesting of resources (Spence et al., 1990, pp. 155, 164). As is clear in the detailed ethnographies of Anishinaabeg populations, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

Remains from Laurel-period (2,200–1,200 B.P.) archaeological sites show a strong riverine and lake adaptation. The subsistence strategies during this period involved, like the Archaic period, a wide range of faunal and floral

resources. Seasonal gatherings of people for subsistence and social purposes began to occur during this period, resulting in the appearance of large settlements at prime fishing locations. A Middlesex burial mound occurs in the Killarney area northeast of Georgian Bay, and later Laurel mounds are known from the Rainy River area of northwestern Ontario, indicating a strongly developed mortuary practice influenced by the Hopewell groups of the Ohio valley. The grave offerings associated with these burials continued to place an emphasis upon the exotic origin of raw materials. These developments suggest that changes first evidenced in the preceding Early Woodland period continued to develop and be expanded upon.

Before the European arrival, extensive exchange systems had already developed between the Anishinaabe and Cree of north-central and northeastern Ontario and the Huron-Wendat and other Iroquoian groups to the south. The end of the Late Woodland period in northern Ontario is marked by the appearance of European Trade goods circa 1600 C.E.

1.2.2 Post-Contact Settlement

Historically, the Study Area is located in the Geographical Widdifield Township, in Lots 21-22 & Concessions B-C.

The S & G stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches, and early cemeteries are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the Ontario Heritage Act or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those that are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be located in proximity to water. The development of the network of concession roads and railroads through the course of the nineteenth century frequently influenced the siting of farmsteads and businesses. Accordingly,

undisturbed lands within 100 metres of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes followed existing Indigenous trails, both along the lakeshore and adjacent to various creeks and rivers (ASI 2006).

Widdifield Township

The independent Township of Widdifield was first surveyed in 1883 by Alexander Niven. It was named for Joseph H. Widdifield, the Member of Provincial Parliament for the riding of York North in the 1870s and 1880s. One of the first recorded European settlers to arrive in the Township in 1884 was G.W. Bartlett, who later became superintendent of Algonquin Park. In order to organize the Township in 1885, 20 voters from neighbouring Ferris Township were "borrowed" to meet the requisite number of 60—the law at the time specified the number of required voters but not from where they must come (Gard, 1909; Mika & Mika, 1983).

The first Reeve of the Township of Widdifield was George Fee and C.W. Thompson was it's first Clerk. North Bay officially separated from the township in 1891 when the village incorporated as a town. In 1968, what remained of Widdifield Township was amalgamated with West Ferris and the Town of North Bay to create the City of North Bay in 1968 (Gard, 1909; Taschner, 2023).

City of North Bay

The community of North Bay was established around the old 'Nipissing Passageway', part of the northern route travelled by fur traders, missionaries, and explorers for more than 200 years. Etienne Brulé visited the region in 1610, followed by Father LeCaron and Samuel de Champlain in 1615. Trading posts

were established in the area, but Euro-Canadian settlement did not progress until the arrival of the Canadian Pacific Railway in 1882 (Mika & Mika, 1983, p. 63).

In 1881, John Ferguson visited the area and decided that the north bay of Lake Nipissing was a promising spot for settlement. He was to play a considerable role in the town's development and even inadvertently contributed its name by directing a shipment of building material to be sent to him at the "north bay". Business enterprises began to sprout around the railway yards, and the construction of the Canadian Pacific Railway resulted in a population surge (Mika & Mika, 1983).

With the construction of the Temiskaming and Northern Ontario Railway (now Ontario Northland Railway) in 1905, North Bay became a distribution centre and the vital link between the northern resources and the markets to the south and west (Mika & Mika, 1983).

1.2.3 Map Review

The 1889 Rand, McNally & Company's map of Ontario (Rand, McNally & Co., 1889), 1943 Topographic Map North Bay Sheet (Department of National Defence, 1943), 1965 Topographic Map North Bay Sheet (Department of Mines and Technical Surveys, 1965), 1877 Topographic Map North Bay Sheet (Department of Energy, Mines and Resources, 1977), and the 1986 National Topographic Series North Bay Sheet (Energy, Mines and Resources Canada, 1986) were examined to determine the presence of historic features within the Study Area during the nineteenth and twentieth centuries (Figures 2-5).

The 1889 map (Figure 2) shows the approximate location of the Study Area in North Bay, indicating that the North Bay station had been constructed on the railway connecting other communities along the northern shore of Lake Nipissing.

The 1943 map (Figure 3) shows the Study Area along an unopened road allowance between Gormanville Road and Algonquin Avenue that would become McKeown Avenue. Gormanville Road is depicted as a north-south

oriented road which jogs to the west north of the Study Area. Algonquin Avenue is depicted as a north-south oriented road which diverts northwest to the north of the Study Area. Two structures are shown adjacent the Study Area.

The 1965 map (Figure 4) depicts McKeown Avenue as a straight west-east oriented road between Gormanville Road and Algonquin Avenue. A side road diverts north from McKeown Avenue within the western portion of the Study Area. Trans Canada Highway 17 is depicted as a diagonal northwest to southeast oriented road located south of the Study Area. A power transmission line is shown within the eastern half of the Study Area, north of McKeown Avenue. One structure is shown within the Study Area, and two adjacent.

The 1977 map (Figure 5) shows the side road veers west to join with Gormanville Road, and a second sideroad extends north from McKeown Avenue and veers west to join with the other sideroad. Three large industrial buildings are built off these sideroads, parts within the western portion of the Study Area. A truck inspection station has been constructed off Trans Canada Highway 17, with weigh scale labeled, adjacent to the Study Area. Five Structures are shown within the Study Area south of McKeown Avenue. Cartier Street is depicted.

The 1986 map (Figure 6) shows residential development labelled Thibeault Terrace encroaching into the Study Area north of McKeown Avenue. The 1986 map shows that McKeown Avenue meets Gormanville Road in a T shaped intersection to the west of the Study Area, and in the east end McKeown Road continues in a straight west-east alignment to intersect with Algonquin Avenue.

1.2.4 Aerial and Orthoimagery Review

A review of available Google satellite imagery shows:

- A car dealership was constructed in 2015 on the south side of the road at 600 McKeown Avenue (Image 27 to Image 28);
- Buildings were demolished at 850 McKeown Avenue between 2004 and 2008 (Image 29 to Image 30);
- Commercial plaza constructed at 789 McKeown Avenue by 2013 (Image 30);

- Construction of plazas at 850 McKeown Avenue in 2015 (Image 31).

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Study Area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research: the site record forms for registered sites available online from the MCM through "Ontario's Past Portal"; published and unpublished documentary sources; and the files of ASI.

1.3.1 Geography

In addition to the known archaeological sites, the state of the natural environment is a helpful indicator of archaeological potential. Accordingly, a description of the physiography and soils are briefly discussed for the Study Area.

The S & G stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario since 5,000 B.P. (Karrow & Warner, 1990, fig. 2.16), proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has

been one of the most commonly used variables for predictive modeling of site location.

Other geographic characteristics that can indicate archaeological potential include elevated topography (eskers, drumlins, large knolls, and plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential (S & G, Section 1.3.1).

The Study Area is within the Canadian Shield region, consisting of bedrock which dominates the landscape from the early Precambrian era. The region has low relief with numerous small lakes and locally abundant outcrops. Sparse forests comprised of black spruce, balsam fir and tamarack are typical of the Canadian Shield. Parts of the area is covered by drumlins and glacial till, with overburden from one to ten metres deep (Fladgate Exploration Consulting Corporation, 2012, p. 26).

Figure 7 demonstrates that the Study Area is underlain by Precambrian bedrock and Pleistocene glaciolacustrine deposits of sand, gravelly sand and gravel, nearshore and beach deposits (Ontario Geological Survey, 2010).

Lake Nipissing is approximately 1.3 kilometres south of the Study Area. A channelized portion of a tributary of Lake Nipissing intersects the western portion of the Study Area. The Study Area is within the Lake Nippissing Shoreline/North Bay subwatershed of the Lake Nipissing Watershed.

1.3.2 Previously Registered Archaeological Sites

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database maintained by the MCM. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and

longitude. A Borden block is approximately 13 kilometres east to west, and approximately 18.5 kilometres north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The Study Area under review is located in Borden blocks *CbGu* and *CcGu.*

According to the Ontario Archaeological Sites Database, seven previously registered archaeological sites are located within one kilometre of the Study Area, none of which are located within 50 metres (MCM 2023). A summary of the sites is provided below in Table 1.

Table 1: Registered Sites within One Kilometre of the Study Area

Borden number	Site Name	Temporal/ Cultural Affiliation	Site type	Researcher
CcGu-4	Monastery 3	Archaic, Early	Beach, campsite, scatter	Swayze 2014
CcGu-5	M-2	Archaic, Early	Beach, campsite	Swayze 2014
CcGu-6	M1	Archaic, Early	Beach, campsite	Swayze 2014
CcGu-7	Quartz Extraction	Archaic, Early	Quarry, scatter	Swayze 2014
CcGu-8	Ridge	Archaic, Early	Beach, campsite	Swayze 2014
CcGu-9	Not Applicable	Archaic, Early	Beach, campsite	Swayze 2014

Borden number	Site Name	Temporal/ Cultural Affiliation	Site type	Researcher
CcGu-10	Cedar Heights	Archaic, Early	Campsite	Swayze 2014

1.3.3 Previous Archaeological Assessments

ASI reviewed previous archaeological assessments that detail fieldwork within 50 metres of the Study Area.

(ASI 2008) Stage 1-2 Archaeological Assessment North Bay MTO Property Class Environmental Assessment, City of North Bay, District of Nipissing, Ontario. P223-006-2008.

The project area overlaps the western portion of the current Study Area, north of McKeown Avenue. The background research and property inspection determined the area to be disturbed and recommended that no additional archaeological work be required.

(ASI 2021) Stage 1-2 Archaeological Assessment Road Weather Information System Upgrades – Northern Region District of Rainy River City of Thunder Bay, District of Thunder Bay, District of Cochrane, District6 of Sudbury, Town of Bruce Mines, District of Algoma, Municipality of Killarney, District of Sudbury, City of North Bay, District of Nipissing, District of Parry Sound, Ontario. P383-0224-2020.

The project area is within 50 metres of the current Study Area, west of the Truck Inspection Station located north of Highway 17. The background research and property inspection determined the area to be disturbed. It was recommended to not retain archaeological potential and not require further archaeological assessment.

2.0 Property Inspection

2.1 Field Methods

A Stage 1 property inspection must adhere to the S & G, Section 1.2, Standards 1-6, which are discussed below. The entire property and its periphery must be inspected. The inspection may be either systematic or random. Coverage must be sufficient to identify the presence or absence of any features of archaeological potential. The inspection must be conducted when weather conditions permit good visibility of land features. Natural landforms and watercourses are to be confirmed if previously identified. Additional features such as elevated topography, relic water channels, glacial shorelines, well-drained soils within heavy soils and slightly elevated areas within low and wet areas should be identified and documented, if present. Features affecting assessment strategies should be identified and documented such as woodlots, bogs or other permanently wet areas, areas of steeper grade than indicated on topographic mapping, areas of overgrown vegetation, areas of heavy soil, and recent land disturbance such as grading, fill deposits and vegetation clearing. The inspection should also identify and document structures and built features that will affect assessment strategies, such as heritage structures or landscapes, cairns, monuments or plaques, and cemeteries.

The Stage 1 archaeological assessment property inspection was conducted under the field direction of Blake Williams (P383) of ASI, on April 19, 2023, in order to gain first-hand knowledge of the geography, topography, and current conditions and to evaluate and map archaeological potential of the Study Area. It was a systematic visual inspection from publicly accessible lands/public right-of-ways only and did not include excavation or collection of archaeological resources. Fieldwork was conducted when weather conditions were deemed clear with good visibility (overcast and eight degrees Celsius), per S & G Section 1.2., Standard 2. Field photography is presented in Section 7.0 (Image 1 to Image 26), and field observations are overlaid onto the existing conditions of the Study Area in Section 8.0 (Figure 9 to Figure 10).

2.2 Current Land Use and Field Conditions

McKeown Avenue is a paved, two-lane road which follows a largely east-west alignment. At the western end of the Study Area, McKeown Avenue angles northwest to connect to the Gormanville Road roundabout. The entrance and exit ramp of the roundabout are divided by a boulevard which extends into the Study Area. McKeown Avenue is bound by commercial and residential properties to the north, and commercial properties to the south. McNamara Street and Cartier Street terminate at McKeown Avenue in T-intersections. Champlain Street intersects McKeown Avenue, in the eastern portion of the Study Area, where McKeown curves northeast towards Algonquin Avenue (now part of the Trans Canada Highway 11). The McKeown Road detailed designs (see Appendix A) show the base plan in light grey. The base plan shows McKeown Roads existing conditions, including the rights-of-way, road edge, channelized tributary of Lake Nipissing, driveways, and a 300-millimetre watermain parallel to the McKeown Road northern right-of-way.

3.0 Analysis of Archaeological Potential

The S & G, Section 1.3.1, lists criteria that are indicative of archaeological potential. The Study Area meets the following criteria indicative of archaeological potential:

- Previously identified archaeological sites (See Table 1); and,
- Water sources: primary, secondary, or past water source (Unnamed watercourse)

According to the S & G, Section 1.4 Standard 1e, no areas within a property containing locations listed or designated by a municipality can be recommended for exemption from further assessment unless the area can be documented as disturbed. The Municipal Heritage Register was consulted and no property within the Study Area is Listed or Designated under the *Ontario Heritage Act*.

Modelling archaeological potential involves reconstructing natural and social environments of the past, reconstructing the life ways of various cultural groups that occupied these past environments, then examining relationships between

the life ways and the environment in order to predict the locations that may have been the focus of past human activity. By identifying the relationship between known sites and past environments, it is possible to select the factors that influenced site selection. However, while site selection may have been influenced by a few important variables, it was a complex decision-making process. Furthermore, given the lack of detailed archaeological research in the vicinity of the Study Area, modelling site potential for the Study Area can only be accomplished at a general, deductive level through reference to land-use patterns documented elsewhere. There are various methods for knowing about the past including the study of archaeological remains, documentary research and Indigenous knowledge. All of these contribute to a more complete and complimentary understanding of the past. This report focuses primarily on archaeological and documentary evidence and does not attempt to replace or minimize the importance or relevance of Indigenous based knowledge.

In the Canadian Shield in general there is an over-abundance of water, therefore, distance from water alone is not a useful predictive index. One must take into account other environmental features in addition to potable water to predict the location of sites. In order to develop a model that is relevant to the boreal nature of the Canadian Shield in which the Study Area is located, it is necessary to examine the existing Indigenous site database, as well as ethnographic or historic descriptions of Indigenous land use.

Lakes and large rivers are probably the most important foci of Indigenous settlement. Generally, lakes over 25 hectares are likely to be suitable for extended occupation, as the presence of a reliable fishery is a necessary prerequisite to settlement. While the general shoreline of a lake has potential for sites, certain shoreline features serve to enhance that potential: These include points of land, islands, river mouths and narrows, as well as secondary features such as rapids, falls, portages, and river mouths or confluences along rivers that drain to or from lakes greater than 25 hectares (ASI 2002).

Wetland areas within reasonable proximity to the primary features noted above may have the potential for sites related to hunting and plant collecting. Camps associated with wetlands would be located on well drained locations adjacent to

the wetland or on ridges that extend into wetland areas. Throughout the region, extensive areas of low-lying meadows and increasingly wetter, muck soils are present. Vegetation associated with low-lying wet areas, such as reed canary grass, cattails, and sedges are also present (Kaiser 1988).

Other geographic characteristics that can indicate pre-contact archaeological potential include: elevated topography (eskers, drumlins, large knolls, plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, and distinctive land formations that might have been special or spiritual places, for Indigenous populations such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use by Indigenous peoples, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas, prairie), and scarce raw materials (quartz, copper, ochre, or outcrops of chert) are also considered characteristics that indicate pre-contact archaeological potential.

Part of the Study Area has been previously assessed and does not require further archaeological assessments (Figure 9: areas highlighted in red).

In accordance with S & G Section 2.1.5 *Alternative Strategies for Special Survey Conditions: Test Pit Survey in Northern Ontario and on Canadian Shield Terrain, d*uring the Stage 2, areas of test pit survey may be reduced:

> Standard 1: Where the identified feature of archaeological potential is a modern water source, test pitting is required between zero and 50 metres from the feature. Space test pits at maximum intervals of five metres. Survey is not required beyond 50 metres.
>
> Standard 2: For features of archaeological potential other than modern water sources (eg., historic water sources such as glacial shorelines) test pitting is required as follows:
>
> a. Space test pits at maximum intervals of five metres between zero and 50 metres from the feature of archaeological potential

b. Space test pits at maximum intervals of 10 metres between 50 and 150 metres from the feature of archaeological potential

c. Survey is not required beyond 150 metres.

Standard 3: While maintaining standard survey grids as closely as possible, the consultant archaeologist may vary from standard survey grids as necessary, based on professional judgment. Document and explain the rationale for all variations in the Stage 2 report.

As per S & G Section 2.1.5 Standard 1, a buffer of 50 metres extending from known modern water sources (Figure 8: areas hatched in black) demonstrates that the part of the Study Area is within 50 metres of water sources and requires Stage 2 test pit survey at five metre intervals (Figure 9: areas highlighted in green).

As per S & G Section 2.1.5 Standard 2c, parts of the Study Area are not within 150 metres of other features of archaeological potential other than modern water sources. This was confirmed by the property inspection. These areas do not require Stage 2 survey (Image 8, Image 20 to Image 21, Image 23; Figure 9 to Figure 10: areas highlighted in teal).

The property inspection determined the remainder of the Study Area has been subjected to deep soil disturbance events due to construction of McKeown Road rights-of-way, construction of late twentieth and early twenty-first century commercial and residential properties, installation of a 300-millimetre watermain, and the channelization of a portion of a tributary of Lake Nipissing. According to the S & G Section 1.3.2 these areas do not retain archaeological potential (Image 1 to Image 7, Image 9 to Image 20, Image 22 to Image 26; Figure 9 to Figure 10: areas highlighted in yellow) and do not require further survey. The proposed grading limits are within the McKeown Road disturbed rights-of-way (see Figure 9 to Figure 10 grading limits and proposed linework).

3.1 Conclusions

The Stage 1 background study determined seven previously registered archaeological sites are located within one kilometre of the Study Area, none of which are located within 50 metres. Part of the Study Area is within 50 metres from a modern water source and, if impacted, will require Stage 2 test pit survey as per Section 2.1.5 Standard 1. The proposed project impacts are within the disturbed McKeown Road right-of-way. The property inspection determined that the remainder of the Study Area does not require further assessment.

4.0 Recommendations

The following recommendations are made:

1) Parts of the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals as per S & G Section *2.1.5 Alternative Strategies for Special Survey Conditions: Test Pit Survey in Northern Ontario and on Canadian Shield Terrain* (Figure 9: area highlighted in green). Stage 2 is required prior to any proposed construction activities on these lands;

2) Part of the Study Area is beyond 150 metres from any features indicating archaeological potential and does not require Stage 2 Archaeological Assessment as per S & G Section 2.1.5, Standard 1. (Figure 9 to Figure 10: areas highlighted in teal);

3) The remainder of the Study Area do not retain archaeological potential on account of deep and extensive land disturbance or being previously assessed. These lands do not require further archaeological assessment; and,

4) Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

NOTWITHSTANDING the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or

carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Archaeology Programs Unit of the Ministry of Citizenship and Multiculturalism should be immediately notified.

The above recommendations are subject to Ministry approval and it is an offence to alter any archaeological site without Ministry of Citizenship and Multiculturalism concurrence. No grading or other activities that may result in the destruction or disturbance of any archaeological sites are permitted until notice of MCM approval has been received.

5.0 Legislation Compliance Advice

ASI advises compliance with the following legislation:

- This report is submitted to the Ministry of Citizenship and Multiculturalism as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, RSO 2005, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological field work and report recommendations ensure the conservation, preservation, and protection of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Citizenship and Multiculturalism, a letter will be issued by the Ministry stating that there are no further concerns with regards to alterations to archaeological sites by the proposed development.

- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological field work on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the

Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) *of the Ontario Heritage Act*.

- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33, requires that any person discovering or having knowledge of a burial site shall immediately notify the police or coroner. It is recommended that the Registrar of Cemeteries at the Ministry of Consumer Services is also immediately notified.

- Archaeological sites recommended for further archaeological field work or protection remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, nor may artifacts be removed from them, except by a person holding an archaeological license.

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7.0 Images

7.1 Field Photography



Image 1: Area is disturbed, no potential.



Image 2: Area is disturbed, no potential.



Image 3: Area is disturbed, no potential.



Image 4: Area is disturbed, no potential.



Image 5: Area is disturbed, no potential.



Image 6: Area is disturbed, no potential.



Image 7: Area is disturbed, no potential.



Image 8: Area has low potential, Stage 2 is not required (S&G 2.1.5).



Image 9: Area is disturbed, no potential.



Image 10: Area is disturbed, no potential.



Image 11: Area is disturbed, no potential.



Image 12: Area is disturbed, no potential.



Image 13: Area is disturbed, no potential.



Image 14: Area is disturbed, no potential.



Image 15: Area is disturbed, no potential.



Image 16: Area is disturbed, no potential.



Image 17: Area is disturbed, no potential.



Image 18: Area is disturbed, no potential.



Image 19: Area is disturbed, no potential.



Image 20: Area beyond disturbed parking lot has low potential, Stage 2 is not required (S&G 2.1.5).



Image 21: Area has low potential, Stage 2 is not required (S&G 2.1.5).



Image 22: Area is disturbed, no potential.



Image 23: Area beyond disturbed right-of-way has low potential, Stage 2 is not required (S&G 2.1.5).



Image 24: Area is disturbed, no potential.



Image 25: Area is disturbed, no potential.



Image 26: Area is disturbed, no potential.

7.2 Historical Imagery



Image 27: 600 McKeown Avenue in 2013 (Google Earth Pro, 2018).



Image 28: 600 McKeown Avenue in 2015 (Google Earth Pro, 2018).



Image 29: 789 and 850 McKeown Avenue in 2004 (Google Earth Pro, 2018).

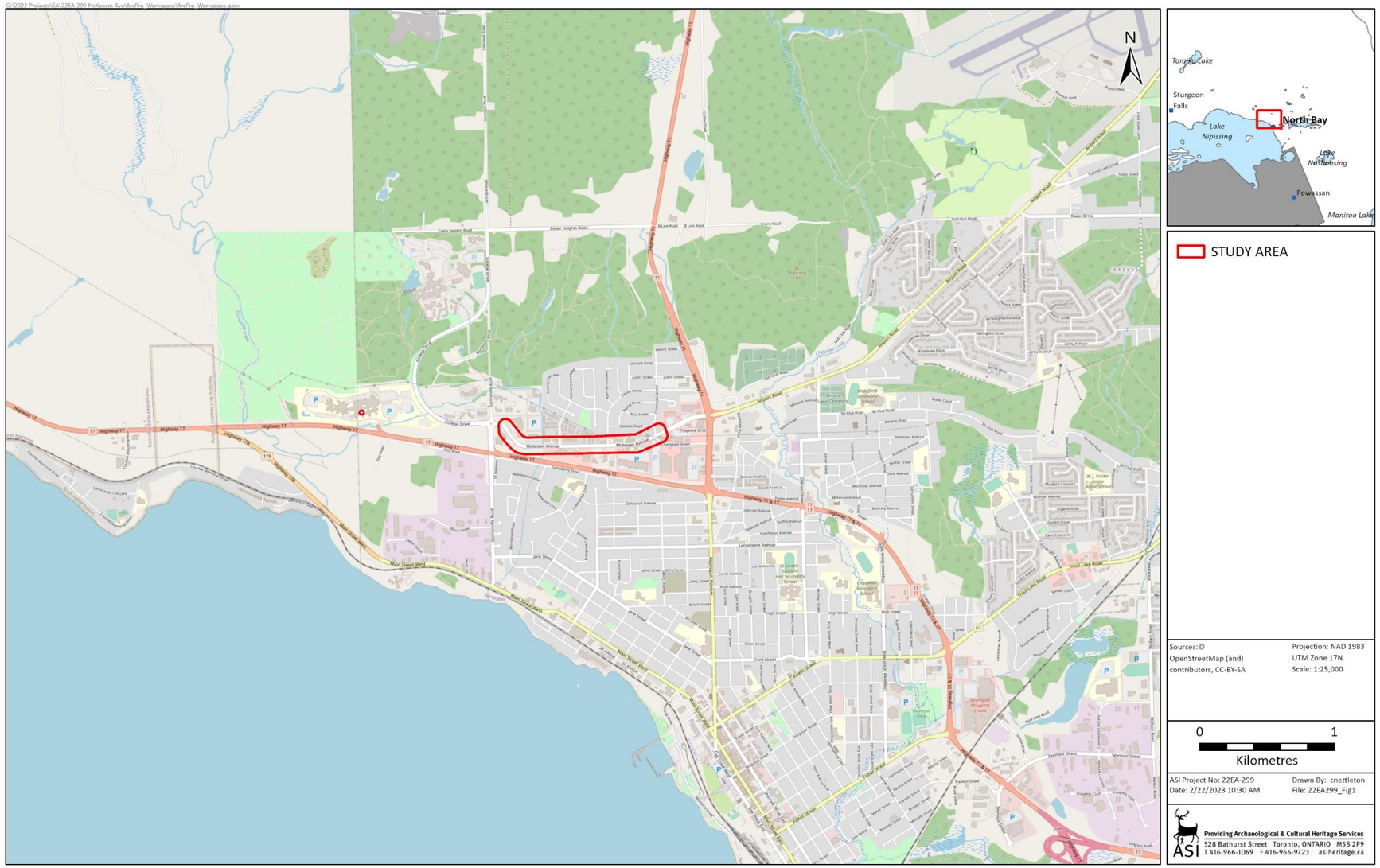


Image 30: 789 and 850 McKeown Avenue in 2013 (Google Earth Pro, 2018).



Image 31: 789 and 850 McKeown Avenue in 2015 (Google Earth Pro, 2018).

8.0 Maps



STUDY AREA

Sources:© OpenStreetMap (and) contributors, CC-BY-SA

Projection: NAD 1983 UTM Zone 17N
Scale: 1:25,000

0 1
Kilometres

ASI Project No: 22EA-299
Date: 2/22/2023 10:30 AM

Drawn By: cnettleton
File: 22EA299_Fig1

Providing Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T 416-966-1069 F 416-966-9723 asiheritage.ca

Figure 1: McKeown Avenue Study Area.



Figure 2: Study Area (Approximate Location) Overlaid on the 1889 Map of Ontario.

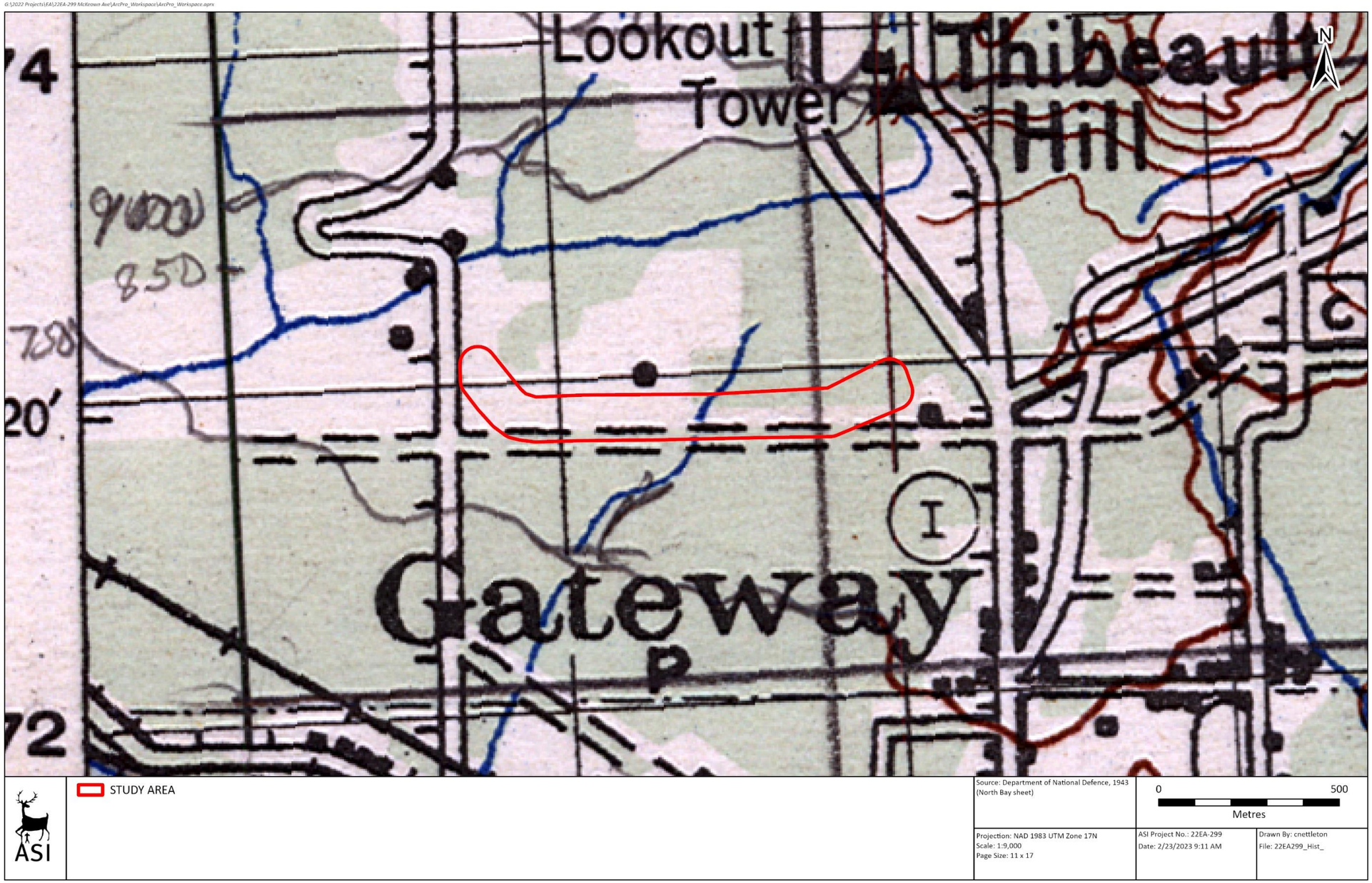


Figure 3: Study Area (Approximate Location) Overlaid on the 1943 Topographic Map North Bay Sheet.

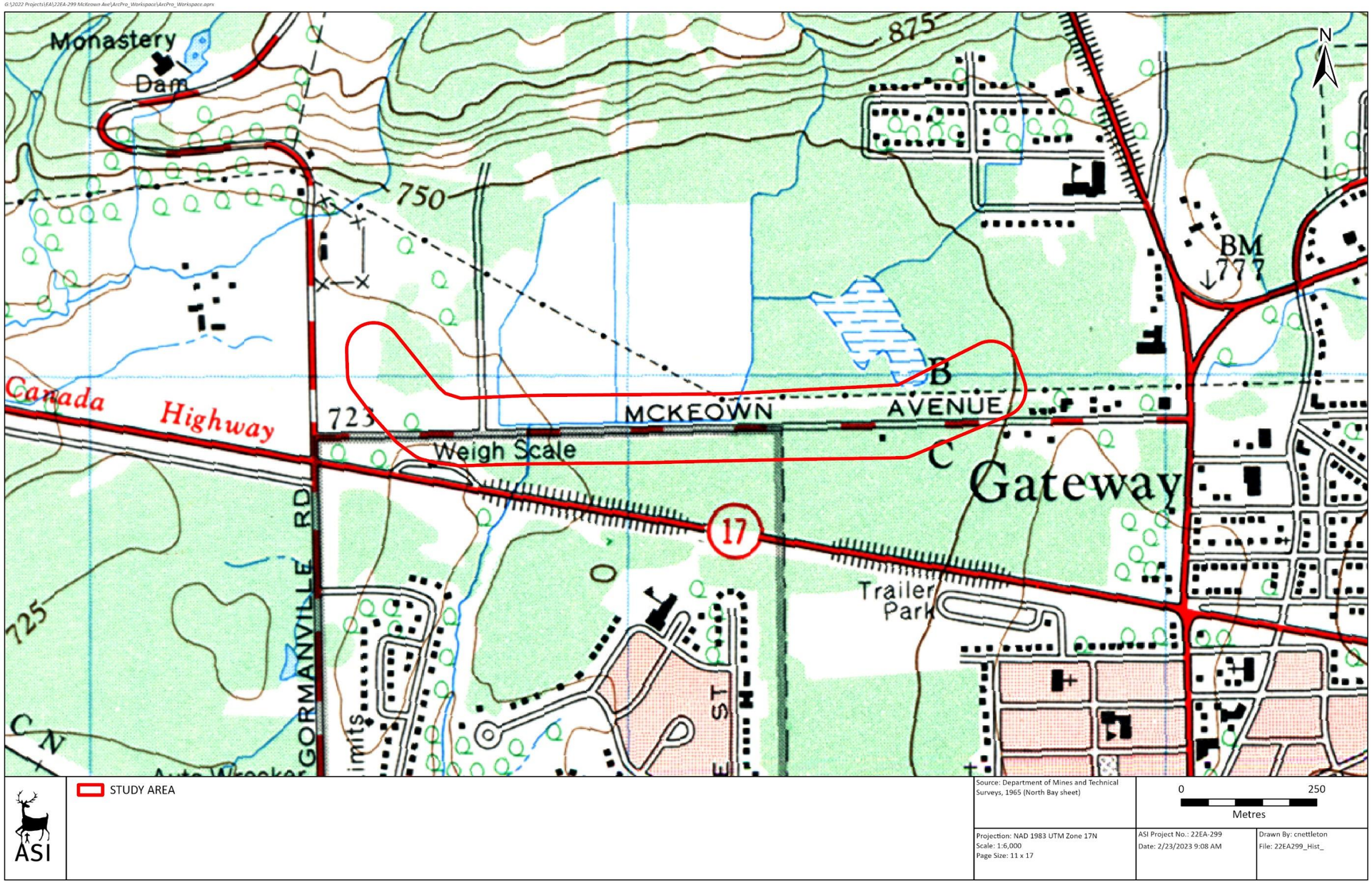


Figure 4: Study Area (Approximate Location) Overlaid on the 1965 Topographic Map North Bay Sheet.

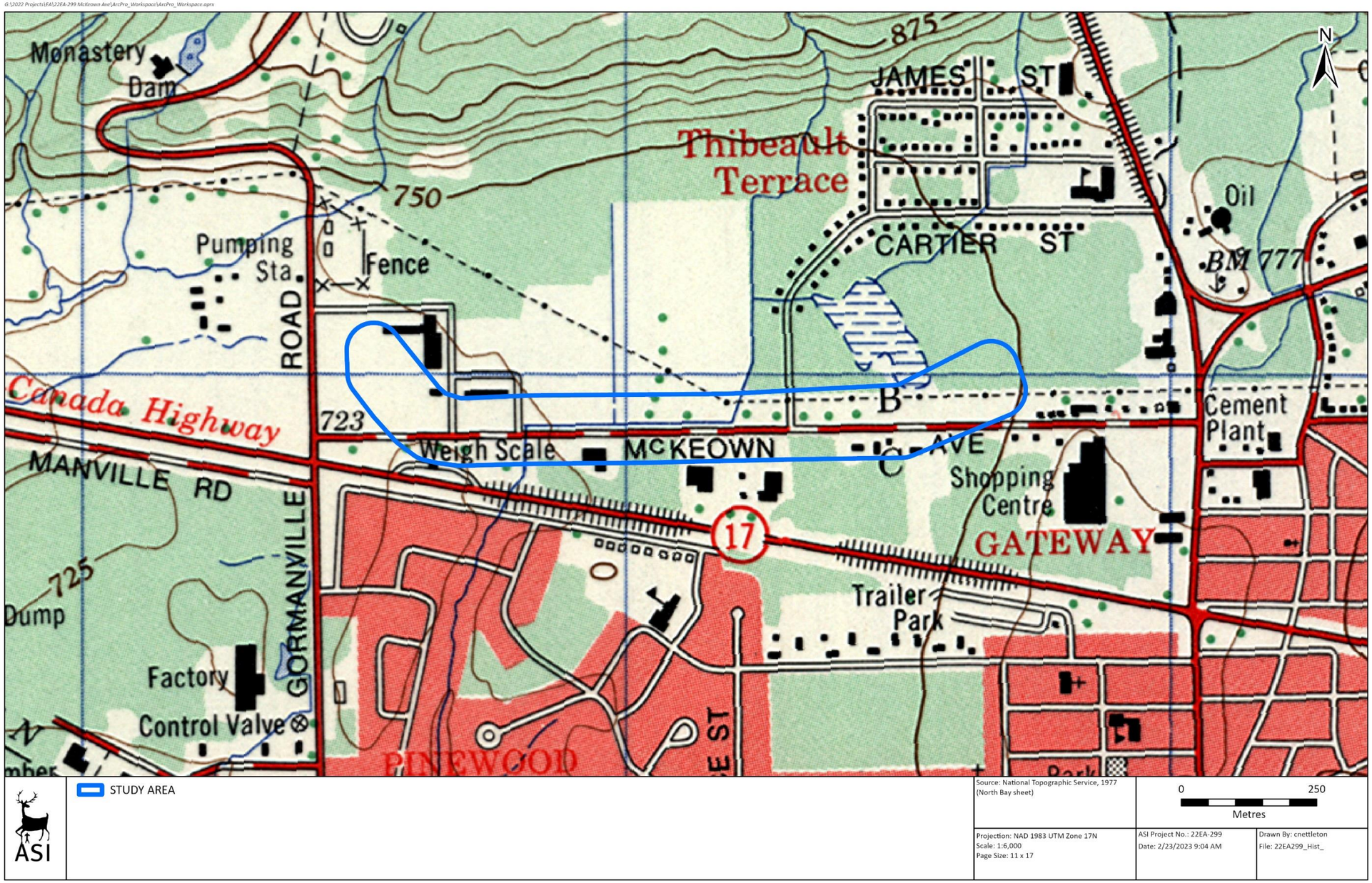


Figure 5: Study Area (Approximate Location) Overlaid on the 1977 National Topographic Series North Bay Sheet.

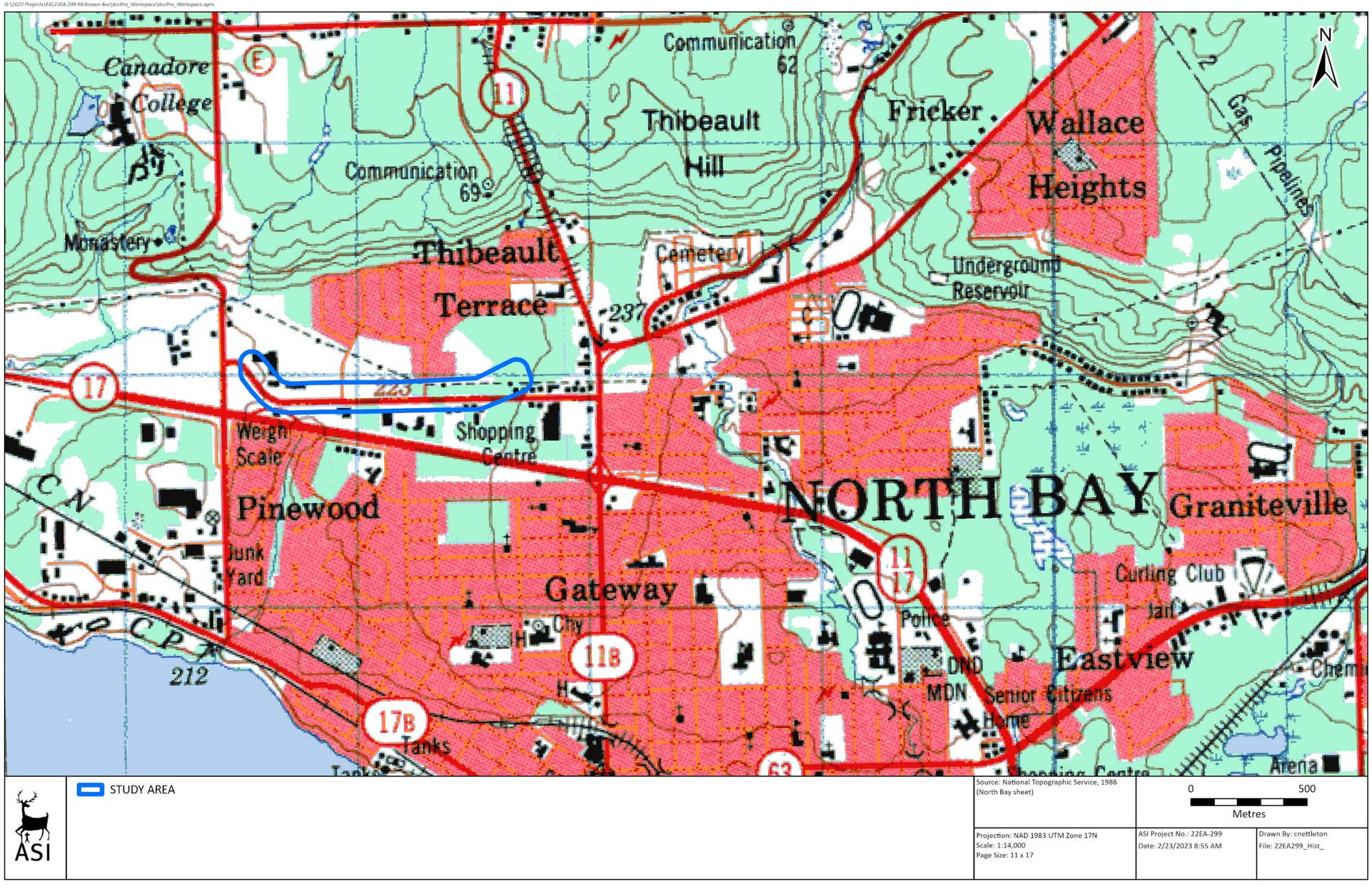


Figure 6: Study Area (Approximate Location) Overlaid on the 1986 National Topographic Series North Bay Sheet.



Figure 7: Study Area – Quaternary Geology.



Figure 8: McKeown Avenue Study Area – Results of Stage 1 (Key Map).

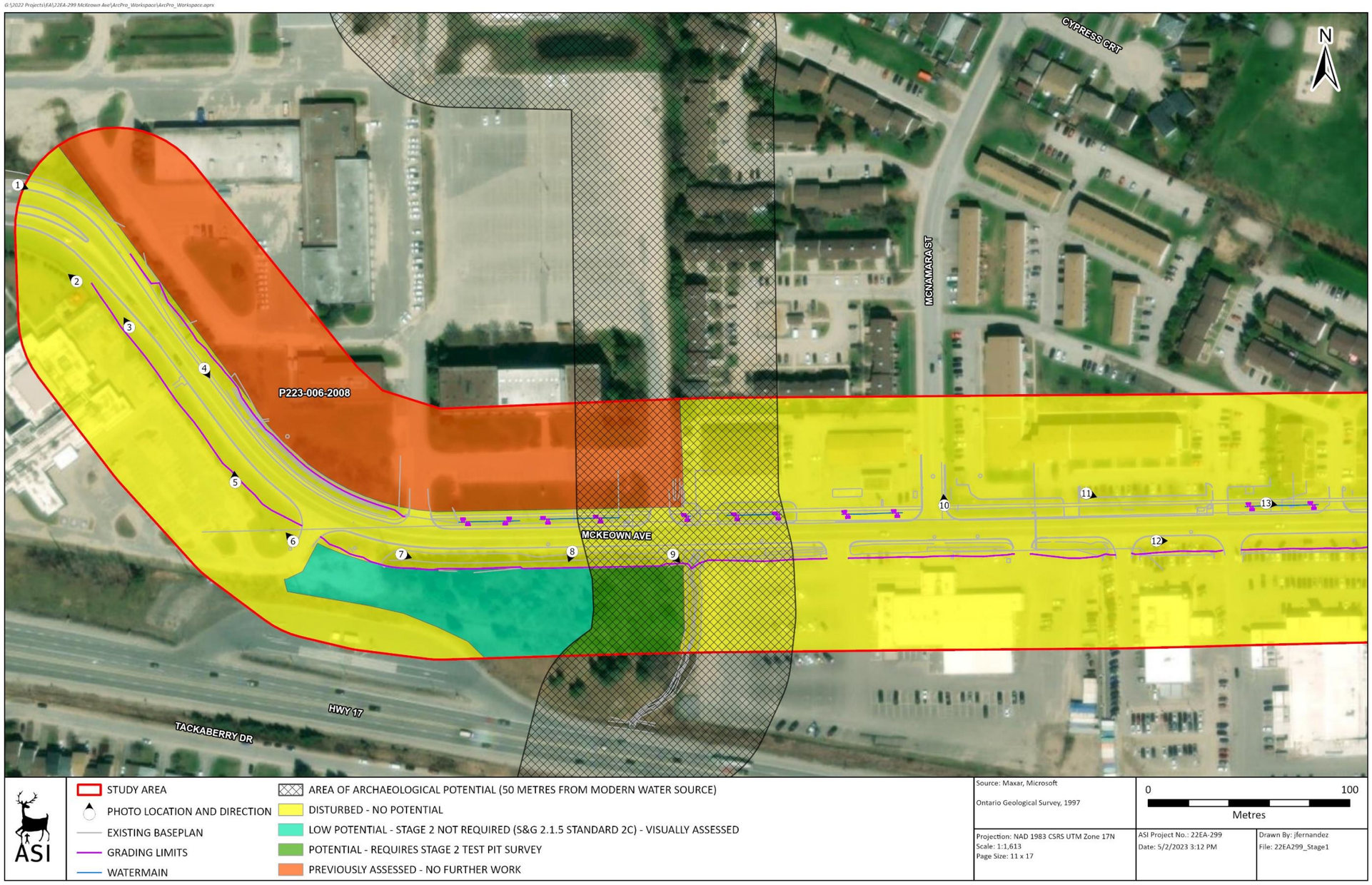


Figure 9: McKeown Avenue Study Area – Results of Stage 1 (Sheet 1).

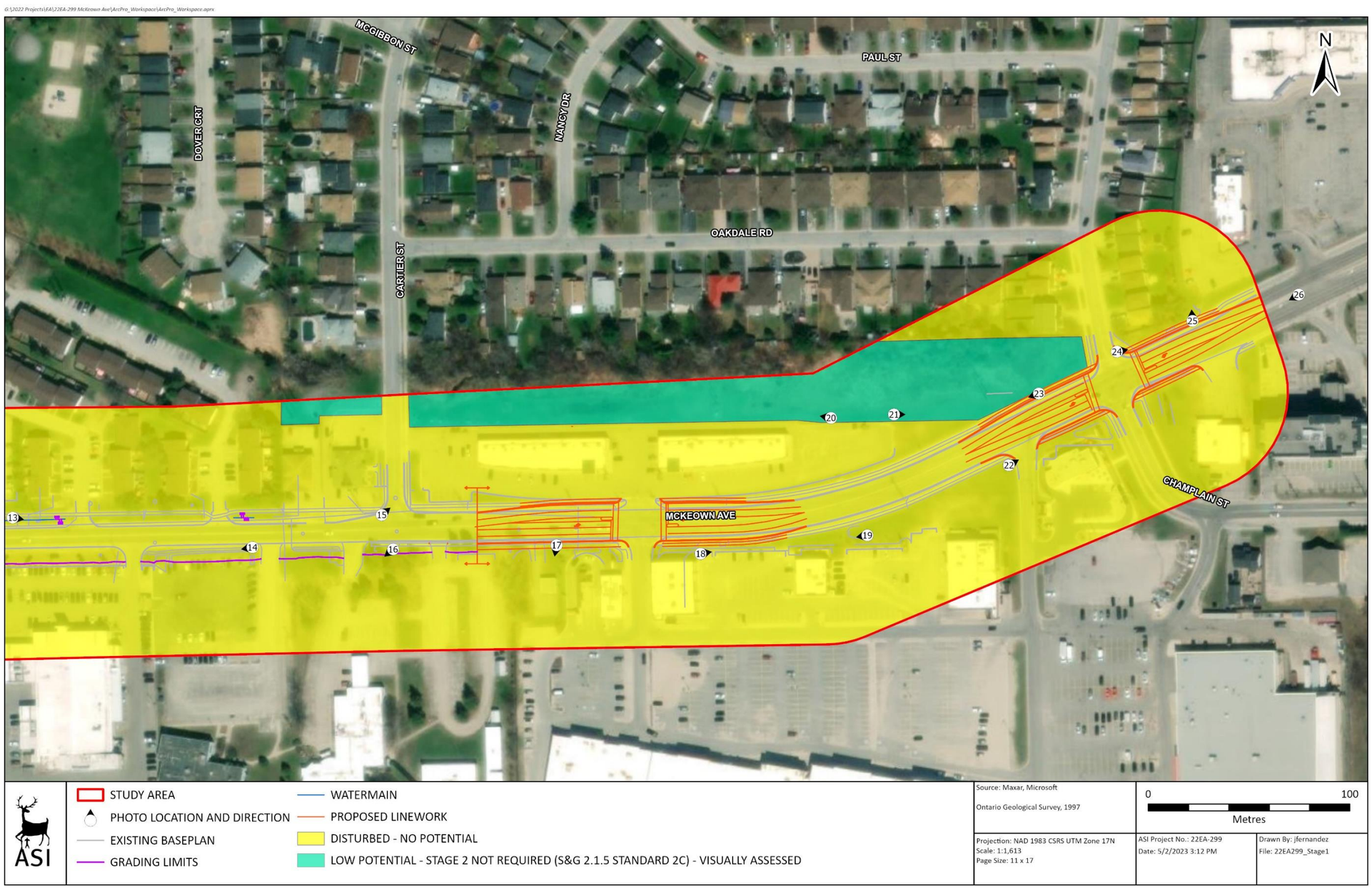


Figure 10: McKeown Avenue Study Area – Results of Stage 1 (Sheet 2).

Appendix A: McKeown Road Designs

NR–2465

36R–2909

PL2

PL1

3.6m BLVD
1.5m SW

EX. 300mm WATERMAIN

14.00

3.00 MULTI USE PATH

36R–8648

PL2

PL3

NR–308

(36R–12357)

MATCHLINE STA 0+560

PL25

PL28

PL27

PL30

PL33

PL50

P–2785–278

McNAMARA STREET

0+037

0+020

0+000

BLK"E"

BLK"F"

M-528

3.70m BLVD
1.5m SW

36R–7164

36R–5983

M-183

BLK"105"

CARTIER STREET

0+023

0+020

2.7m BLVD
1.5m SW

0+000

14.05

14.00

3.00m MULTI USE PATH

MATCHLINE STA 0+560

MATCHLINE STA 0+960

(36R–12289)

(36R–12437)

(36R–12420)

36R–3281

36R–13915

PL1

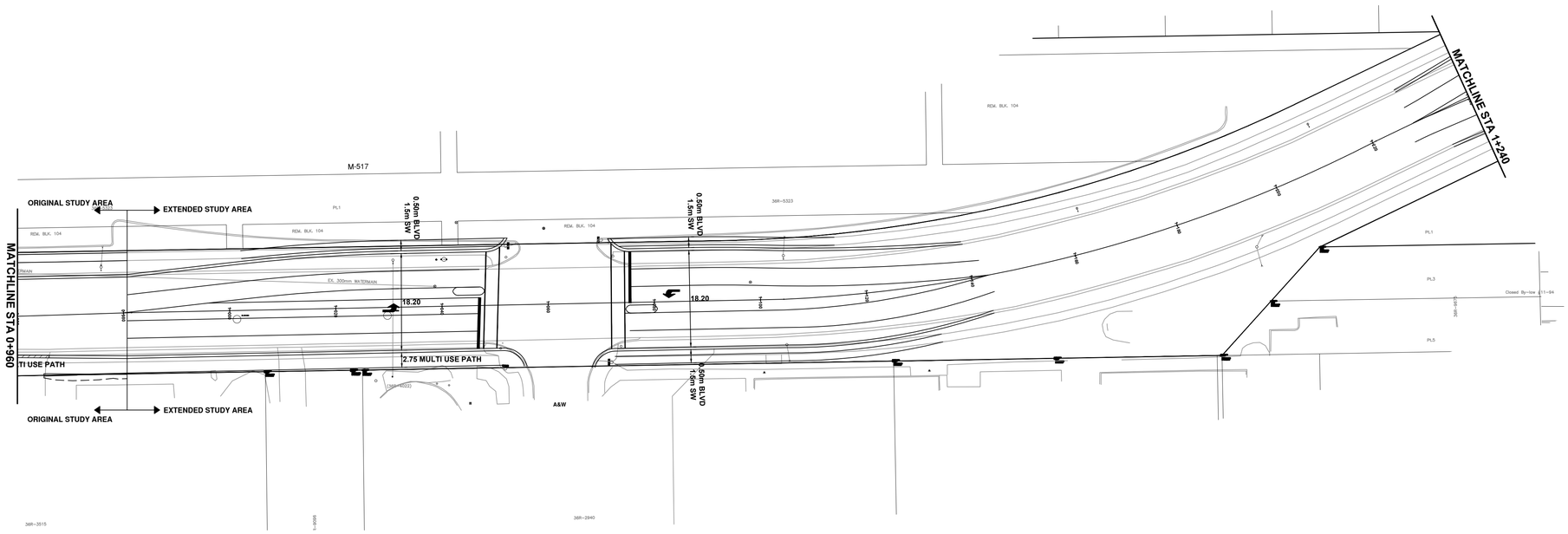
PL3

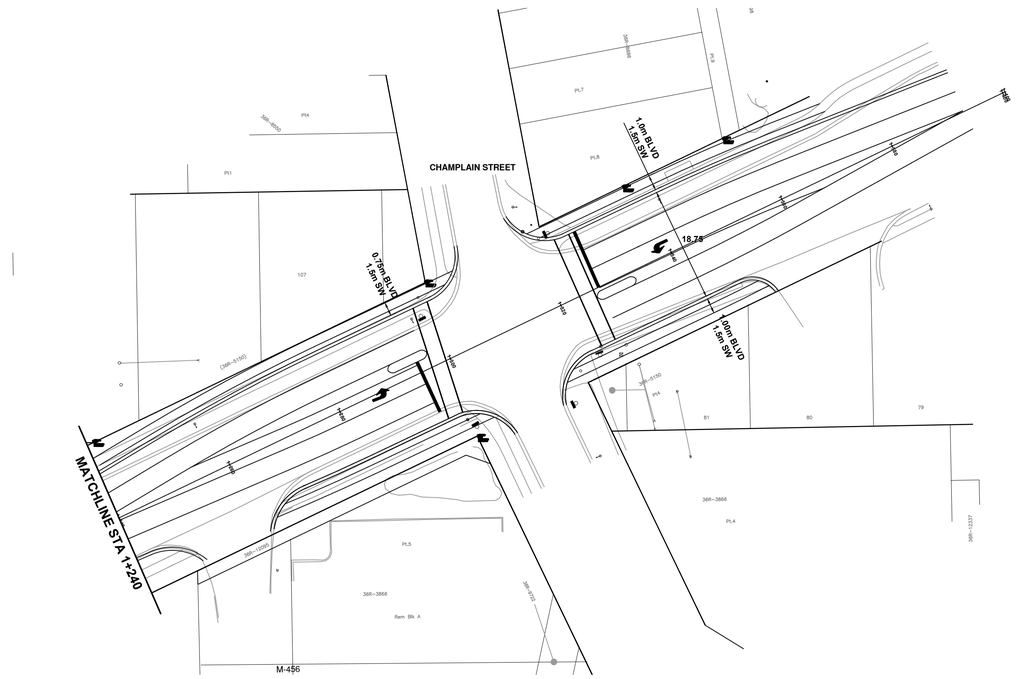
36R–12767

NRD–2060

5m 0 10m 20m

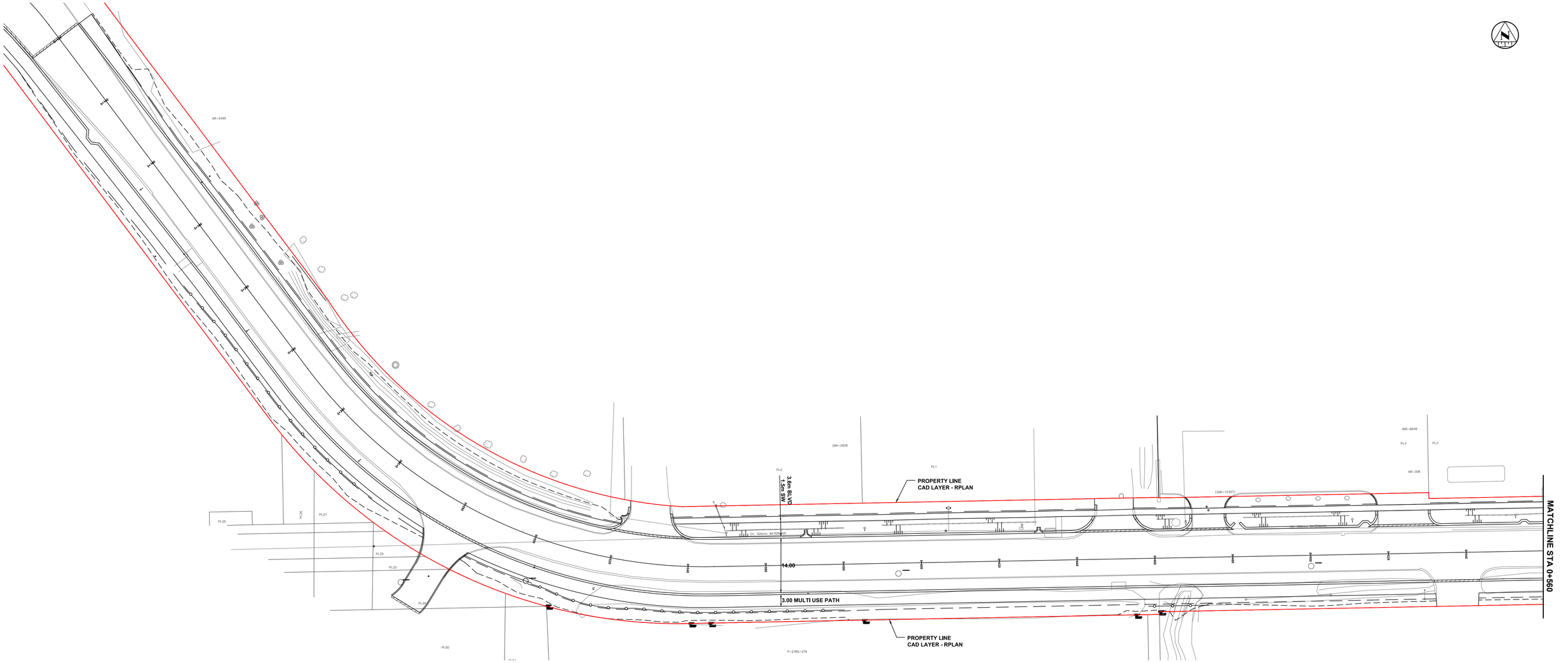
1:500

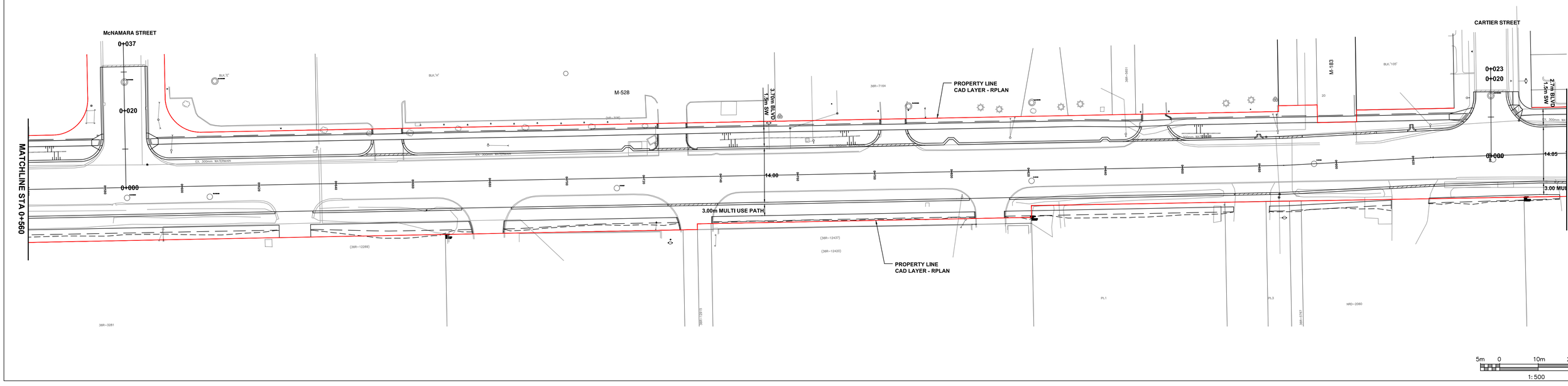


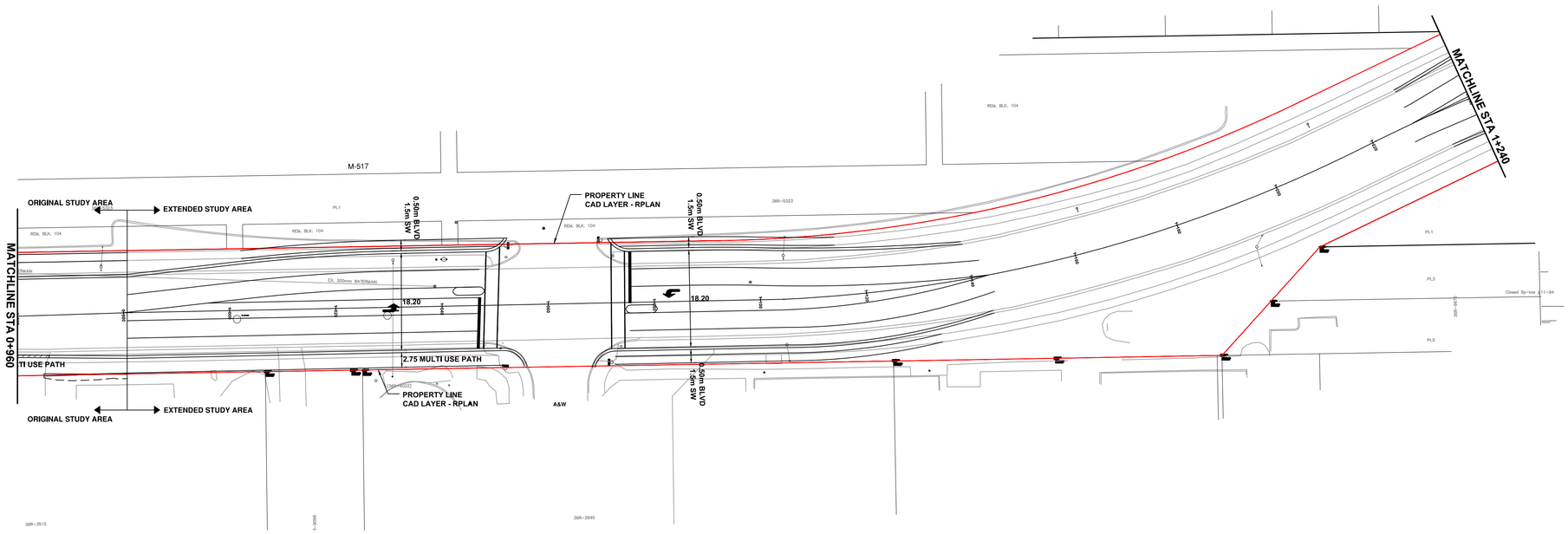


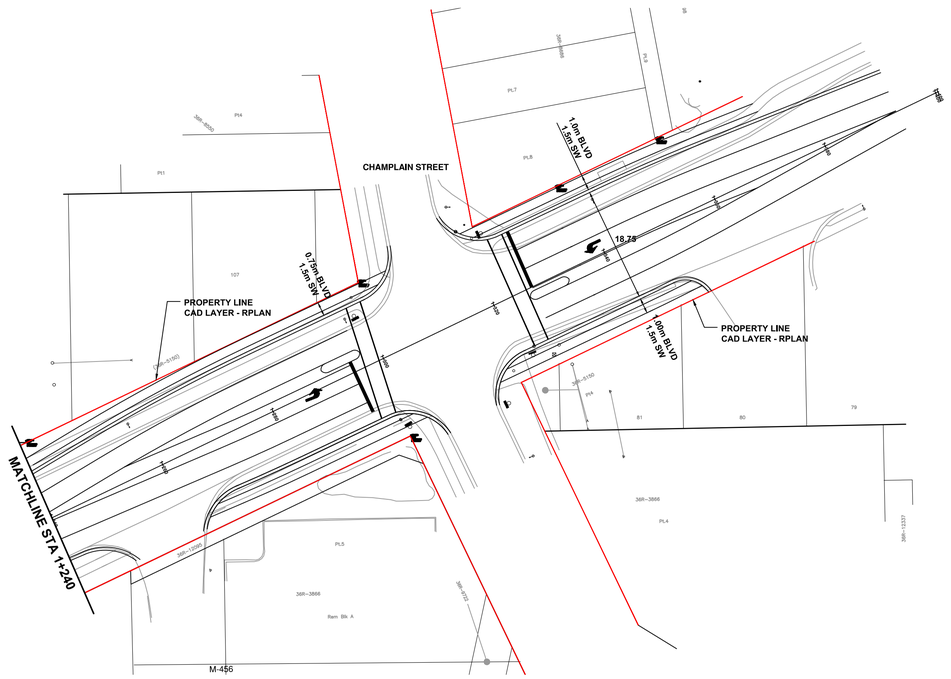
5m 0 10m 20m

1:500


NR–2465
36R–2809
PL1
PL2
3.6m BLVD
1.5m SW
PROPERTY LINE
CAD LAYER - RPLAN
36R–8648
PL2
PL3
NR–308
(36R–12357)
EX. 300mm WATERMAIN
14.00
3.00 MULTI USE PATH
PROPERTY LINE
CAD LAYER - RPLAN
MATCHLINE STA 0+560
PL25
PL28
PL27
PL30
PL33
PL50
P–2785–278


McNAMARA STREET
0+037
0+020
0+000
MATCHLINE STA 0+560
BLK"E"
BLK"H"
M-528
EX. 300mm WATERMAIN
3.60m BLVD
1.5m SW
36R–7164
PROPERTY LINE
CAD LAYER - RPLAN
36R–5801
M-183
BLK"105"
CARTIER STREET
0+023
0+020
2.7m BLVD
1.5m SW
0+000
14.05
14.00
3.00m MULTI USE PATH
3.00 MU
MATCHLINE STA 0+960
(36R–12289)
(36R–12437)
(36R–12420)
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PL1
PL3
36R–12767
NRD–2060
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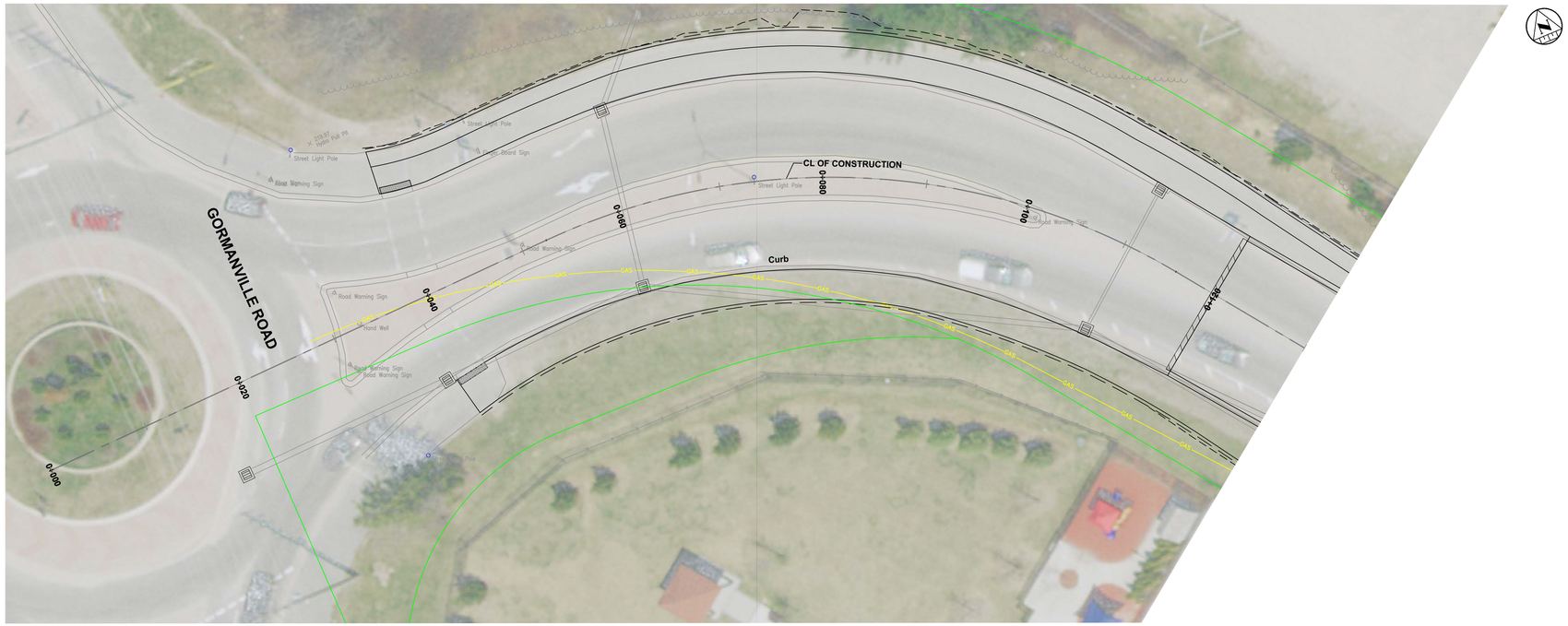
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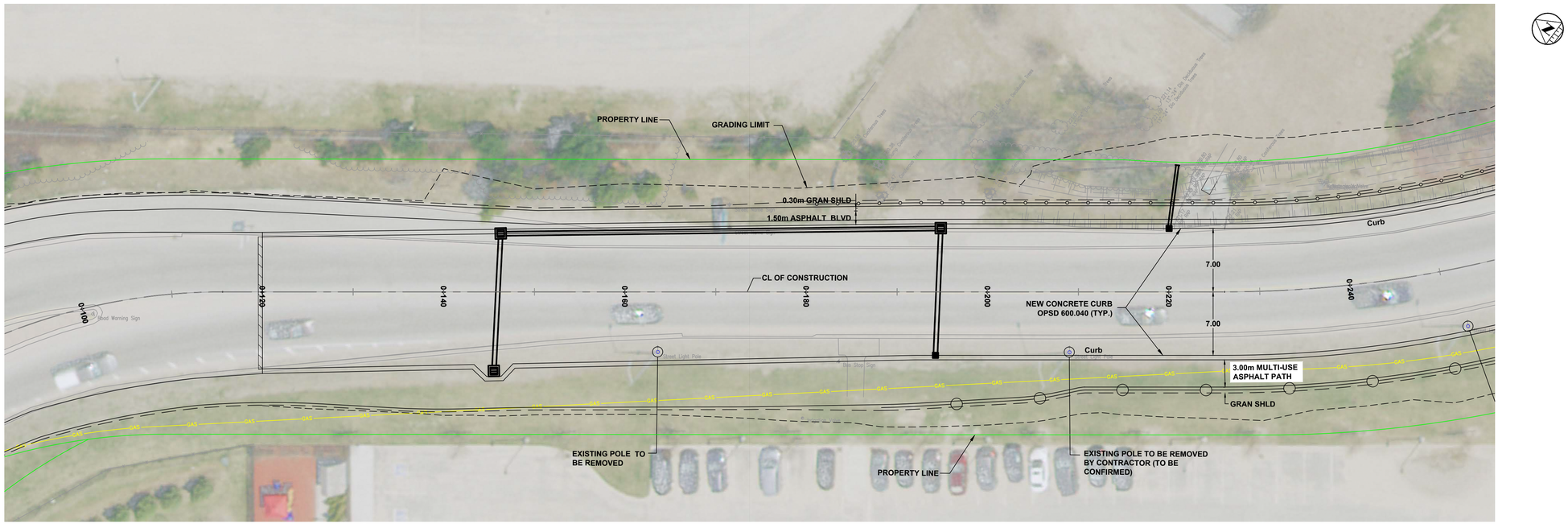
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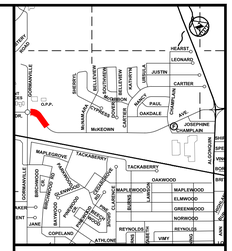
APPENDIX 8

RECOMMENDED PLAN DRAWINGS









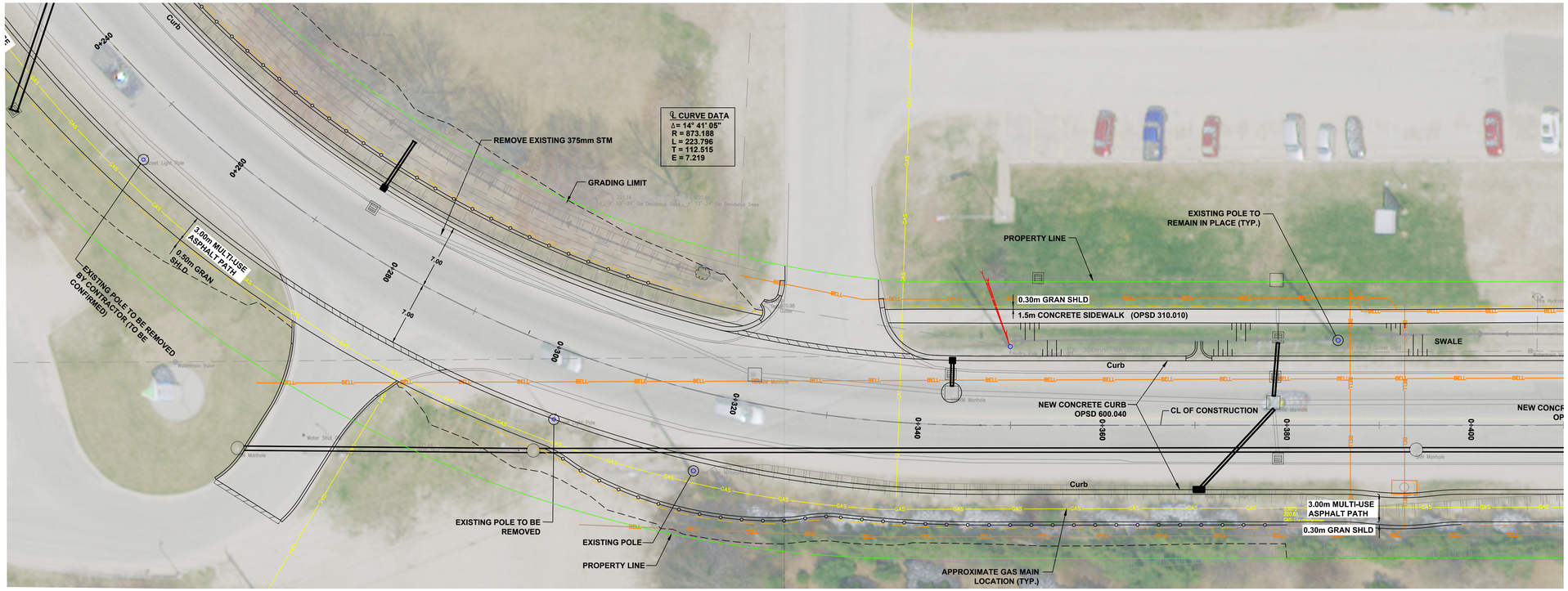
NORTH BAY
ONTARIO · CANADA
Just North Enough to be PERFECT

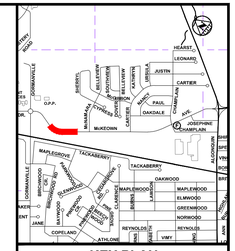
McKeown St. Reconstruction Gormanville Rd to Champlain St

STA 0+000 TO 0+250

PRELIMINARY DESIGN

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1:50





NORTH BAY
ONTARIO · CANADA
Just North Enough to be PERFECT

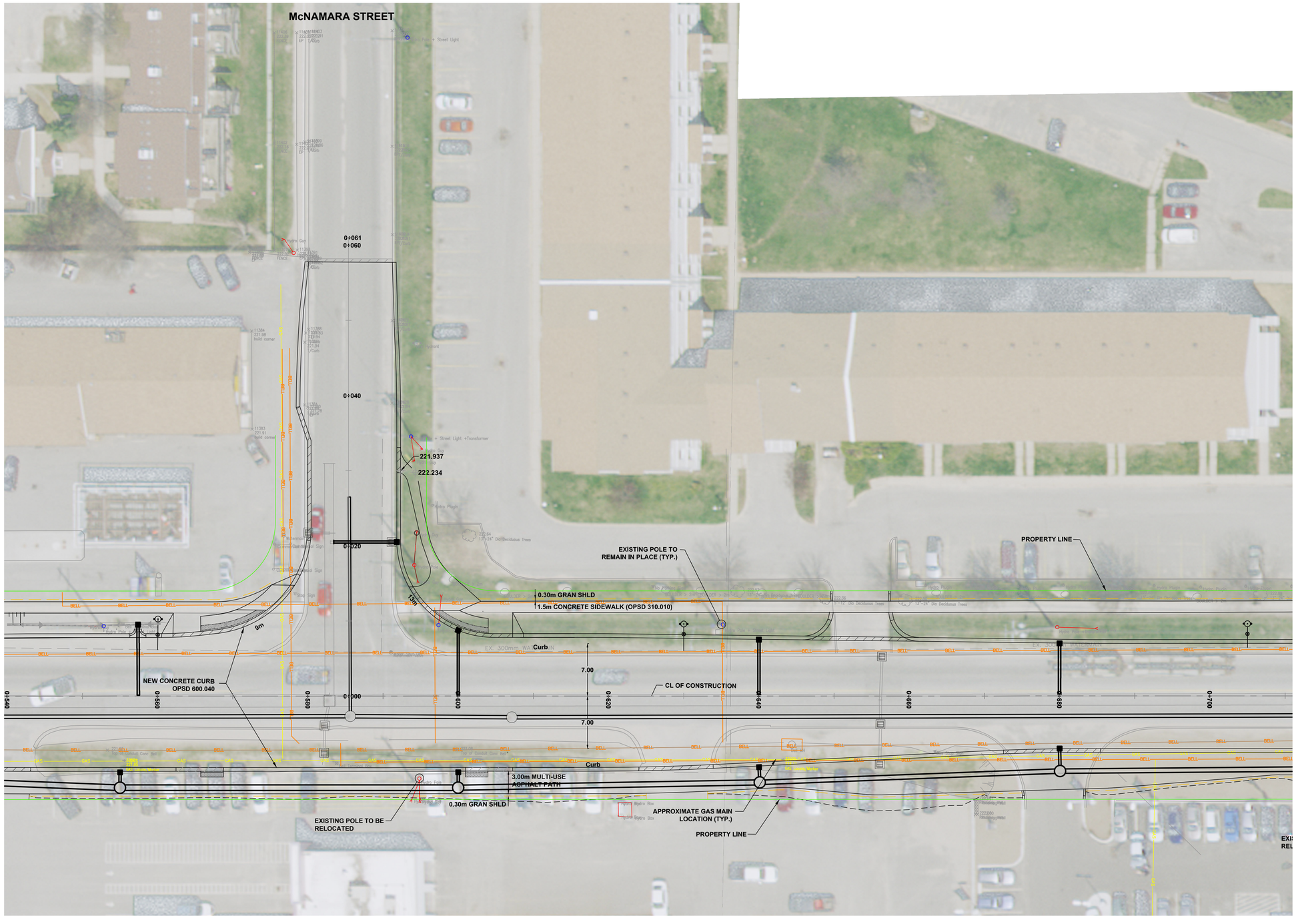
McKeown St. Reconstruction Gormanville Rd to Champlain St

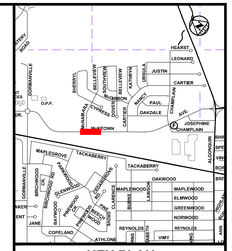
STA 0+250 TO 0+550

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PG 2





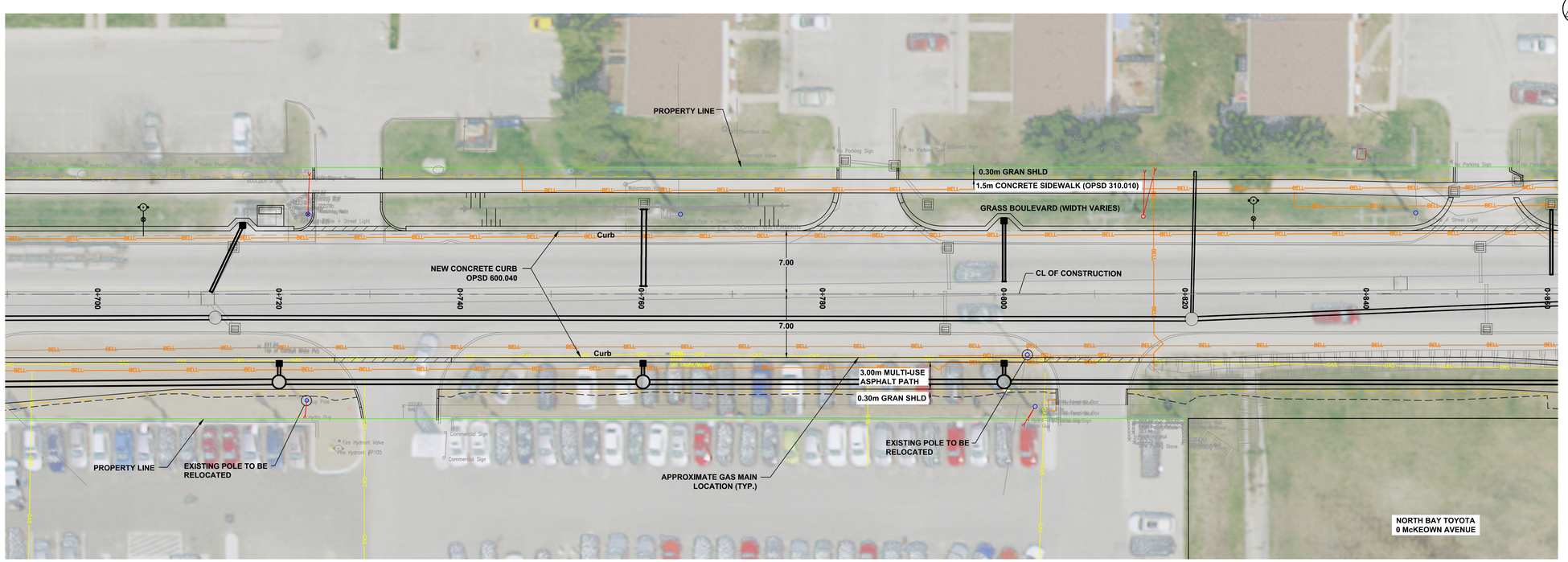
NORTH BAY
ONTARIO · CANADA
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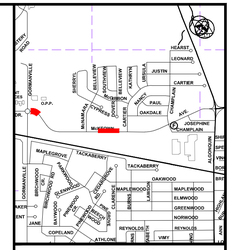
McKeown St. Reconstruction Gormanville Rd to Champlain St

STA 0+550 TO 0+700

PRELIMINARY DESIGN

Scale:
1:250
1:50





PROPERTY ADDRESS	ESTIMATED AREA	DESCRIPTION
690 McKeown Avenue	50.34m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
710 McKeown Avenue	255.64m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
710 McKeown Avenue	181.28m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
850 McKeown Avenue	49.47m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
850 McKeown Avenue	62.98m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
850 McKeown Avenue	98.18m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
890 McKeown Avenue	6.70m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
900 McKeown Avenue	10.15m²	Property Acquisition required to fit new 3m multi use path, a left turn lane, and installation of proposed street lights
138 Champlain Street	23.09m²	Property Acquisition required for intersection geometry improvements, installation of new traffic lights and addition of a left turn lane
NW Corner at McKeown & Champlain	39.91m²	Property Acquisition required for intersection geometry improvements, installation of new traffic lights and addition of a left turn lane
Total	767.74m²	

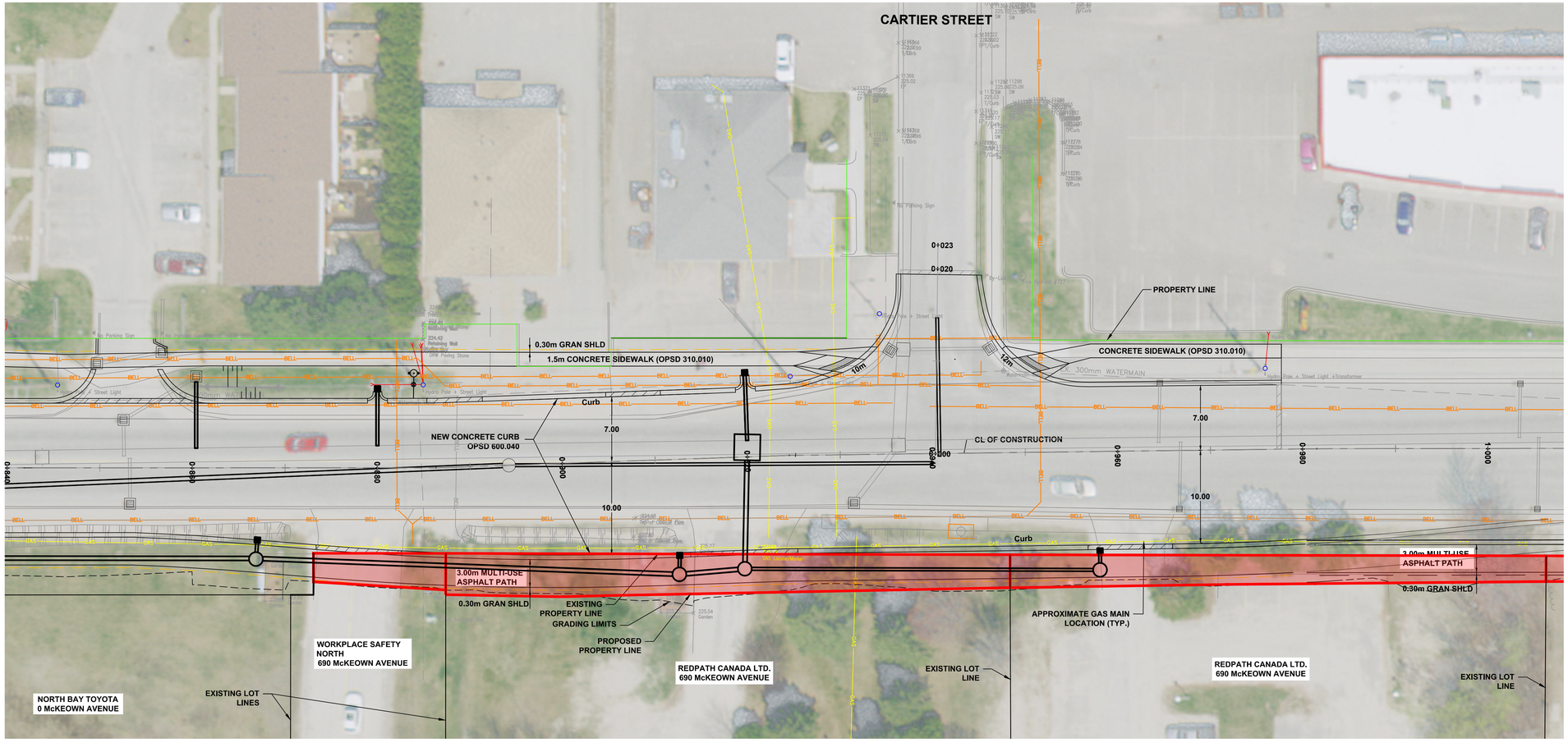
NORTH BAY
ONTARIO · CANADA
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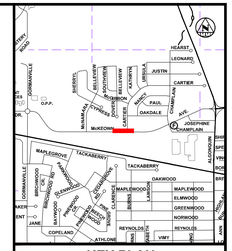
McKeown St. Reconstruction Gormanville Rd to Champlain St

STA 0+700 TO 0+850

PRELIMINARY DESIGN

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KEY PLAN

NOTES

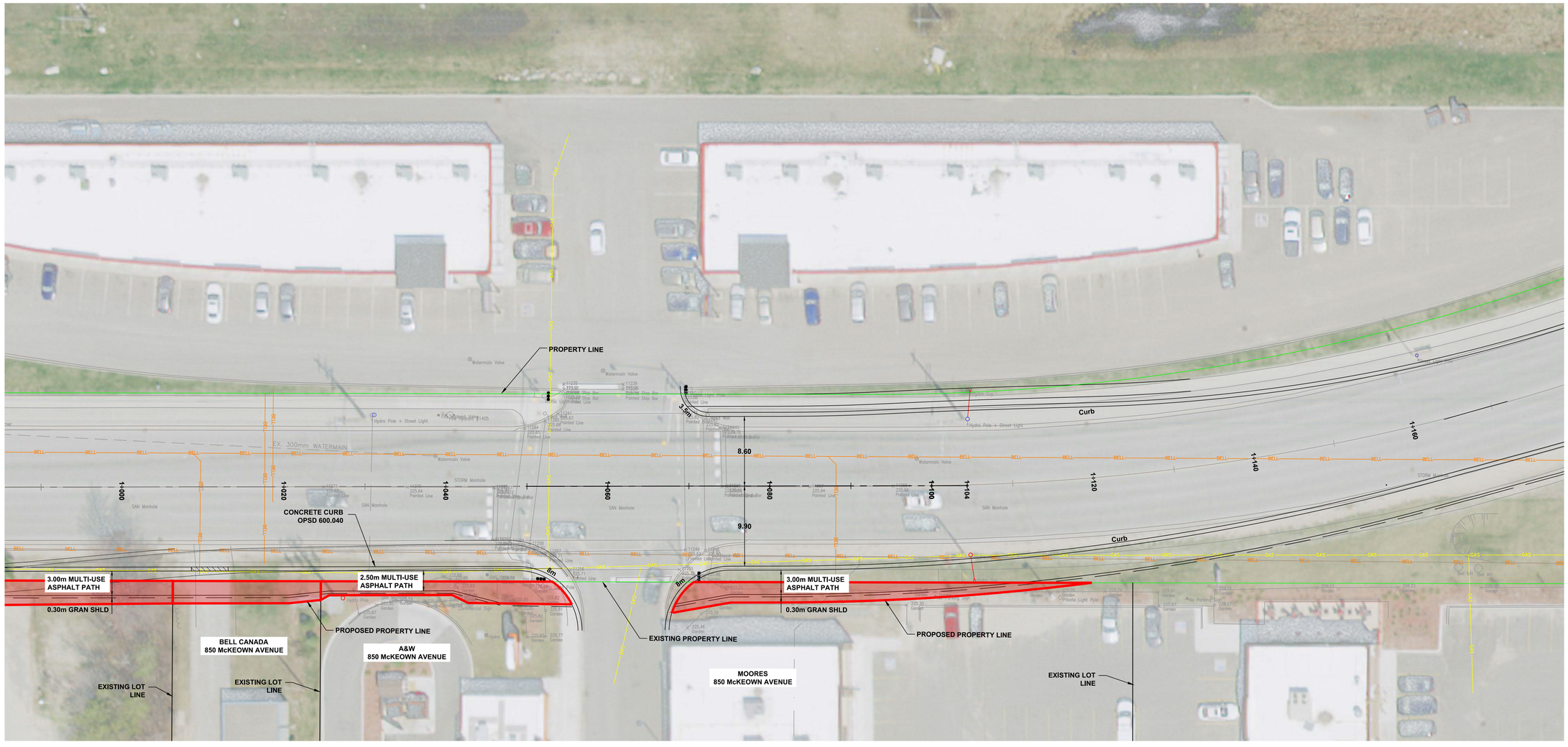
NORTH BAY
ONTARIO · CANADA
Just North Enough to be PERFECT

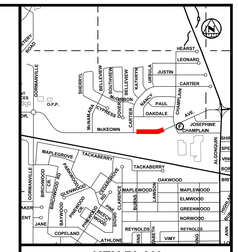
McKeown St. Reconstruction Gormanville Rd to Champlain St

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PRELIMINARY DESIGN

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KEY PLAN

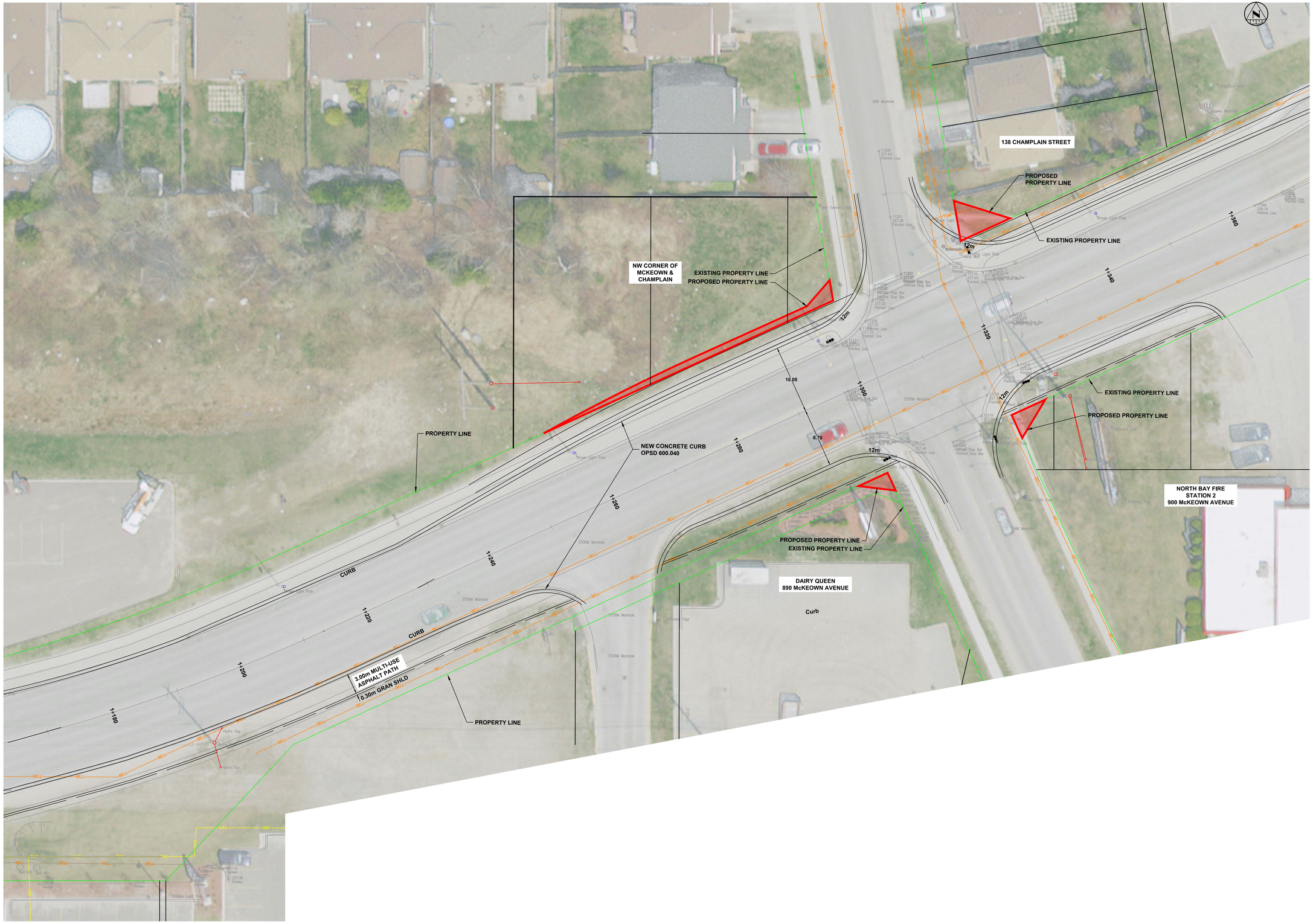
NORTH BAY
ONTARIO · CANADA
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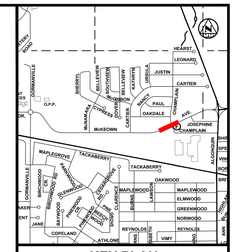
McKeown St. Reconstruction Gormanville Rd to Champlain St

STA 1+000 TO 1+170

PRELIMINARY DESIGN

Scale:
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NORTH BAY
ONTARIO · CANADA
Just North Enough to be PERFECT

McKeown St. Reconstruction Gormanville Rd to Champlain St

STA 1+170 TO 1+380

PRELIMINARY DESIGN

Scale:
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PG 7

APPENDIX 9

CONSULTAITON MATERIAL



APPENDIX 9-1

Technical Agency and Stakeholder List

McKeown EA Addendum

Updated: 2023-05-05

Agency	Contact	Title	Date Added to List	Removed from List	Notice of PIP (date sent)	Notice of Revised Study Area (date sent)
Provincial Ministries, Agencies and Departments						
Ministry of the Environment, Conservation and Parks (MECP)	Northern Region		2022-11-11		2022-10-25	
Ministry of the Environment, Conservation and Parks (MECP)	Mira Majerovich	Northern Region Environmental Planner	2022-11-11		2022-10-25	
Ministry of the Environment, Conservation and Parks (MECP)	Ellen Cramm	EA Co-ordinator	2022-11-11		2022-10-25	
Ministry of the Environment, Conservation and Parks (MECP)	Lee, Erinn	Regional Environmental Planner	2022-11-11		2022-10-25	2023-01-20
Ministry of the Environment, Conservation and Parks (MECP)	Battarino, Gavin	Special Project Officer	2022-12-06		2022-10-25	2023-01-20
Ministry of the Environment, Conservation and Parks (MECP)	Whiteley, Angela	Area Supervisor	2022-12-06		2022-10-25	2023-01-20
Ministry of Transportation	Sylvie Lauzon	Corridor Management Officer	2022-11-11	07-Feb-23	2022-10-25	07-Feb-23
Ministry of Natural Resources and Forestry (MNRF)	Mitch Baldwin	District Manager	2022-11-11		2022-10-25	07-Feb-23
Ministry of Tourism, Culture and Sport (MTCS)	Karla Barboza	Team Lead(A), Heritage Heritage Planning Unit Programs and Services Branch	2022-11-11		2022-10-25	2023-01-20
Ministry of Tourism, Culture and Sport (MTCS)	Joseph Harvey	Heritage Planner	2022-11-11		2022-10-25	2023-01-20
~~Ministry of Tourism, Culture and Sport (MTCS)~~	~~Rosi Zirger~~	~~Heritage Planner (Culture Services Unit)~~	2022-11-11		2022-10-25	07-Feb-23
Ministry of Indigenous Affairs	Lise Chabot	Manager, Ministry Partnerships Unit	2022-11-11		2022-10-25	07-Feb-23
Environmental Assessment and Permissions Branch		Director	2022-11-11		2022-10-25	07-Feb-23
Conservation Authority						
North Bay-Mattawa Conservation Authority	Paula Scott	Director - Planning & Development	2022-11-11		2022-10-25	07-Feb-23
North Bay-Mattawa Conservation Authority	Chitra Gowda	CAO, Secretary Treasurer	2022-11-11		2022-10-25	07-Feb-23
Utiltiies						
Enbridge Gas (Union Gas)	Chris Riddler	Supervisor Operations - North Bay Area			2022-10-25	07-Feb-23
North Bay Hydro	Rolly Dubois				2022-10-25	07-Feb-23

Agency	Contact	Title	Date Added to List	Removed from List	Notice of PIP (date sent)	Notice of Revised Study Area (date sent)
Bell Canada - AN Facilities	Doug Ferguson				2022-10-25	07-Feb-23
Agilis Networks					2022-10-25	
Ontario Hydro					2022-10-25	
Cogeco Cable					2022-10-25	
City Services						
City of North Bay Fire Department	Jason Whiteley	Chief	2022-11-11		2022-10-25	07-Feb-23
City of North Bay Police Department			2022-11-11		2022-10-25	07-Feb-23
City of North Bay Transit	Drew Poera	Manager	2022-11-11		2022-10-25	07-Feb-23
North Bay General hospital			2022-11-11		2022-10-25	07-Feb-23
District of Nipissing Social Services Administration Board (DNSSAB	CATHERINE MATHESON	Chief Administrative Officer	2022-11-11		2022-10-25	07-Feb-23
North Bay and District Ambulance Service	Jim Stewart	EMS Manager	2022-11-11		2022-10-25	07-Feb-23
Heritage North Bay	Naomi Rupke	Museum Director	2022-11-11		2022-10-25	07-Feb-23
Education						
Canadore College	George Burton	President and CEO	2022-11-11		2022-10-25	07-Feb-23
Nippising University	Dr. Kevin Wamsley	President, Vice-Chancellor	2022-11-11		2022-10-25	07-Feb-23
Near North District School Board			2022-11-11		2022-10-25	07-Feb-23
Nippissing Parry Sound Catholic District School Board			2022-11-11		2022-10-25	07-Feb-23
Conseil scolaire catholique Franco-Nord			2022-11-11		2022-10-25	07-Feb-23
Conseil Scolaire Publique du Nord-Est de l'Ontario			2022-11-11		2022-10-25	07-Feb-23
Indigenous Groups						
Union of Ontario Indians	Gary Dokis	Chief Administrative Officer	2022-11-11		2022-10-25	07-Feb-23
MNO Region 5 – North Bay Métis Counci	Jeannie Vaillancourt		2022-11-15		2022-10-25	07-Feb-23
Métis Nation of Ontario	Lands, Resources and Consultation Unit	General Email	2022-11-15		2022-10-25	07-Feb-23
Dokis First Nation	Gerry Duquette	Chief	2022-11-11		2022-10-25	07-Feb-23

Agency	Contact	Title	Date Added to List	Removed from List	Notice of PIP (date sent)	Notice of Revised Study Area (date sent)
North Bay Indian Friendship Centre	Justin Plouffe		2022-11-11		2022-10-25	07-Feb-23
North Bay Indian Friendship Centre	Brandon Manuel	Asst. Director	2022-11-11		2022-10-25	07-Feb-23
North Bay's urban Aboriginal Strategy - North Bay Indian Friendship Centre	Dawn Lamothe	Urban Aboriginal Strategy Coordinator	2022-11-11		2022-10-25	07-Feb-23
Nipissing First Nation	Scott McLeod	Chief	2022-11-11		2022-10-25	07-Feb-23
Nipissing First Nation	Joan McLeod	Lands Manager	2022-11-11		2022-10-25	07-Feb-23
Nipissing First Nation	Dwayne Nashkawa	Executive Director	2022-11-11		2022-10-25	07-Feb-23
Additional Stakeholder Groups						
~~Downtown Improvement Area~~	~~Jeff Serran~~	~~Executive Director~~	2022-11-11	07-Feb-23	2022-10-25	07-Feb-23
~~Community Waterfront Friends~~	~~Rod Johnston~~		2022-11-11	07-Feb-23	2022-10-25	07-Feb-23
Heritage Gardeners	Monica McLaren		2022-11-11		2022-10-25	07-Feb-23
Rotary Club of North Bay	Brett Tucker	President	2022-11-11		2022-10-25	07-Feb-23
Kiwanis Club of North Bay	Sheldon Forgette	President	2022-11-11		2022-10-25	07-Feb-23
Lions Club of North Bay	Raymond Weiler	President	2022-11-11		2022-10-25	07-Feb-23
Nippissing Naturalist Club			2022-11-11		2022-10-25	07-Feb-23
Northwatch			2022-11-11		2022-10-25	07-Feb-23
~~North Bay and District Chamber of Commerce~~	~~Patti Carr~~	~~Executive Director~~	2022-11-11	07-Feb-23	2022-10-25	07-Feb-23
North Bay and District Chamber of Commerce	Kyle Thomas	Chair Young Professionals	2022-11-11		2022-10-25	07-Feb-23
Invest North Bay Economic Develpoment Corporation	George Burton	Chair	2022-11-11		2022-10-25	07-Feb-23
Discovery North Bay	Naomi Rupke	Museum Director	2022-11-11		2022-10-25	07-Feb-23
Downtown Inc	Rob Jamieson		2022-11-11		2022-10-25	07-Feb-23
Downtown Inc	Brad Minogue		2022-11-11		2022-10-25	07-Feb-23
Municipal Heritage Committee	Peter Carello		2022-11-11		2022-10-25	07-Feb-23
MAAC	Nora Long		2022-11-11		2022-10-25	07-Feb-23
Coordinating Body of Arts Culture and Heritage North Bay	Katie Beaven		2022-11-11		2022-10-25	07-Feb-23
Developers Liason Advisory Committee	Rick Miller	Miller and Urso Surveying	2022-11-11		2022-10-25	07-Feb-23
Nipissing Environmental Watch	Peggy Walsh Craig					

McKeown EA Addendum

Updated: 2023-05-05

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MAAC	Nora Long		2022-11-11		2022-10-25	07-Feb-23
Coordinating Body of Arts Culture and Heritage North Bay	Katie Beaven		2022-11-11		2022-10-25	07-Feb-23
Developers Liason Advisory Committee	Rick Miller	Miller and Urso Surveying	2022-11-11		2022-10-25	07-Feb-23
Nipissing Environmental Watch	Peggy Walsh Craig					

APPENDIX 9-2

Technical Agency Correspondence

Connor MacIsaac

From: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Sent: August 8, 2023 2:52 PM
To: Connor MacIsaac
Cc: Battarino, Gavin (MECP); reid.porter@northbay.ca; Scott, Jason (MECP); Qiu, Guowang (MECP); Jimmy Rathod; Matthew Di Maria
Subject: RE: McKeown Avenue Reconstruction - Schedule C MCEA draft Addendum Report

Categories: Technical Agency Comments

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate **before** Replying or Clicking on any links

Hi Connor,

Thank you for providing your responses to our comments on the draft Addendum report. We are satisfied with the responses, and look forward to receiving the final report.

Thanks,
Trevor

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: August 3, 2023 2:38 PM
To: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; reid.porter@northbay.ca; Scott, Jason (MECP) <Jason.Scott@ontario.ca>; Qiu, Guowang (MECP) <Guowang.Qiu@ontario.ca>; Jimmy Rathod <JRathod@rvanderson.com>; Matthew Di Maria <MDiMaria@rvanderson.com>
Subject: RE: McKeown Avenue Reconstruction - Schedule C MCEA draft Addendum Report

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Trevor,

To follow-up this email, as well as the phone calls that I placed to you on July 24th and today (August 3rd), we are planning to issue the Notice of Addendum next week. We trust that the responses provided adequately address the MECP's comments.

Again, thank you for the MECP's input throughout this project. The Notice of Addendum and Addendum to the Environmental Study Report, including the revised Environmental Management Plan and Traffic Air Quality Impact Assessment, will also be distributed to you upon study completion (planned for next week), as requested in MECP's Notice of Public Information Package response letter (December 6, 2022) .

Best,

Connor MacIsaac, ENV SP, EPt
Environmental Planner, EA & Approvals

R.V. Anderson Associates Limited
43 Church Street, Suite 104, St. Catharines ON L2R 7E1
t 905 685 5049 ext. 4218
LinkedIn | Facebook | Website

SUMMER HOURS NOTICE: RVA offices will be closed each Friday from June 2nd to September 8th as we celebrate the summer season. We will be available for project and construction related matters.

From: Connor MacIsaac
Sent: Tuesday, July 25, 2023 3:12 PM
To: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; reid.porter@northbay.ca; Scott, Jason (MECP) <Jason.Scott@ontario.ca>; Qiu, Guowang (MECP) <Guowang.Qiu@ontario.ca>; Jimmy Rathod <JRathod@rvanderson.com>; Matthew Di Maria <MDiMaria@rvanderson.com>
Subject: RE: McKeown Avenue Reconstruction - Schedule C MCEA draft Addendum Report

Hi Trevor,

On behalf of the City of North Bay, please find attached the project team's responses to the MECP's comments. We trust that the responses provided adequately address the MECP's comments. Should you wish to discuss any of these comments further, namely Comment 2, please provide your availability for this week and/or early next week.

Thank you for the MECP's input throughout this project. The Notice of Addendum and Addendum to the Environmental Study Report, including the revised Environmental Management Plan and Traffic Air Quality Impact Assessment, will also be distributed to you upon study completion (planned for next week), as requested in MECP's Notice of Public Information Package response letter (December 6, 2022) .

Best,

Connor MacIsaac, ENV SP, EPt
Environmental Planner, EA & Approvals

R.V. Anderson Associates Limited
43 Church Street, Suite 104, St. Catharines ON L2R 7E1
t 905 685 5049 ext. 4218
LinkedIn | Facebook | Website

SUMMER HOURS NOTICE: RVA offices will be closed each Friday from June 2nd to September 8th as we celebrate the summer season. We will be available for project and construction related matters.

From: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Sent: Friday, June 16, 2023 2:55 PM
To: reid.porter@northbay.ca
Cc: Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>; Scott, Jason (MECP) <Jason.Scott@ontario.ca>; Qiu,

Guowang (MECP) <Guowang.Qiu@ontario.ca>; Connor MacIsaac <cmacIsaac@rvanderson.com>
Subject: McKeown Avenue Reconstruction - Schedule C MCEA draft Addendum Report

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate **before** Replying or Clicking on any links

Good afternoon,

Please find attached a letter and supporting documents from the Ministry of the Environment, Conservation and Parks, Environmental Assessment Branch, regarding the above mentioned project. Feel free to contact me directly with any questions or concerns you may have.

Sincerely,

Trevor Bell | Regional Environmental Planner
Project Review Unit, Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
5775 Yonge Street, 8th floor, Toronto ON, M2M 4J1
New Phone: 437-770-3731 | trevor.bell@ontario.ca

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Comments Matrix

Project Name: McKeown Avenue Reconstruction
Project No.: RVA 216166
Document Name: McKeown Avenue Reconstruction: Addendum to the Environmental Study Report (Draft)
Document Date: 24-Jul-23
Comments Received: 16-Jun-23

Comment No.	Document Section / Comment Topic	Comment	RVA Response/Question	Response Accepted/Additional Comments
1	Consultation with Indigenous Communities	The ministry recommends following-up with identified Indigenous communities that didn't respond to project notifications, to ensure they are aware of the project and their opportunity to participate in consultation and engagement activities. Please include any follow-up attempts in the record of consultation with Indigenous communities.	In response to the MECP recommending that the project team follow-up with identified Indigenous communities that didn't respond to project notifications, a third follow-up via phone call was completed to each of the three communities identified by the MECP as potentially affected by the projected project, on July 24, 2023 including: • Nipissing First Nation • Dokis First Nation • MNO Region 5 – North Bay Métis Council The phone calls were not answered, however a message was left providing a brief summary of the project, with contact information provided, should further information be desired.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
2	Water Resources	The report should commit to achieving 80% removal of Total Suspended Solids as part of the Stormwater Management Plan.	80% TSS removal cannot be achieve on this project due to the constrained corridor. Property, grade difference, and ground water separation limit the possible treatment train options available for stormwater management. In addition, the McKeown Road is only a minor contributor to the downstream watercourse and treatment of the road drainage from the project limits will only have a negligible impact on the environment downstream. We recommend a best-efforts approach to stormwater quality treatment, in acknowledgement of the constraints for this project.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
3	Water Resources	Section 6.2 of the draft report states that "A Permit to Take Water will be required from the MECP if dewatering exceeds 50,000 but less than 400,000 litres per day. Environmental Activity and Sector Registry would be required, should dewatering exceed 400,000 litres per day." This should be revised to indicate that an EASR is required if dewatering rates are between 50,000 and 400,000 LPD, and a PTTW is required if dewatering will exceed 400,000 LPD.	Report revised.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
4	Source Protection	Section 4.1.4 indicates that the study area is outside the North Bay Intake Protection Zone. The report should also indicate whether any of the other Source Protection features identified in Section 4.1.4 (i.e., WHPAs, HVAs and SGRAs) are present in the study area.	There are no Wellhead Protection Areas (WHPAs) identified within the North Bay-Mattawa Source Protection Area, as North Bay is a municipal surface water system. There are also no Highly Vulnerable Aquifers (HVAs) or Significant Groundwater Recharge Areas (SGRAs) identified within the plan. Further explanation provided in the updated report.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
5	Appendix 5 – Traffic AQIA: Air Quality	Section 2.1 of Appendix 5. The report only provides future road traffic data for 2041 for McKeown Avenue and the main intersecting roads in the study area. Current road traffic data should also be included to compare with future road traffic data.	Existing Road traffic data has been added to Table 1 within Section 2.1 of Appendix 5.	MECP noted they are satisfied with each of the responses via email August 8, 2023.

Comments Matrix

Project Name: McKeown Avenue Reconstruction
Project No.: RVA 216166
Document Name: McKeown Avenue Reconstruction: Addendum to the Environmental Study Report (Draft)
Document Date: 24-Jul-23
Comments Received: 16-Jun-23

Comment No.	Document Section / Comment Topic	Comment	RVA Response/Question	Response Accepted/Additional Comments
6	Appendix 5 – Traffic AQIA: Air Quality	Section 2.2 of Appendix 5. The report mentioned the key contaminants that have commonly been assessed in air quality studies for Ontario roadway EAs. However, only three key contaminants, nitrogen dioxide (NO2), respirable particulate matter (PM2.5), and acrolein were discussed in the report because they are the worst contaminants with the highest ratios of emission rate to air quality threshold as indicated in the report. Please provide data/documentation to support that these three contaminants are the worst contaminants with the highest ratios of emission rate to air quality threshold. The report should also include information on major sources that contribute to the background air quality for the study area in addition to the emissions from local traffic roads.	RWDI has revised the AQIA report to include all the potential contaminants from transportation sources. A description of other major sources that contribute to the background air quality in the study area has been included in Section 2.4 of the revised report (Appendix 5).	MECP noted they are satisfied with each of the responses via email August 8, 2023.
7	Appendix 5 – Traffic AQIA: Air Quality	Section 3.1 of Appendix 5. In addition to the 1-hr Canadian Ambient Air Quality Standards (CAAQS), there is also an annual CAAQS for NO2. The report should include annual background NO2 concentration compared with the applicable CAAQS.	The annual NO2 background has been added to Table 2 1 within Section 3.1 of he revised report (Appendix 5) for comparison to the annual CAAQS.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
8	Appendix 5 – Traffic AQIA: Air Quality	Section 3.2 of Appendix 5. The widening project will improve the level of service for the roadway due to fewer emissions from the idling and queuing of vehicles on the roadway as indicated in the report. Please clarify whether the separation distances between the road and sensitive receptors will change significantly due to road expansion, especially for receptors close to the road.	Discussion of the change in distance to the receptors has been included in Section 3.2 of the revised report (Appendix 5).	MECP noted they are satisfied with each of the responses via email August 8, 2023.
9	Appendix 5 – Traffic AQIA: Air Quality	Section 3.3 of Appendix 5. To minimize potential air quality impacts during construction, it is recommended that the construction tendering process should include requirements for the implementation of an emissions management plan as indicated in the report. Mitigation measures to prevent/reduce air quality emissions from road construction were not provided in the Environmental Management Plan. A commitment to the implementation of mitigation measures during construction should be added and mitigation measures and dust complaints response procedures should be included in the Environmental Management Plan.	This comment will be addressed through the development of the Environmental Management Plan.	MECP noted they are satisfied with each of the responses via email August 8, 2023.
10	Appendix 5 – Traffic AQIA: Air Quality	Please note that the ministry recommends the use of non-chloride dust suppressants for the entrainment of fugitive dust particles during construction.	This will be noted as part of the Environmental Management Plan.	MECP noted they are satisfied with each of the responses via email August 8, 2023.

R.V. Anderson Associates Limited
436 Westmount Avenue, Unit 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 **F** 855 833 4022
rvanderson.com

COMMUNICATION RECORD

Date:	July 26, 2023	Time:	11:24 a.m.
By:	Connor MacIsaac	Project No.:	RVA 216166
Project Name:	McKeown Avenue Reconstruction		

☐ Call From ☒ Call To ☐ Meeting With ☐ Memo to File

Name: Trevor Bell, Regional Environmental Planner - Project Review Unit, Environmental Assessment Branch - Ministry of the Environment, Conservation and Parks

Details:

- As a follow-up to the email sent to MECP July 25, 2023 which contained detailed responses to MECP's comments provided on the draft Addendum to the Environmental Study Report, a phone call was made to MECP staff, to ensure MECP's comments had been adequately addressed.
- The phone call was not answered, however a message was regarding the intent of the call, with contact information provided, should further information be desired.
- The phone call was not immediately returned.

R.V. Anderson Associates Limited
436 Westmount Avenue, Unit 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 **F** 855 833 4022
rvanderson.com

COMMUNICATION RECORD

Date:	July 24, 2023	Time:	11:24 a.m.
By:	Connor MacIsaac	Project No.:	RVA 216166
Project Name:	McKeown Avenue Reconstruction		

☐ Call From ☒ Call To ☐ Meeting With ☐ Memo to File

Name: Trevor Bell, Regional Environmental Planner - Project Review Unit, Environmental Assessment Branch - Ministry of the Environment, Conservation and Parks

Details:

- As a follow-up to the email sent to MECP July 25, 2023 which contained detailed responses to MECP's comments provided on the draft Addendum to the Environmental Study Report, a phone call was made to MECP staff, to ensure MECP's comments had been adequately addressed.
- The phone call was not answered, however a message was regarding the intent of the call, with contact information provided, should further information be desired.
- The phone call was not immediately returned.

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

June 16, 2023

Reid Porter, P.Eng.
Infrastructure Engineer
City of North Bay
reid.porter@northbay.ca

BY EMAIL ONLY

Re: **McKeown Avenue Reconstruction**
City of North Bay
Schedule C Municipal Class EA
Draft Addendum Report

Dear Reid Porter,

The ministry has reviewed the Draft Addendum Report (draft report) for the McKeown Avenue Reconstruction Project, dated May 5, 2023, which follows the approved planning process for an addendum to a Schedule C Municipal Class Environmental Assessment.

We understand that the preferred alternative is Alternative 2: Two lanes of traffic in each direction, with a 3-meter-wide off-road multi-use path installed on the south side of the road to accommodate pedestrians and cyclists, and a new 1.5-meter-wide sidewalk installed on the north side of the road to accommodate pedestrians.

The following comments are offered for your consideration:

Consultation with Indigenous Communities

1. The ministry recommends following-up with identified Indigenous communities that didn't respond to project notifications, to ensure they are aware of the project and their opportunity to participate in consultation and engagement activities. Please include any follow-up attempts in the record of consultation with Indigenous communities.

Water Resources

2. The report should commit to achieving 80% removal of Total Suspended Solids as part of the Stormwater Management Plan.

3. Section 6.2 of the draft report states that "A Permit to Take Water will be required from the MECP if dewatering exceeds 50,000 but less than 400,000 litres per day. Environmental Activity and Sector Registry would be required, should dewatering exceed 400,000 litres per day." This should be revised to indicate that an EASR is required if dewatering rates are between 50,000 and 400,000 LPD, and a PTTW is required if dewatering will exceed 400,000 LPD.

Source Protection

4. Section 4.1.4 indicates that the study area is outside the North Bay Intake Protection Zone. The report should also indicate whether any of the other Source Protection features identified in Section 4.1.4 (i.e., WHPAs, HVAs and SGRAs) are present in the study area.

Air Quality

The following comments are related to Appendix 5 – Traffic AQIA:

5. Section 2.1 of Appendix 5. The report only provides future road traffic data for 2041 for McKeown Avenue and the main intersecting roads in the study area. Current road traffic data should also be included to compare with future road traffic data.

6. Section 2.2 of Appendix 5. The report mentioned the key contaminants that have commonly been assessed in air quality studies for Ontario roadway EAs. However, only three key contaminants, nitrogen dioxide (NO2), respirable particulate matter (PM2.5), and acrolein were discussed in the report because they are the worst contaminants with the highest ratios of emission rate to air quality threshold as indicated in the report. Please provide data/documentation to support that these three contaminants are the worst contaminants with the highest ratios of emission rate to air quality threshold.

   The report should also include information on major sources that contribute to the background air quality for the study area in addition to the emissions from local traffic roads.

7. Section 3.1 of Appendix 5. In addition to the 1-hr Canadian Ambient Air Quality Standards (CAAQS), there is also an annual CAAQS for NO2. The report should include annual background NO2 concentration compared with the applicable CAAQS.

8. Section 3.2 of Appendix 5. The widening project will improve the level of service for the roadway due to fewer emissions from the idling and queuing of vehicles on the roadway as indicated in the report. Please clarify whether the separation distances between the road and sensitive receptors will change significantly due to road expansion, especially for receptors close to the road.

9. Section 3.3 of Appendix 5. To minimize potential air quality impacts during construction, it is recommended that the construction tendering process should include requirements for the implementation of an emissions management plan as indicated in the report. Mitigation measures to prevent/reduce air quality emissions from road construction were not provided in the Environmental Management Plan. A commitment to the implementation of mitigation measures during construction should be added and mitigation measures and dust complaints response procedures should be included in the Environmental Management Plan.

10. Please note that the ministry recommends the use of non-chloride dust suppressants for the entrainment of fugitive dust particles during construction.

Thank you for the opportunity to review the draft report. Feel free to contact me directly at trevor.bell@ontario.ca if you have any questions about the material above.

Sincerely,



Trevor Bell
Regional Environmental Planner
Project Review Unit

Cc Gavin Battarino, Supervisor, Project Review Unit, MECP
Jason Scott, Manager, Sudbury District Office, MECP
Guowang Qiu, Air Quality Analyst, Northern Region, MECP
Connor MacIsaac, Environmental Planner, R.V. Anderson Associates Ltd.

Connor MacIsaac

From: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent: November 11, 2022 6:26 PM
To: Connor MacIsaac; reid.porter@northbay.ca
Cc: Jimmy Rathod
Subject: RE: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

Categories: Technical Agency Comments

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate before Replying or Clicking on any links

Good evening Connor and Reid,

The Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule C Class Environmental Assessment has been passed on to me. Please send future notice to the Northern Region EA email address: eanotification.nregion@ontario.

It is noted that comments were requested by November 11th so I wanted to provide a status update that MECP will be providing comments related to air and noise studies and an updated Indigenous communities list next week once this information is available.

Thank you,

Erinn Lee (she/her)
Regional Environmental Planner | Ministry of the Environment, Conservation and Parks
Project Review Unit, Environmental Assessment Branch
135 St. Clair Ave W, Toronto, ON M4V 1P5
P : 1 (416) 357-1511 E: Erinn.Lee2@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: October 25, 2022 2:50 PM
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum | City of North Bay.

Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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Connor MacIsaac

From:	Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent:	November 16, 2022 12:45 PM
To:	Connor MacIsaac
Cc:	Jimmy Rathod; reid.porter@northbay.ca; Andrew McGregor
Subject:	RE: City of North Bay - McKeown Avenue Reconstruction Schedule “C” Class Environmental Assessment Addendum - Notice of Public Information Package
Categories:	Technical Agency Comments

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Hi Connor,

Thanks for sending these, confirming I was able to access the files.

Thanks,
Erinn

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: November 14, 2022 12:14 PM
To: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>
Subject: RE: City of North Bay - McKeown Avenue Reconstruction Schedule “C” Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Erinn,

Thank you for the quick response. I’ve just sent the 1999 ESR and 2002 update via a Newforma Info Exchange transmittal. You will get an email in the next few minutes with a link to the files. Please let me know if you don’t receive the email, or if you are having trouble downloading the data.

As recommended, the project team will be contacting MNO Region 5 – North Bay Métis Council (ccing Métis Nation of Ontario) as soon as possible so they receive the same correspondence as the other communities that have already been contacted.

Best,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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From: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent: November 14, 2022 11:20 AM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>
Subject: RE: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate before Replying or Clicking on any links

Hi Connor,

Thanks for this background information. I will share this information with the air quality and noise technical specialists for their consideration and get back to you about additional studies. **Could you please provide a copy of the original ESR?**

With regards to Indigenous consultation, the Indigenous Advisor has provided the following list:

- **Nipissing First Nation**
- **Dokis First Nation**
- **MNO Region 5 - North Bay Métis Council (please cc Métis Nation of Ontario on any correspondence going to the council)**

This list does not preclude the proponent from contacting other Indigenous communities, but at a minimum these communities must be contacted. The project team should contact MNO Region 5 – North Bay Métis Council (please cc Métis Nation of Ontario on any correspondence going to the council) as soon as possible so they receive the same correspondence as the other communities that have already been contacted.

Thanks,

Erinn Lee (she/her)
Regional Environmental Planner | Ministry of the Environment, Conservation and Parks
Project Review Unit, Environmental Assessment Branch
135 St. Clair Ave W, Toronto, ON M4V 1P5
P : 1 (416) 357-1511 E: Erinn.Lee2@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: November 14, 2022 10:10 AM
To: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>
Subject: RE: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Erinn,

Thank you for the Ministry's comments. We have added the referenced email address, as well as yourself, as the MECP contacts for this project. We have reviewed the information provided, and wanted to clarify that, as part of the previously approved EA, both air and noise impacts were addressed in accordance with Ministry of Environment requirements as described below.

As part of the Original EA, the City completed a robust noise impact assessment to quantify existing noise levels, and impacts to noise levels based on the proposed widening (see attached). The noise assessment in the original Class EA concluded that noise will increase as a result of expected increases in traffic, but, as noise levels would remain within acceptable levels, barriers and other devices on the right-of-way are not required or feasible. As projected traffic volumes are anticipated to increase to 13,000 vehicles per day by 2041, compared with the 20,000 vehicles per day anticipated by the original Class EA anticipated, and the cross-section has been reduced, it was concluded that no additional noise impacts or mitigation measures are required. I've attached the original Noise study appended to the ESR document for your information. Please let me know if the Ministry would like to receive the full copy of the original ESR, and I can provide it via a File Exchange.

Similarly, the Original EA considered the qualitative impacts to air quality associated with implementing each of the cross-section options. It was noted that providing additional capacity will provide greater roadway capacity, which would result in lower fuel consumption and provide marginal improvement to air quality. Furthermore, the revised recommendations developed for the roadway include extensive provision for pedestrians and cyclists, including a continuous multi-use path on the south side of the road, and sidewalk on the north side of the road. The recommended multi-use path will improve the City's active transportation network, encouraging active transportation. Encouraging active transportation through increased pedestrian and cyclist facilities supports the reduced use of vehicular traffic and GHG emissions, thereby reducing the project' effects on climate change, and air quality impacts.

Based on the above, the City had not anticipated completing any additional noise or air studies as part of the EA Addendum Process. Recognizing that Ministry requirements change over time, could you please confirm the requirements for any additional studies regarding noise and air? We want to be sure that we meet all requirements as part of the Addendum.

One final note would be that the City has initiated contact with each of the Indigenous communities listed below.

- Union of Ontario Indians
- Dokis First Nation
- North Bay Indian Friendship Centre
- North Bay's urban Aboriginal Strategy - North Bay Indian Friendship Centre
- Nipissing First Nation

On behalf of the City of North Bay, thank you for your input on the study, and we look forward to hearing back from you.

Best,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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From: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent: November 11, 2022 6:26 PM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>; reid.porter@northbay.ca
Cc: Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Good evening Connor and Reid,

The Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule C Class Environmental Assessment has been passed on to me. Please send future notice to the Northern Region EA email address: eanotification.nregion@ontario.

It is noted that comments were requested by November 11th so I wanted to provide a status update that MECP will be providing comments related to air and noise studies and an updated Indigenous communities list next week once this information is available.

Thank you,

Erinn Lee (she/her)
Regional Environmental Planner | Ministry of the Environment, Conservation and Parks
Project Review Unit, Environmental Assessment Branch
135 St. Clair Ave W, Toronto, ON M4V 1P5
P : 1 (416) 357-1511 E: Erinn.Lee2@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: October 25, 2022 2:50 PM
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum | City of North Bay.

Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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Connor MacIsaac

From:	Connor MacIsaac
Sent:	January 20, 2023 11:41 AM
To:	Lee, Erinn (MECP)
Cc:	Whiteley, Angela (MECP); reid.porter@northbay.ca; Battarino, Gavin (MECP); Andrew McGregor
Subject:	RE: MECP Comments - Notice of Public Information Package - McKeown Avenue Reconstruction MCEA Addendum (RVA 216166)
Attachments:	Revised Study Area Map.jpg
Categories:	Filed by Newforma

Hi Erinn,

Thank you for your advice. To provide you an update on the project, based on the comments received from the Public Information Package, the City will be extending the study area easterly to include the intersection of McKeown Avenue at Champlain Street. The revised study area is highlighted in the attached. Improvements to this portion of McKeown Avenue were included in the 1999 ESR, and as such, the recommendations will be reflected in the Addendum to the ESR report. We'll also be notifying the remainder of the stakeholder list of this revision in the study area.

Based on MECP's comments, we have initiated both a noise assessment and qualitative air assessment as part of the Addendum, as well as reached out to each of the Indigenous communities noted.

As requested, we will provide the draft Addendum to the ESR Report for MECP's review and comment once available.

Thanks,

rva

Connor MacIsaac, ENV SP, EPt

ENVIRONMENTAL PLANNER, EA & APPROVALS

t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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From: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent: December 6, 2022 1:57 PM
To: reid.porter@northbay.ca; Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: Whiteley, Angela (MECP) <Angela.Whiteley@ontario.ca>; Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>
Subject: MECP Comments - Notice of Public Information Package - McKeown Avenue Reconstruction MCEA Addendum

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate before Replying or Clicking on any links

Good afternoon Reid and Connor,

Please find attached MECP's comments in response to the Notice of Public Information Package for the McKeown Avenue Reconstruction Addendum. **The letter includes an updated list of Indigenous communities for consultation.**

Please note the following comments regarding air and noise studies:

- **Noise:** Given the previous noise report was prepared more than twenty years ago, the noise report should be updated to reflect the new horizon year 2041 vehicular traffic data, as well as the new road alignment cross-section.
- **Air Quality:** MECP expects that the report contain a qualitative assessment which includes:
    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

Thank you,

Erinn Lee (she/her)
Regional Environmental Planner | Ministry of the Environment, Conservation and Parks
Project Review Unit, Environmental Assessment Branch
135 St. Clair Ave W, Toronto, ON M4V 1P5
P : 1 (416) 357-1511 E: Erinn.Lee2@ontario.ca

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-845

December 6, 2022

Reid Porter
Infrastructure Engineer
City of North Bay
Reid.porter@northbay.ca

Connor MacIsaac
Environmental Planner, EA & Approvals
R.V. Anderson Associates Limited
cmacisaac@rvanderson.com

BY EMAIL ONLY

Re: **McKeown Avenue Reconstruction**
City of North Bay
Municipal Class Environmental Assessment Addendum
Response to Notice of Public Information Package

Dear Reid Porter and Connor MacIsaac,

This letter is in response to the Notice of Public Information Package for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the City of North Bay (proponent) has indicated that the study is following the approved environmental planning process for an Addendum under the Municipal Class Environmental Assessment (Class EA).

The **updated (August 2022)** attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please address all areas of interest in the EA documentation at an appropriate level for the EA study. Proponents who address all the applicable areas of interest can minimize potential delays to the project

schedule. **Further information is provided at the end of the Areas of Interest document relating to recent changes to the Environmental Assessment Act through Bill 197, Covid-19 Economic Recovery Act 2020.**

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project:

- Nipissing First Nation
- Dokis First Nation
- MNO Region 5 – North Bay Métis Council (please cc Métis Nation of Ontario on any correspondence going to the Council)

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments.

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information, including the MECP's expectations for EA report documentation related to consultation with communities.

The proponent must contact the Director of Environmental Assessment Branch (EABDirector@ontario.ca) under the following circumstances after initial discussions with the communities identified by the MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities;

- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right;
- Consultation with Indigenous communities or other stakeholders has reached an impasse; or
- A Section 16 Order request is expected based on impacts to Aboriginal or treaty rights

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

It is recommended that a draft copy of the report be provided to me prior to the filing of the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments.

Please also ensure a copy of the final notice is sent to the ministry's Northern Region EA notification email account (eanotification.nregion@ontario.ca) after the draft report is reviewed and finalized.

Should you or any members of your project team have any questions regarding the material above, please contact me at Erinn.Lee2@ontario.ca.

Sincerely,

Erinn Lee

Erinn Lee
Regional Environmental Planner
Project Review Unit, Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks

Cc: Angela Whitely, Supervisor, North Bay Area Office, MECP
Gavin Battarino, Supervisor, Project Review Unit, MECP

Enclosed: Areas of Interest

Attached: Client's Guide to Preliminary Screening for Species at Risk

A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities

AREAS OF INTEREST (v. August 2022)

It is suggested that you check off each section after you have considered / addressed it.

☐ **Planning and Policy**

- Applicable plans and policies should be identified in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.
    - Projects located in MECP Central, Eastern or West Central Region may be subject to **A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020)**.
    - Projects located in MECP Central or Eastern Region may be subject to the **Oak Ridges Moraine Conservation Plan (2017)** or the **Lake Simcoe Protection Plan (2014)**.
    - Projects located in MECP Central, Southwest or West Central Region may be subject to the **Niagara Escarpment Plan (2017)**.
    - Projects located in MECP Central, Eastern, Southwest or West Central Region may be subject to the **Greenbelt Plan (2017)**.
    - Projects located in MECP Northern Region may be subject to the **Growth Plan for Northern Ontario (2011).**

- The **Provincial Policy Statement (2020)** contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

- In addition to the provincial planning and policy level, the report should also discuss the planning context at the municipal and federal levels, as appropriate.

☐ **Source Water Protection**

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e.

systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- In October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the report on source water protection.**

    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

    - If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the report how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use Source Protection Information Atlas, which is an online mapping tool available to the public. Note that various layers (including WHPAs, WHPA-Q1 and WHPA-Q2, IPZs, HVAs, SGRAs, EBAs, ICAs) can be turned on through the “Map Legend” bar on the left. The

mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the report and include all communication documents/correspondence.**

More Information

For more information on the *Clean Water Act*, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the *Clean Water Act*. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

☐ **Climate Change**

The document "Considering Climate Change in the Environmental Assessment Process" (Guide) is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. Proponents should review this Guide in detail.

- **The MECP expects proponents of Class EA projects to:**

1. Consider during the assessment of alternative solutions and alternative designs, the following:
    a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
    b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- MECP expects that the report contain a qualitative assessment which includes:
    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* report prepared for Environment Canada. March 2005.

- Given the previous noise report was prepared more than twenty years ago, the noise report should be updated to reflect the new horizon year 2041 vehicular traffic data, as well as the new road alignment cross-section.

- The report should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- Natural heritage and hydrologic features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:
  - Key Natural Heritage Features: Habitat of endangered species and threatened species, fish habitat, wetlands, areas of natural and scientific interest (ANSIs), significant valleylands, significant woodlands; significant wildlife habitat (including habitat of special concern species); sand barrens, savannahs, and tallgrass prairies; and alvars.
  - Key Hydrologic Features: Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.
  - Other natural heritage features and areas such as: vegetation communities, rare species of flora or fauna, Environmentally Sensitive Areas, Environmentally Sensitive Policy Areas, federal and provincial parks and conservation reserves, Greenland systems etc.

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, for projects located in Central Region you may consider the provisions of the Rouge Park Management Plan if applicable.

Species at Risk

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. Information, standards, guidelines, reference materials and technical resources to assist you are found at https://www.ontario.ca/page/species-risk.

- The Client's Guide to Preliminary Screening for Species at Risk (Draft May 2019) has been attached to the covering email for your reference and use. Please review this document for next steps.

- For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

Surface Water

- The report must include enough information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the report and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the *Ontario Water Resources Act* (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the report should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

- Consultation with the railroad authorities is necessary wherever there is a plan to use construction dewatering in the vicinity of railroad lines or where the zone of influence of the construction dewatering potentially intercepts railroad lines.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase

in effect on January 1, 2021. For more information, please visit https://www.ontario.ca/page/handling-excess-soil.

- The report should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014).

- All waste generated during construction must be disposed of in accordance with ministry requirements

Contaminated Sites

- Any current or historical waste disposal sites should be identified in the report. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites. We recommend referring to the MECP's D-4 guideline for land use considerations near landfills and dumps.
  - Resources available may include regional/local municipal official plans and data; provincial data on large landfill sites and small landfill sites; Environmental Compliance Approval information for waste disposal sites on Access Environment.

- Other known contaminated sites (local, provincial, federal) in the study area should also be identified in the report (Note – information on federal contaminated sites is found on the Government of Canada's website).

- The location of any underground storage tanks should be investigated in the report. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the appropriate MECP District Office for further consultation if contaminated sites are present.

Servicing, Utilities and Facilities

- The report should identify any above or underground utilities in the study area such as transmission lines, telephone/internet, oil/gas etc. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

- The report should identify any servicing infrastructure in the study area such as wastewater, water, stormwater that may potentially be impacted by the project.

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with MECP's Environmental Permissions Branch to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's environmental land use planning guides to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the report and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the report that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The report should also include copies of comments submitted on the

project by interested stakeholders, and the proponent's responses to these comments (as directed by the Class EA to include full documentation).

- Please include the full stakeholder distribution/consultation list in the documentation.

Class EA Process

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. **The Master Plan should clearly indicate the selected approach for conducting the plan**, by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the Environmental Assessment Act, although the plan itself would not be. **Please include a description of the approach being undertaken (use Appendix 4 as a reference).**

- If this project is a Master Plan: Any identified projects should also include information on the MCEA schedule associated with the project.

- The report should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment (including planning, natural, social, cultural, economic, technical). The report should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments, cultural heritage assessments) such that all potential impacts can be identified, and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the report.

- Please include in the report a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, MTO permits and approvals under the *Impact Assessment Act*, 2019.

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the report.

Amendments to the EAA through the Covid-19 Economic Recovery Act, 2020
Once the EA Report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the proponent. The Notice of Completion must be sent to the appropriate MECP Regional Office email address.

The public can request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Section 16 Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to:

Minister David Piccini
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Zachary Anderson

From: Allan, Mike (MECP) <Mike.Allan@ontario.ca>
Sent: March 17, 2023 2:52 PM
To: Zachary Anderson
Subject: McKeown Ave Assurance letter

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate **before** Replying or Clicking on any links

Hi Zach,

The Ministry of the Environment, Conservation and Parks (MECP) has reviewed the information provided (preliminary screening, McKeown design drawings) concerning the reconstruction of McKeown Street from Cartier Street to the Gormanville roundabout approach in the City of North Bay, Ontario submitted by RV Anderson Associates on behalf of the City of North Bay on February 4, 2022 and February 14, 2023 to assess the potential impacts of the proposal on the following species at risk protected under the Endangered Species Act, 2007 (ESA):

Black Ash
Little Brown Myotis
Eastern Hog-nosed snake
Blanding's Turtle
Barn Swallow
Bobolink
Chimney Swift
Golden Eagle

Based on the ministry's review of the project documentation and information that has been provided, the conclusions that neither sections 9 nor 10 of the ESA will be contravened for species identified above appear reasonable and valid and therefore authorization is not required. However, the proponent has agreed to adhere to avoidance and mitigation measures to avoid contravening the ESA for breeding birds and bats by conducting any tree or vegetation removal outside of the sensitive season for breeding birds (April 15 – August 31) and bats (May 1 – August 31). The Breeding Bird avoidance window proposed by Anderson of April 15 – September 5 is acceptable to MECP.

Should any of the project activities change, please notify MECP immediately to obtain advice on whether the changes require authorization under the ESA. Failure to carry out these activities as described could potentially result in contravention of the ESA. Further, it is recommended that City of North Bay continue to monitor for these species while carrying out the activities to document changes, in the event that there should be any. The proponent remains responsible for ensuring compliance with the ESA and may be subject to prosecution or other enforcement action if activities result in any harm to an at-risk species or habitat.

The ministry's position here is based on the information that has been provided to MECP by City of North Bay and/or its project team. Should information not have been made available and considered in MECP's review or new information come to light that changes the conclusions made, or if on-site conditions and circumstances change so as to alter the basis for the conclusions, please contact the Species at Risk Branch as soon as possible to discuss next steps.
We also note that while it does not appear that an ESA authorization will be required, the proposed activities may be subject to other approvals, such as those issued by local municipalities and conservation authorities. Please be advised that it is the responsibility of the City of North Bay to be aware of and comply with all other relevant provincial or

federal requirements, municipal by-laws or required approvals from other agencies. It is also the responsibility of the City of North Bay to ensure that all required approvals are obtained and relevant policies adhered to.

If you require anything further, please feel free to contact me. Good luck with your project.

Regards,
Mike

Mike R. Allan, MSc.
A/Management Biologist
Landscape Species Recovery Section
Species at Risk Branch
Ministry of Environment Conservation and Parks
705-313-0894
Mike.Allan@ontario.ca

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
Tel.: 613.242.3743

Ministère des Affaires civiques et du Multiculturalisme

Unité de la planification relative au patrimoine
Direction du patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
Tél.: 613.242.3743

April 12, 2023 VIA EMAIL ONLY

Connor MacIsaac
Environmental Planner
R.V. Anderson Associates Limited
43 Church Street, Suite 104,
St. Catharines ON L2R 7E1
cmacIsaac@rvanderson.com

MCM File	**:**	**0017953**
Proponent	**:**	**City of North Bay**
Subject	**:**	**Municipal Class EA – Schedule C – Cultural Heritage Report**
Project	**:**	**McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum**
Location	**:**	**City of North Bay**

Dear Connor MacIsaac:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the draft *Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment* (dated February 2023, prepared by ASI) prepared in support of the McKeown Avenue Reconstruction Municipal Class Environmental Assessment Addendum.

MCM's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Project Summary
The City of North Bay is preparing an Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). The study area includes McKeown Avenue from Cartier Street to the Gormanville Road roundabout approach as shown in the key plan below. The project is being completed in accordance with requirements for Schedule 'C' projects within the Municipal Class Environmental Assessment (October 2000, amended in 2007, 2011 & 2015) process under the Ontario Environmental Assessment Act.

Comments
MCM has reviewed the above referenced report and found that it is consistent with the requirements, guidance and standards of the Municipal Class EA and with best practice guidance prepared by MCM.

MCM recommends that the Report be included as an appendix in any EA report for public review and should be made available to local heritage organizations or any individuals who express an interest throughout the EA process.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Joseph Harvey, Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) | 613-242-3743 | joseph.harvey@ontario.ca

Thank you for consulting MCM on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Joseph Harvey
Heritage Planner
Heritage Planning Unit
joseph.harvey@Ontario.ca

Copied to: Reid Porter, North Bay
Andrew McGregor, R.V. Anderson
Jimmy Rathod, R.V. Anderson
John Sleath, ASI
Eliza Brandy, ASI

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Connor MacIsaac

From:	Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent:	April 12, 2023 11:12 AM
To:	Connor MacIsaac
Cc:	Barboza, Karla (MCM); reid.porter@northbay.ca; Andrew McGregor; Jimmy Rathod; John Sleath; Eliza Brandy
Subject:	RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" MCEA Addendum
Attachments:	2023-04-12_MckeownAveRecon-CHAR-MCM-Comments.pdf
Categories:	Technical Agency Comments

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Connor MacIsaac,

Please find attached our comments on the draft Cultural Heritage Report prepared for the above referenced undertaking.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

Please do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: March 13, 2023 10:26 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>; John Sleath <jsleath@asiheritage.ca>; Eliza Brandy <ebrandy@asiheritage.ca>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

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Hi Joseph,

As requested, please find attached the draft Cultural Heritage Report for McKeown Ave that includes the Existing Conditions and Preliminary Impact Assessment portions of the report completed by ASI. The background research and field review determined that there are no known or potential built heritage resources or cultural heritage landscapes within the study area, and so there will be no impacts from a cultural heritage perspective in the proposed works. Please let us know whether MCM has any comments on the attached prior to finalizing.

As an update on the Stage 1 Archaeological Assessment, ASI has completed all the desktop work for the project and has noted that based on the baseline conditions, the works are anticipated to remain within previously disturbed area. Once the snow clears up, ASI will complete the property inspection and finalize the Stage 1 AA report. We'll follow-up with you once a PIF number is assigned.

Best,

Connor MacIsaac, ENV SP, EPt

Environmental Planner, EA & Approvals

R.V. Anderson Associates Limited
43 Church Street, Suite 104, St. Catharines ON L2R 7E1
t 905 685 5049 ext. 4218
LinkedIn | Facebook | Website

From: Connor MacIsaac
Sent: January 23, 2023 2:30 PM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>; Katrina Thach <kthach@asiheritage.ca>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

Hi Joseph,

We will provide a copy of the Cultural Heritage Report to MCM for review and comment once available as requested. Our archaeological and cultural heritage subconsultant ASI will request a PIF number from the Ministry after they've got the project initiated. We'll follow-up with you once a PIF number is assigned.

Best,

Connor MacIsaac, ENV SP, EPt

ENVIRONMENTAL PLANNER, EA & APPROVALS

t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: January 20, 2023 12:13 PM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

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Hi Connor,

Thanks for your reply.

Please provide us with a copy of the Cultural Heritage Report for review and comment prior to the completion of the Addendum. In addition, to support record keeping on our side, can you provide us with the Project Information Form number (PIF#) for the Stage 1 archaeological assessment.

Thanks,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: January 20, 2023 11:47 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

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Hi Joseph,

Thank you for your advice. To provide you an update on the project, based on the comments received from the Public Information Package, the City will be extending the study area easterly to include the intersection of McKeown Avenue at Champlain Street. The revised study area is highlighted in the attached. Improvements to this portion of McKeown Avenue were included in the 1999 ESR, and as such, the recommendations will be reflected in the Addendum to the ESR report. We'll also be notifying the remainder of the stakeholder list of this revision in the study area.

Based on MCM's comments, we have initiated both Stage 1 Archaeological Assessment as well as a Cultural Heritage Report as part of the Addendum.

Thanks,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: November 17, 2022 11:17 AM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Connor,

Thanks for providing the additional background information on the McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum. We reviewed the original ESR (2002) and have the following comments:

Archaeological Resources

- Since approvals for this project were granted, the legislative and regulatory framework as it relates to archaeological resources, and associated due diligence, has changed (e.g., Standards and Guidelines for Consultant Archaeologists (2011)). As such, we continue to recommend that the Criteria for Evaluating Archaeological Potential be completed to determine if an archaeological assessment is needed.
- If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the *Ontario Heritage Act* (OHA), who is responsible for submitting the report directly to MCM for review.

Built Heritage Resources and Cultural Heritage Landscapes

- Although the Ministry previously indicated that "*the study area does not contain designated heritage resources or properties*", additional built heritage resources and/or cultural heritage landscapes (BHR/CHL) may have been identified since the completion of the original ESR. The MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project will impact BHR/CHL.
- Where a known or potential BHR/CHL may be directly and adversely impacted, and whether it has not yet been evaluated for cultural heritage value or interest (CHVI), completion of a Cultural Heritage Evaluation Report (CHER) is required to fully understand its CHVI and level of significance. Cultural heritage value or interest is determined based on the application of the criteria in Ontario Regulations 9/06 and 10/06. If a BHR/CHL is found to be of CHVI, then a Heritage Impact Assessment will be completed in consultation with MCM as early as

possible during detail design. We are available to provide further advice and comment on any technical cultural heritage studies to be completed in support of this undertaking.

Please do not hesitate to contact me if you have any further questions or need further information.

Regards,

Joseph Harvey | Heritage Planner
Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: November 4, 2022 10:55 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Joseph,

Thank you for the Ministry's comments. We have reviewed the information in the letter provided, and wanted to clarify that, as part of the original EA, the Ministry of Citizenship, Culture, and Recreation had provided clearance that no archaeological or cultural heritage resources were present within the study area, and that no further action was required.. I've attached relevant portions of the original ESR document for your information. Please let me know if the Ministry would like to receive the full copy of the original ESR, and I can provide it via a File Exchange.

Based on the letter provided, both checklists provided, "*Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*" and "*Criteria for Evaluating Archaeological Potential"* are required to be completed as part of the Addendum to the ESR, and that if either checklist determines the need for additional studies, those would need to be completed. Could you please confirm these requirements? We want to be sure that we meet all requirements as part of the Addendum.

Best,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: November 2, 2022 3:38 PM
To: reid.porter@northbay.ca

Cc: Connor MacIsaac <cmacIsaac@rvanderson.com>
Subject: FW: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Reid Porter,

Please find attached our initial advice on the above referenced undertaking.

Please note that the responsibility for administration of the Ontario Heritage Act and matters related to cultural heritage has been recently transferred from the Ministry of Tourism, Culture and Sport to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, reports and/or documentation to both Karla Barboza and myself.

Do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: October-25-22 2:50 PM
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum | City of North Bay.

Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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Ministry of Citizenship and Multiculturalism

Heritage Branch
400 University Ave.
5th Floor
Toronto ON M7A 2E7
Tel.: 613.242.3743

Ministère des Affaires civiques et du Multiculturalisme

Direction du patrimoine
400, av. University
5th étage
Toronto ON M7A 2E7
Tél.: 613.242.3743

Ontario

November 2, 2022 EMAIL ONLY

Reid Porter
Infrastructure Engineer
City of North Bay
reid.porter@northbay.ca

MCM File	**:**	**0017953**
Proponent	**:**	**City of North Bay**
Subject	**:**	**Municipal Class Environmental Assessment – Schedule C - Notice of Public Information Package**
Project	**:**	**McKeown Avenue Reconstruction Schedule**
Location	**:**	**City of North Bay**

Dear Reid Porter:

Thank you for providing us with the Notice for the above-referenced project.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage recently transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and Joseph Harvey.

MCM's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources, including land and marine;
- built heritage resources, including bridges and monuments; and
- cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on known (previously recognized) and potential cultural heritage resources.

Project Summary
The City of North Bay is preparing an Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). The study area includes McKeown Avenue from Cartier Street to the Gormanville Road roundabout approach as shown in the key plan below. The project is being completed in accordance with requirements for Schedule 'C' projects within the Municipal Class Environmental Assessment (October 2000, amended in 2007, 2011 & 2015) process under the Ontario Environmental Assessment Act.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation.

Archaeological Resources
This EA project may impact archaeological resources and should be screened using the MTCS *Criteria for Evaluating Archaeological Potential* to determine if an archaeological assessment is needed. MCM archaeological sites data are available at *archaeology@ontario.ca*.

If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the *Ontario Heritage Act (OHA)*, who is responsible for submitting the report directly to MCM for review.

Built Heritage Resources and Cultural Heritage Landscapes
A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment will be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. MTCS has developed screening criteria that may assist with this exercise: *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*.

2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.

3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

Given that this project covers a large study area, MCM recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected.

Cultural Heritage Reports will be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to them.

Environmental Assessment Reporting

All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MCM whether any technical cultural heritage studies will be completed for this EA project and provide them to MCM before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MCM on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Joseph Harvey
Heritage Planner
Joseph.harvey@Ontario.ca

Copied to: Connor MacIsaac, Environmental Planner, R.V. Anderson

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. The Ministry of Citizenship and Multiculturalism (MCM) makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MCM be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out an archaeological assessment, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with *Ontario Regulation 30/11* the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Connor MacIsaac

Subject: RE: [EXTERNAL] McKeown Avenue Reconstruction Schedule C Class EA Addendum

From: Valerie Murphy <Valerie.Murphy@nbmca.ca>
Sent: November 8, 2022 2:10 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue Reconstruction Schedule C Class EA Addendum

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you validate the sender and know the content is safe. Please forward this email to infosec@northbay.ca if you believe this email is suspicious.

Good afternoon Reid,

North Bay-Mattawa Conservation Authority (NBMCA) has received the notice of the Addendum for the Class EA for McKeown Ave. We would like to take this opportunity to advise you that there is a small watercourse that flows through the study area. This watercourse is a feature regulated by NBMCA under Ontario Regulation 177/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourse (DIA).

In any future planning for work in this area, a DIA permit would be required which would set out appropriate sediment and erosion controls and in-water work measures.

Please do not hesitate to contact me should you have any questions or concerns.

Thank you,

Valerie Murphy (she/her)
Regulations Officer
North Bay-Mattawa Conservation Authority
15 Janey Avenue
North Bay, ON P1C 1N1
Cell: 705-498-3038
Office:: 705-474-5420 ext 2004
Fax: 705-474-9793
Web: www.nbmca.ca

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1972-2022

Consider the environment. Please don't print this e-mail unless you really need to.

The information contained in this electronic message from North Bay-Mattawa Conservation Authority is directed in confidence solely to the person(s) named above and may not be otherwise distributed, copied or disclosed including attachments. The message may contain information that is privileged, confidential and exempt from disclosure under the Municipal Freedom of Information and Protection of Privacy Act and by the Personal Information Protection and Electronic Documents Act. The use of such personal information except in compliance with the Acts, is strictly prohibited. If you have received this message in error, please notify the sender immediately advising of the error and delete the message without making a copy. Thank you.

Zachary Anderson

From: OP Habitat (DFO/MPO) <DFO.OPHabitat.MPO@dfo-mpo.gc.ca>
Sent: March 6, 2023 11:05 AM
To: Zachary Anderson
Cc: Courtney Beneteau; Tisha Doucette; Jimmy Rathod; Natasha Welch
Subject: RE: 23-HCAA-00358 - 216166 - North Bay McKeown Avenue - Request for Review

[CAUTION EXTERNAL EMAIL] Make Sure that it is legitimate **before** Replying or Clicking on any links

Dear Reid Porter:

Subject: Culvert Replacement, Pinewood Creek, City of North Bay (23-HCAA-00358) – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on February 17, 2023. We understand that you propose to:

- Remove an existing culvert on Pinewood Creek and replace with a 1675mm diameter by 15m long culvert; and,
- Work in isolation of flow to avoid sedimentation of the watercourse.

Our review considered the following information:

- Request for Review form and associated documents.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*; and,
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the *Species at Risk Act*.

The aforementioned impacts are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures listed below:

- Plan in-water works, undertakings and activities to respect timing windows, **or as stipulated by the Ministry of Natural Resources and Forestry (MNRF)**, to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed and migrate;
- Capture, relocate and monitor for fish trapped within isolated, enclosed, or dewatered areas;
    - Dewater gradually to reduce the potential for stranding fish
- Screen intake pipes to prevent entrainment or impingement of fish;
    - Use the code of practice for water intake screens
- Limit impacts on riparian vegetation to those approved for the work, undertaking or activity;
    - Limit access to banks or areas adjacent to waterbodies
    - Construct access points and approaches perpendicular to the watercourse or waterbody
    - Re-vegetate the disturbed area with native species suitable for the site
- Restore stream geomorphology (i.e., restore the bed and banks, gradient and contour of the waterbody) to its initial state;
- Develop and implement an erosion and sediment control plan to avoid the introduction of sediment into any waterbody during all phases of the work, undertaking or activity;
    - Conduct all in-water works, undertakings or activities in isolation of open or flowing water to reduce the introduction of sediment into the watercourse;
        - Use the code of practice for temporary cofferdams and diversion channels;

    - Schedule work to avoid wet, windy and rainy periods (and heed weather advisories) that may result in high flow volumes and/ or increase erosion and sedimentation;
    - Monitor the watercourse to observe signs of sedimentation during all phases of the work, undertaking or activity and take corrective action; and,
- Develop and implement a response plan to avoid a spill of deleterious substances.

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal will not require an authorization under the *Fisheries Act* or the *Species at Risk Act*.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act* and the *Species at Risk Act*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to FisheriesProtection@dfo-mpo.gc.ca or 1-855-852-8320.

We recommend that you notify this office at least 10 days before starting your project and that a copy of this letter be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

If you have any questions with the content of this letter, please contact Michael Bedford by email at Michael.Bedford@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Michael Bedford
Biologist, Triage and Planning
Fish and Fish Habitat Protection Program

From: Zachary Anderson <zanderson@rvanderson.com>
Sent: Friday, February 17, 2023 1:26 PM
To: OP Habitat (DFO/MPO) <DFO.OPHabitat.MPO@dfo-mpo.gc.ca>
Cc: Courtney Beneteau <cbeneteau@rvanderson.com>; Tisha Doucette <TDoucette@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>; Natasha Welch <nwelch@rvanderson.com>
Subject: 23-HCAA-00358 - 216166 - North Bay McKeown Avenue - Request for Review

Good afternoon,

R.V. Anderson Associates (RVA) has been retained by The Corporation of The City of North Bay to complete the detailed design and EA addendum for McKeown Avenue in the City of North Bay. The project involves, in part, replacement of an existing culvert structure that outlets to a watercourse that contains fish. Please find our Request for Review application attached.

Please feel free to reach out if you have any questions or require any additional information.

Sincerely,

Zachary Anderson, B.Sc. (he/him)

Terrestrial Ecologist

R.V. Anderson Associates Limited
557 Southdale Road East, Suite 200, London ON N6E 1A2
t 519 681 9916 ext. 5045 |
LinkedIn | Facebook | Website

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Request for Review

Please note that Guidance on Submitting a Request for Review is available at the end of this form. This guidance explains the requirements for a Request for Review by DFO under the fish and fish habitat protection provisions of the *Fisheries Act*. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

A) Contact information

Name of Business/Company:

The Corporation of The City of North Bay ("The City")

Name of Proponent:

Reid Porter, P.Eng
Infrastructure Engineer
Infrastructure and Operations
The Corporation of The City of North Bay

Mailing address:

200 McIntyre Street East

City/Town:

North Bay

Province/Territory:

Ontario

Postal Code:

P1B 8V6

Tel. No. :

7054740626

Fax No.:

Email:

reid.porter@northbay.ca

Is the Proponent the main/primary contact? ○ Yes ◉ No

Select additional contact:
Contractor/Agency/Consultant *(if applicable):*

Courtney Beneteau, Fisheries Biologist
R.V. Anderson Associates Limited (RVA)

Zachary Anderson, Ecologist
R.V. Anderson Associates Limited (RVA)

Mailing address:

557 Southdale Road East, Suite 200

City/Town:

London

Province/Territory:

Ontario

Postal Code:

N6E 1A2

Tel. No. :

519-681-9916

Fax No.:

855-833-4022

Email:

cbeneteau@rvanderson.com

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

If no, please enter information for the primary contact or any additional contact.

Courtney Beneteau, Fisheries Biologist, RVA

B) Description of Project

If your project has a title, please provide it.

North Bay McKeown Avenue Detailed Design and ESR Amendment

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

The City plans to replace and extend an existing concrete pipe crossing as part of the McKeown Avenue road reconstruction and widening project between Cartier Street and the Gormanville Road roundabout in the City of North Bay, Ontario. The Study Area map can be found in Attachment A. The existing culvert consists of a 10 m long, 1650 mm diameter round concrete pipe conveying flow through Pinewood Creek to Lake Nipissing south of McKeown Ave, within the Study Area. To support the road widening/reconstruction project, the existing culvert will be replaced with a 15 m long, 1675 mm diameter culvert, along the existing alignment.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

Project components in or near the watercourse will consist of the installation of erosion and sediment control (ESC) measures, removal of riparian vegetation, isolation of an in-water work area, dewatering and fish salvage within the isolated work area, removal of the existing concrete culvert, installation of a new 15 m long culvert, installation of scour and slope rock protection, followed by site restoration of the disturbed work area. Design drawings can be found in Attachment B.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

- ☐ Aquaculture Operations
- ☒ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Boat Launches / Ramps
- ☐ Breakwaters
- ☐ Bridges
- ☐ Cable Crossings
- ☐ Causeways
- ☒ Culverts
- ☐ Dams
- ☒ Dewatering / Pumping
- ☐ Docks
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☒ Riparian Vegetation Removal
- ☐ Seismic Work
- ☐ Shoreline Protection
- ☐ Stormwater Management Facilities
- ☐ Surface Water Taking
- ☐ Tailings Impoundment Areas
- ☒ Temporary Structures
- ☐ Turbines
- ☐ Water Control Structures
- ☒ Water Intakes / Fish Screens

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

- [ ] Dredging / Excavation
- [ ] Dykes
- [ ] Fishways / Ladders
- [ ] Flow Modification (hydro)
- [ ] Groundwater Extraction
- [ ] Groynes
- [ ] Habitat Restoration
- [ ] Ice Bridges
- [ ] Water Outfalls
- [ ] Watercourse Realignment
- [ ] Weirs
- [ ] Wharves
- [ ] Wind Power Structures
- [ ] Other Please Specify

Was your project submitted for review to another federal or provincial department or agency? (•) Yes ( ) No

If yes, indicate to whom and associated file number(s).

Ministry of Environment, Conservation, and Parks (MECP)
North Bay - Mattawa Conservation Authority (NBMCA)
Ministry of Natural Resources and Forestry (MNRF)

C) Location of the Project

Coordinates of the proposed project Latitude _____ N Longitude _____ W

OR UTM zone 17 T ; 616830 Easting

5132100 Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): City of North Bay

Municipality, District, Township, County, Province: City of North Bay

Name of watershed (if applicable): Lake Nipissing

Name of watercourse(s) or waterbody(ies) near the proposed project: Pinewood Creek

Provide detailed directions to access the project site:

The site is located immediately adjacent to 501 McKeown Avenue, approximately 120 m west of the McKeown Avenue and McNamara Street intersection, in the City of North Bay, Ontario.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

- ( ) Estuary (Estuarine)
- ( ) Lake (Lacustrine)
- ( ) On the bank/shore at the interface between land and water (Riparian)
- (•) River or stream (Riverine)
- ( ) Salt water (Marine)

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

○ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site. This description should include information on aquatic species at risk* (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html), their residence* and critical habitat* if found in the area. An overview of the distribution of aquatic species at risk and the presence of their critical habitat within Canadian waters can be found here http://dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Based on a review of the Land Information Ontario (LIO) Aquatic Resource Area (ARA) database, Pinewood Creek supports a fish community consisting of Central Mudminnow, Creek Chub and Northern Redbelly Dace. Based on the results of fish sampling completed within the Study Area by RVA on August 9, 2022 via backpack electrofisher, Brook Stickleback was also captured in addition to the aforementioned species. Therefore, based on the background review and site specific fish community sampling, Pinewood Creek supports a fish community consisting of non-sensitive, spring-summer spawning, coolwater baitfish species. Based on the thermal regime, fish community and direction provided by NDMNRF through an information request, Pinewood Creek has a spring restricted in-water timing window of April 1 - June 15 (in-water works can be completed between June 16 - March 31 of any given year). A review of Fisheries and Oceans (DFO) aquatic Species at Risk (SAR) mapping, did not identify any aquatic SAR within or adjacent to the Study Area (Attachment C). In addition, a review of the Natural Heritage Information Centre (NHIC) database did not identify any aquatic SAR within or adjacent to the Study Area.

An aquatic habitat assessment was completed for Pinewood Creek within the Study Area by RVA biologists on August 9, 2022. At the time of assessment, weather conditions were warm (20 degrees C) and sunny. No precipitation was observed during the assessment, however 14.1 mm of precipitation was recorded within 24 hours prior to the assessment.

Upstream of the McKeown Avenue crossing within the Study Area, Pinewood Creek consisted of a combination of piped drainage and an open, grass drainage swale. A small high density poly-ethylene (HDPE) pipe with a metal grate on the inlet was observed for flow conveyance underneath McKeown Avenue. At the time of assessment, the open swale was mostly dry with no flow and minor standing water, therefore it is anticipated the piped drainage upstream was contributing flow to downstream reaches. Downstream of the culvert crossing within the Study Area, Pinewood Creek consisted of an open natural watercourse with a defined channel and permanent flow regime. From the Study Area, the feature flows in a southerly direction for approximately 1.3 km to its confluence with Lake Nipissing. Based on a review of aerial imagery, there is a second buried/piped section of the watercourse approximately 800 m downstream of the Study Area. The channel appears to daylight again downstream of Main St. West before its confluence with Lake Nipissing. Within the Study Area, a round concrete pipe was observed to be embedded within sand substrate at the downstream end. A pool was observed at the culvert outlet with a mean wetted width of 3.2 m, mean wetted depth of 0.45 m and was comprised predominately of sand substrate with minor fine gravel. A buried pipe along the southeast side of McKeown Avenue with an outlet into the watercourse was observed along the right upstream bank, immediately downstream of the culvert. An open roadside drainage swale with standing water was observed along the southwest side of McKeown Avenue with no direct connection to Pinewood Creek. Downstream of the culvert outlet pool, the channel was comprised predominately of riffle-run sequences with abundant coarse substrate present. One additional pool with fine bed material was observed approximately 60 m downstream of the culvert, prior to the watercourse flowing underneath a chain-link fence toward the Highway 17 crossing. Minor undercut banks were observed within the downstream reach, suggesting minor bank erosion, however also provided potential cover and habitat for fish. Both banks were steep, however well-vegetated and generally stable overall. Other minor in-stream cover was provided by overhanging vascular macrophytes, overhanging/in-stream woody debris, cobble and boulders. Limited shade was provided by meadow vegetation and shrubs along the right upstream bank, while trees and shrubs associated with the Cultural Woodland along the left upstream bank provided minor shade to the channel. Representative photographs are provided in the attached photo appendix.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

◉ Yes ○ No

If yes, select the PoEs that apply to your project.

- ☒ Addition or removal of aquatic vegetation
- ☒ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☒ Placement of material or structures in water
- ☒ Riparian Planting
- ☐ Streamside livestock grazing

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

- [ ] Dredging
- [x] Excavation
- [x] Fish passage issues
- [x] Grading
- [ ] Marine seismic surveys
- [ ] Organic debris management
- [ ] Placement of marine finfish aquaculture site
- [ ] Structure removal
- [ ] Use of explosives
- [x] Use of industrial equipment
- [x] Vegetation Clearing
- [ ] Wastewater management
- [x] Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? (•) Yes ( ) No ( ) Unknown

If yes, provide a description.

A new longer culvert (total increase in length of 5 m) will be installed that will remain as closed fish habitat. The bed substrate of the watercourse will be altered slightly due to construction and new culvert length. The habitat will continue to persist post-project completion.

Is there likely to be a harmful alteration, disruption or destruction of habitat used by fish? ( ) Yes (•) No ( ) Unknown

Is there likely to be destruction or loss of habitat used by fish? (•) Yes ( ) No ( ) Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

The approximate area that will take place below the High Water Mark is 8.375 square metres.

Is your project likely to change water flows or water levels? ( ) Yes (•) No ( ) Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

N/A

If your project includes a water control structure, provide the % of flow reduction.

N/A

If your project includes discharge of water, provide source, volume and rate.

N/A

Will your project cause death of fish? ( ) Yes (•) No ( ) Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

With the implementation of recommended mitigation measures, death of fish is not anticipated.

What is the time frame of your project?

The construction will start on 07/16/2023 and end by 11/30/2025

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

N/A

If applicable, provide schedule for decommissioning

N/A

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

Are there additional effects to fish and fish habitat that will occur outside of the time periods identified above? ○ Yes ◉ No

(If yes, provide details)

N/A

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*? ◉ Yes ○ No

(If no, provide explanations.)

N/A

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ○ No

If yes, describe.

To accommodate the proposed road widening, culvert replacement and extension is the only option. Impacts to fish and fish habitat will be managed with appropriate mitigation measures.

Have you consulted DFO's Fish and Fish Habitat Protection Measures Habitat (https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html) to determine which measures apply to your project? ◉ Yes ○ No

Will you be incorporating applicable measures into your project? ◉ Yes ○ No

If yes, identify which ones. If No, identify which ones and provide reasons.

-Prevent the death of fish
-Maintain fish passage
-Ensure proper sediment control
-Prevent entry of deleterious substances in water

Have you considered whether DFO standards and codes of practice apply to your project? ○ No ◉ Yes

If Yes, include a list.

- Interim code of practice: Temporary cofferdams and diversion channels
- Interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater

Have you considered other avoidance and mitigation measures? ○ No ◉ Yes

If Yes, include a list.

- In-water works will be isolated and only occur outside of fish spawning window noted
- Avoiding depositing any deleterious substances in the watercourse
- Develop a response plan to be implemented immediately in the event of a spill of a deleterious substance
- Keeping an emergency spill kit on site
- Stopping work and containing deleterious substances to prevent dispersal
- Reporting any spills of oil, fuel or other deleterious material whether near or directly into the watercourse
- Cleaning up and appropriately disposing of the deleterious substances
- Maintaining all machinery on site in a clean condition and free of fluid leaks to prevent any deleterious substances from entering the water
- Washing, refuelling and servicing machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water
- Work that may cause the disturbance of sediment shall be completed in a slow, controlled manner, to minimize turbidity

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

Are there any relevant measures that you are unable to incorporate? ○ Yes ◉ No

(If yes, identify which ones.)

N/A

What harmful effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

If all of the mitigation and avoidance measures for the project are followed during all phases of the rehabilitation works, no additional harmful effects to fish and fish habitats are anticipated.

Do these include effects on aquatic species at risk*? ○ Yes ◉ No

If yes, please describe, including how many individuals will be harmed, harassed, or otherwise affected by the project, and how?

N/A

Do these include effects on areas identified as their residence or critical habitat? ○ Yes ◉ No

If yes, please describe

N/A

Are there any aquatic invasive species in the vicinity of your project area? ○ Yes ◉ No

(If yes, identify which ones.)

N/A

Does your project aim to, or will it be likely to, effect any of these aquatic invasive species? ○ Yes ◉ No

If yes, how?

N/A

All definitions are provided in Section G of the Guidance on Submitting a Request for Review

F) Signature

I, Zachary Anderson (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.



Signature

17/02/2023
Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Guidance on Submitting a Request for Review

This document explains the requirements for a Request for Review by DFO under the fish and fish habitat protection provisions of the *Fisheries Act*. To determine whether you should request a review, visit DFO's Projects Near Water webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).

Incomplete Requests for Review will be returned to the applicant without review by DFO. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

Section A: Contact Information

Provide the full legal name of the proponent and primary mailing address for the proponent. When the proponent is a company, identify the full legal registered name of the company.

If applicable, also provide the contact information of the duly authorized representative of the proponent. Please note that a copy of correspondence to Contractor/Agency/Consultant will also be sent to the Proponent.

Section B: Description of Project

This information is meant to provide background about the proposed project. All components of the proposed project in or near water, must be described.

Proponents should provide information about all appropriate phases of the project, i.e., the construction, operation, maintenance and closure phases for the proposed project.

All details about the construction methods to be used, associated infrastructure, permanent and temporary structure, structure type (e.g. corrugated steel pipe vs box culvert), structures dimension, building materials to be used, machinery and equipment to be used must also be provided. For example, the construction of p**ermanent structures** may require the construction of temporary structures such as temporary dikes, in conjunction with other associated activities like the withdrawal of water, land clearing, excavation, grading, infilling, blasting, dredging, installing structures, draining or removing debris from water. Similarly, the equipment and materials to be used may include hand tools, backhoes, gravel, blocks or armor stone (provide the average diameter), concrete (indicate if pre-cast or poured in-water), steel beams or wood.

When physical structures in or near water are proposed, provide the plan and specifications of those works which would require a review.

Section C: Location of the Project

The purpose for this information is to describe and illustrate the location of the proposed project, and to provide geographical and spatial context. The information should also facilitate an understanding of how the project will be situated in relation to existing structures.

The details to be provided must include:

- Coordinates of the project (e.g., Latitude and Longitude or Universal Transverse Mercator Grid coordinates);
- A map(s), site plan, or diagrams indicating the high water mark and the location, size and nature of proposed and existing structures (e.g., floating or fixed), landmarks and proposed activities. In a marine setting, it may be helpful to depict the approximate location of the proposed development on a nautical chart or showing the relation of the site to sea marks or other navigational aids. These plans, maps or diagrams should be at an appropriate scale to help determine the relative size of the proposed structures and activities, the proximity to the watercourse or waterbody and the distance from existing structures;
- The community nearest to the location of the proposal as means to provide a general reference point. When possible, proponents should use geographical names recognized by the Geographical Names Board of Canada (http://www.nrcan.gc.ca/earth-sciences/geography-boundary/geographical-name/11680).
- If available, provide aerial photographs or satellite imagery of the water source(s) and waterbody(ies);
- Names of the watershed(s), water source(s) and/or waterbody(ies) likely to be affected by the proposal; and
- Brief directions to access the proposed project site.

Section D: Description of the Aquatic Environment

Proponents must describe the environmental context and aquatic resources present at the proposed site. The information must identify the current state of the fish and fish habitat prior to the carrying on of the project.

It is important to include information about the fish species present, the biological, chemical, physical features present (habitat characteristics), and the fish life-cycle functions (fish characteristics).

The spatial scope for assessing fish and fish habitat should encompass the direct physical footprint of the project, and the upstream and downstream areas affected.

As an example, the following is a non-exhaustive and non-prescriptive list of some common attributes which may characterize the aquatic environment:

- Type of water source or watercourse (groundwater, river, lake, marine, estuary, etc.);
- Characteristics of the water source or waterbody could include:
  - Substrate characterization - describe the types of substrate (e.g., bedrock, boulder, cobble, gravel etc.), identify the predominant substrate type (e.g., 80% cobble, 20% gravel etc.) and provide maps of the substrate;
  - Aquatic and riparian vegetation characterization - identify the prevalent types of vegetation (e.g. rooted, submerged, emergent, etc.), identify the relative abundance of the vegetation (e.g., 10% cattails, 80% grass, 10% sedge) , indicate the predominant vegetation (e.g., by species or types) and identify the vegetation densities (e.g., type of vegetation/ area);
  - Flow characterization - specify if the flow is controlled or if it is natural, identify if the flow is permanent or intermittent, identify the current and tide (marine environment) etc.;
  - Physical waterbody characterization - identify the average depth of water for water bodies, identify bathymetry of water bodies, provide bathymetric maps where available, channel width (determine the width of the channel from the high water mark), slope ;
  - Water quality characterization - (e.g., annual or average pH, salinity, alkalinity, total dissolved solids, turbidity, temperature etc.);
  - Biological water quality characterization - (e.g., benthic macro-invertebrates, zooplankton, phytoplankton, etc.)
- Fish species characterization - identify the fish species (including molluscs, crustaceans, etc.) known or suspected to be in the area, predator prey relationships etc. Identify what source of information was used to determine the presence of fish in that area; and
- Estimate the fish abundance - estimate the number of fish present, estimate the year class for each species etc.

There are many different methods and attributes available to characterize fish and fish habitat. Proponents must describe all sources of information used, all fish and environment sampling techniques used, all modelling techniques used and all other approaches used to define the fish and fish habitat. Proponents are encouraged to use recognized fisheries inventory methods such as those approved by DFO or provinces

Section G: Definitions

Aquatic Species at Risk: an extirpated, endangered, threatened species, or a species of special concern. A non-exhaustive list of aquatic species at risk found in Canadian waters can be found here (http://www.dfo-mpo.gc.ca/species-especes/sara-lep/identify-eng.html).

Aquatic Species at Risk Critical Habitat
the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species critical habitat in the recovery strategy or in an action plan for the species.
Aquatic Species at Risk Residence: the specific dwelling place, such as a den, nest or other similar area or a place that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding, or hibernating.

Aquatic invasive species: are fish, invertebrate or plant species that have been introduced into a new aquatic environment, outside of their natural range. Once introduced, aquatic invasive species populations can grow quickly because they don't have natural predators in their new environment. As a result, they can outcompete and harm native species. They can even alter habitats to make them inhospitable for the native species. A non-exhaustive list of aquatic invasive species can be found here (http://www.dfo-mpo.gc.ca/species-especes/ais-eae/identify-eng.html).

Emergency circumstance: If your project must be conducted in response to an emergency, you may apply for an Emergency Authorization. The emergency situations are:

- The project is required as a matter of national security
- The project is being conducted in response to a national emergency where special temporary measures are being taken under the federal *Emergencies Act*
- The project is required to address an emergency that poses a risk to public health or safety or to the environment or property.

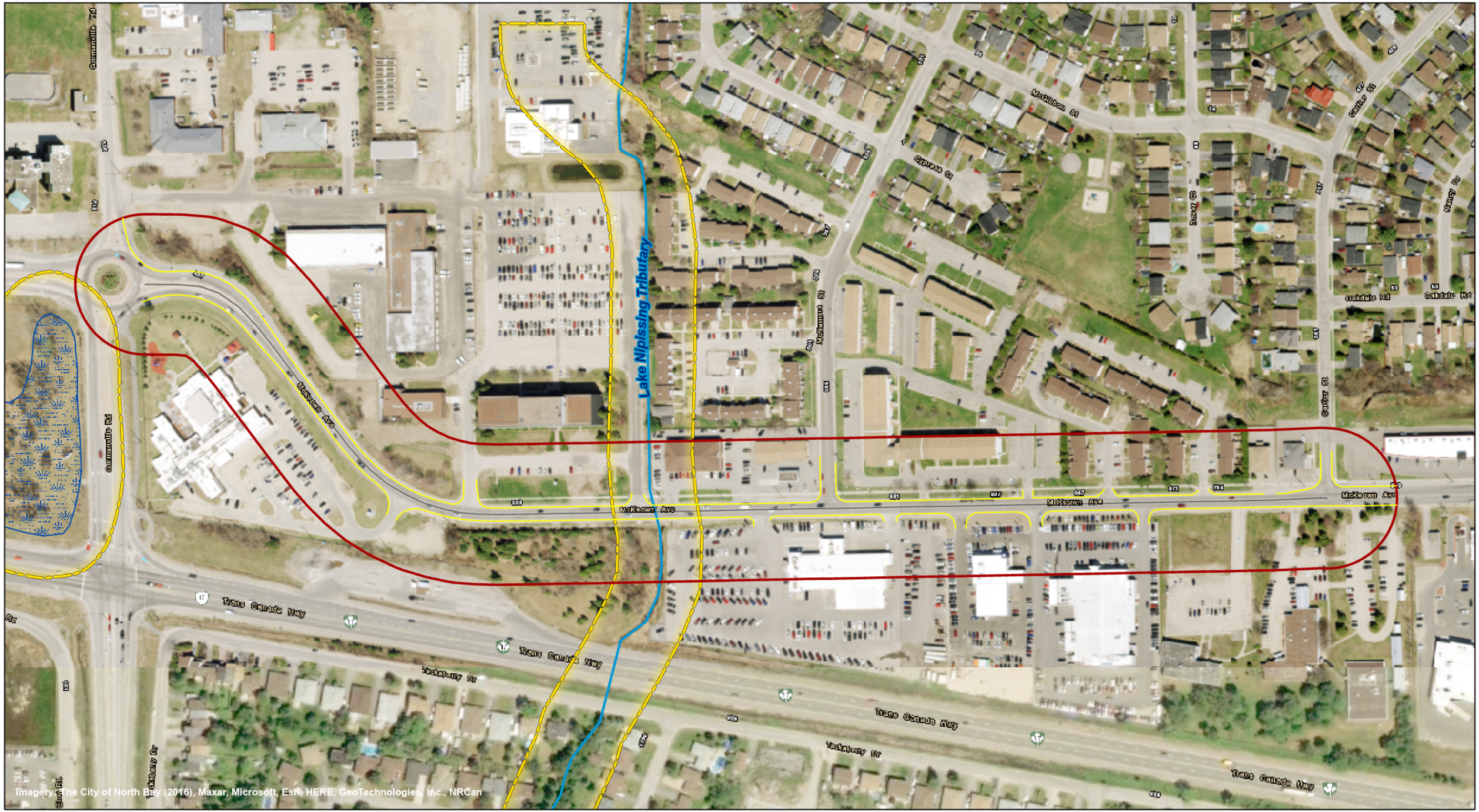
Fish habitat: means habitat that can directly or indirectly support life processes. This includes but is not limited to: spawning grounds, nursery, rearing, food supply and migration areas.

Harmful alteration, disruption or destruction means any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish.

High Water Mark: The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to leave a mark on the land.

ATTACHMENT A

Study Area Map



The Corporation of the City of North Bay

McKeown Avenue Reconstruction Design and EA Amendment

Map 1: Study Area Overview

0 20 40 60 80 100 120 Meters

Scale: 1:2,500

Date: 2022-05-16 | Page 1

RVA: 216166 | Draft By: CER

N

Legend

- Road
- Watercourse
- Study Area
- Wetland
- General Study Area (50 m)
- NBMCA Approximate Regulated Area (177/06)

Data Sources: The City of North Bay, North Bay-Mattawa Conservation Authority (NBMCA), RVA, OHN, LIO, ESRI.

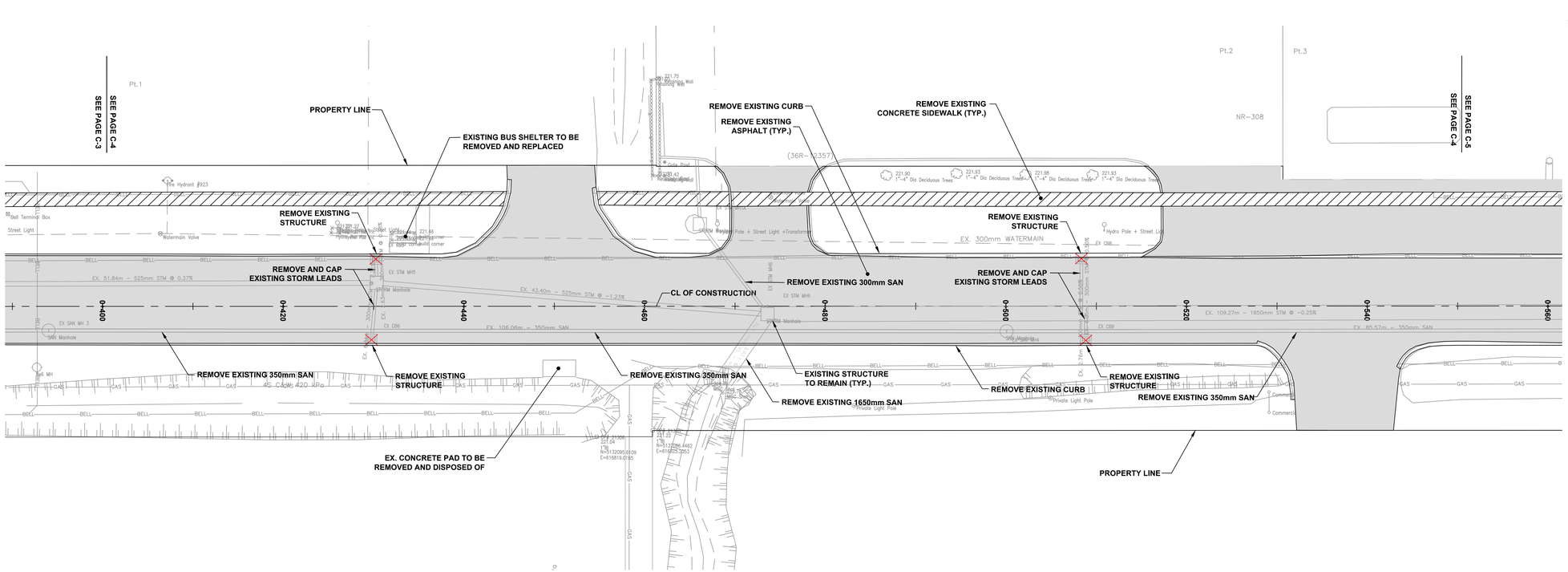
NORTH BAY ONTARIO CANADA Just North Enough to be PERFECT

RVA

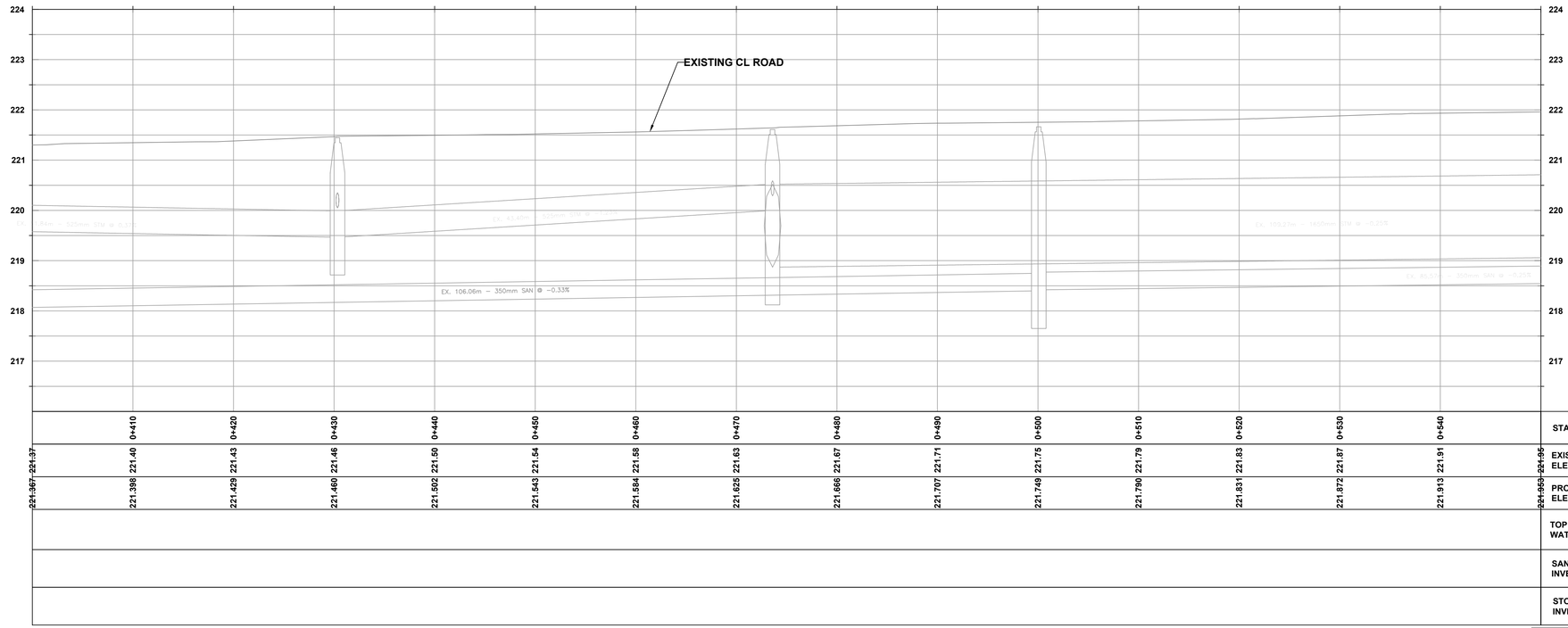
Note: The City of North Bay makes no guarantees, representations or warranties respecting the accuracy, completeness or reliability of the digital drawing either express or implied. The City of North Bay specifically disclaims any and all liability, including without limitation, consequential and incidental damages, that may arise in any way from the use of or reliance on the digital drawing. This digital drawing is not a legal plan or survey and is not to be used as a navigational aid.
The data used in this map is approximate only. © Queen's Printer for Ontario and its licensors. [2022]. May Not be Reproduced without Permission. Approximate Regulated Area and Wetlands have been provided by North Bay-Mattawa Conservation Authority, and are approximate only. Contains information licensed under the Open Government Licence - Ontario. Publicly available open data modified in agreement with Terms of Use. Aerial imagery used to update watercourse alignment (LIO).

ATTACHMENT B

Site Plans

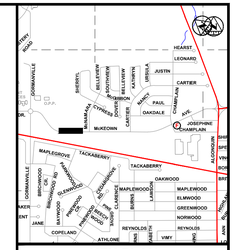


McKeown St.



STATION	0+400	0+410	0+420	0+430	0+440	0+450	0+460	0+470	0+480	0+490	0+500	0+510	0+520	0+530	0+540	
EXISTING ELEVATIONS	221.367	221.40	221.43	221.46	221.50	221.54	221.58	221.63	221.67	221.71	221.75	221.79	221.83	221.87	221.91	224.95
PROPOSED ELEVATIONS	221.367	221.398	221.429	221.460	221.502	221.543	221.584	221.625	221.666	221.707	221.749	221.790	221.831	221.872	221.913	224.953
TOP OF WATERMAIN																
SANITARY INVERTS																
STORM INVERTS																

PRELIMINARY



KEY PLAN

NOTES

1. THE UTILITIES INFORMATION CONTAINED ON THIS DRAWING MAY BE BASED UPON DATA PROVIDED BY OTHERS AND MAY NOT HAVE BEEN VERIFIED BY EITHER AS-CONSTRUCTED DRAWINGS OR AN ONTARIO LAND SURVEYOR. THE CITY OF NORTH BAY CANNOT ACCEPT RESPONSIBILITY FOR ERRORS OR OMISSIONS ON ANY INFORMATION SHOWN HEREIN. FIELD VERIFICATION, LAND SURVEYS OR EXCAVATION (WITH CITY APPROVALS) MAY BE REQUIRED TO DETERMINE ACTUAL LOCATION OF ANY AND ALL UTILITIES OR PROPERTY LINES.
2. REFER TO GENERAL PLAN PAGE FOR DRAWING LEGEND.

REVISIONS

No.	Date	By	Description
1	JUL 12 2022	JR	Issued for 30% Review
2	JAN 11 2023	JR	Issued for 60% Review

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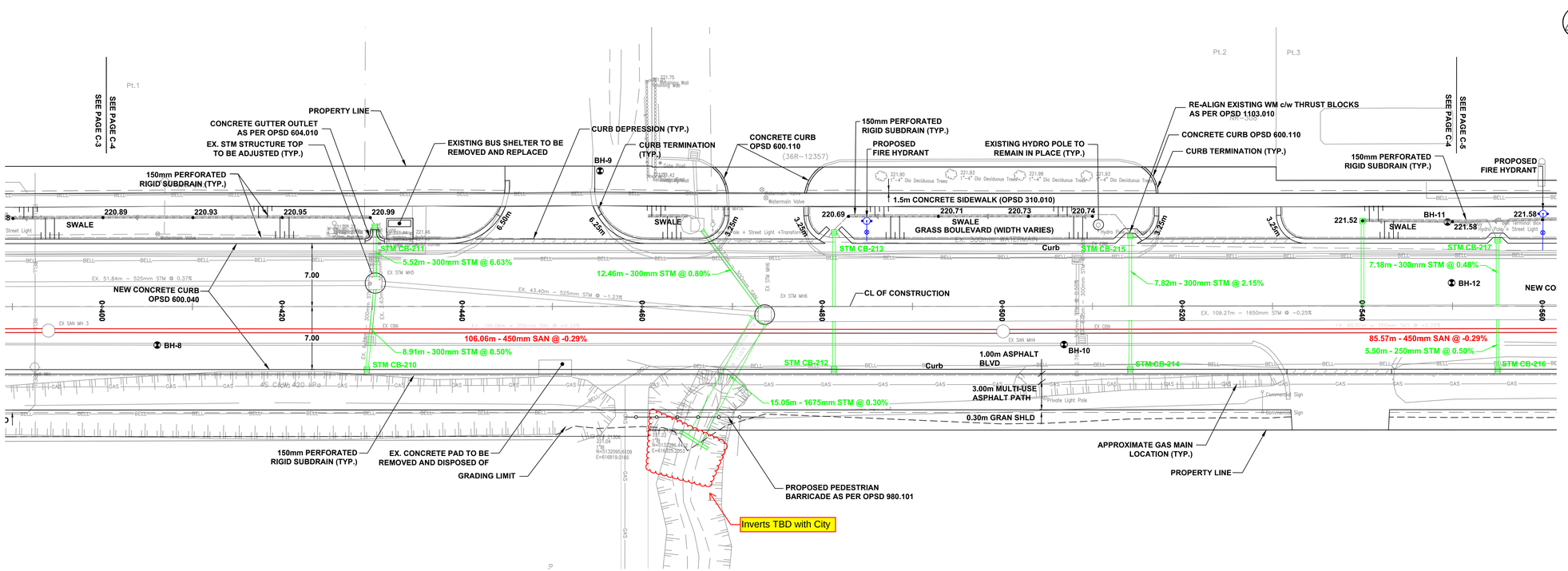
McKeown St. Reconstruction Gormanville Rd to Cartier St

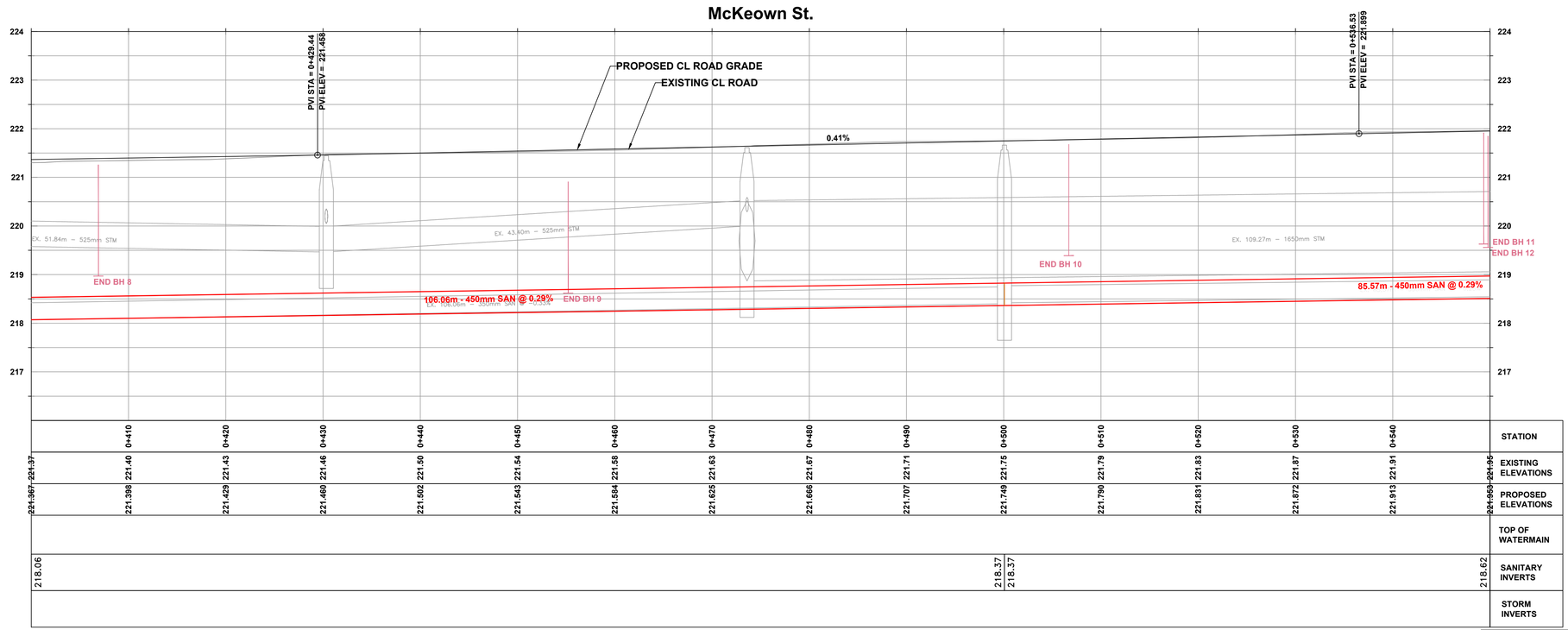
REMOVALS

McKeown St. Plan & Profile

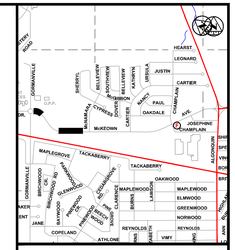
Sta. 0+400 to Sta. 0+550

Designer: J.R.	Checked by: J.M.B.
Date: 06/23/2022	Approved by: J.R.
Scale: 1:250 1:50	2.5 0 5 10 / 0.5 0 1 2
Drawing Number: R-4	Drawing Set: 6 of 31





PRELIMINARY



KEY PLAN

NOTES

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2. REFER TO GENERAL PLAN PAGE FOR DRAWING LEGEND.
3. CONTRACTOR TO ENSURE 0.50m VERTICAL CLEARANCE BETWEEN WATERMAIN AND STORM SEWER.

REVISIONS

No.	Date	By	Description
1	JUL 12 2022	JR	Issued for 30% Review
2	JAN 11 2023	JR	Issued for 60% Review

NORTH BAY ONTARIO · CANADA
Just North Enough to be PERFECT

McKeown St. Reconstruction Gormanville Rd to Cartier St

NEW CONSTRUCTION

McKeown St. Plan & Profile

Sta. 0+400 to Sta. 0+550

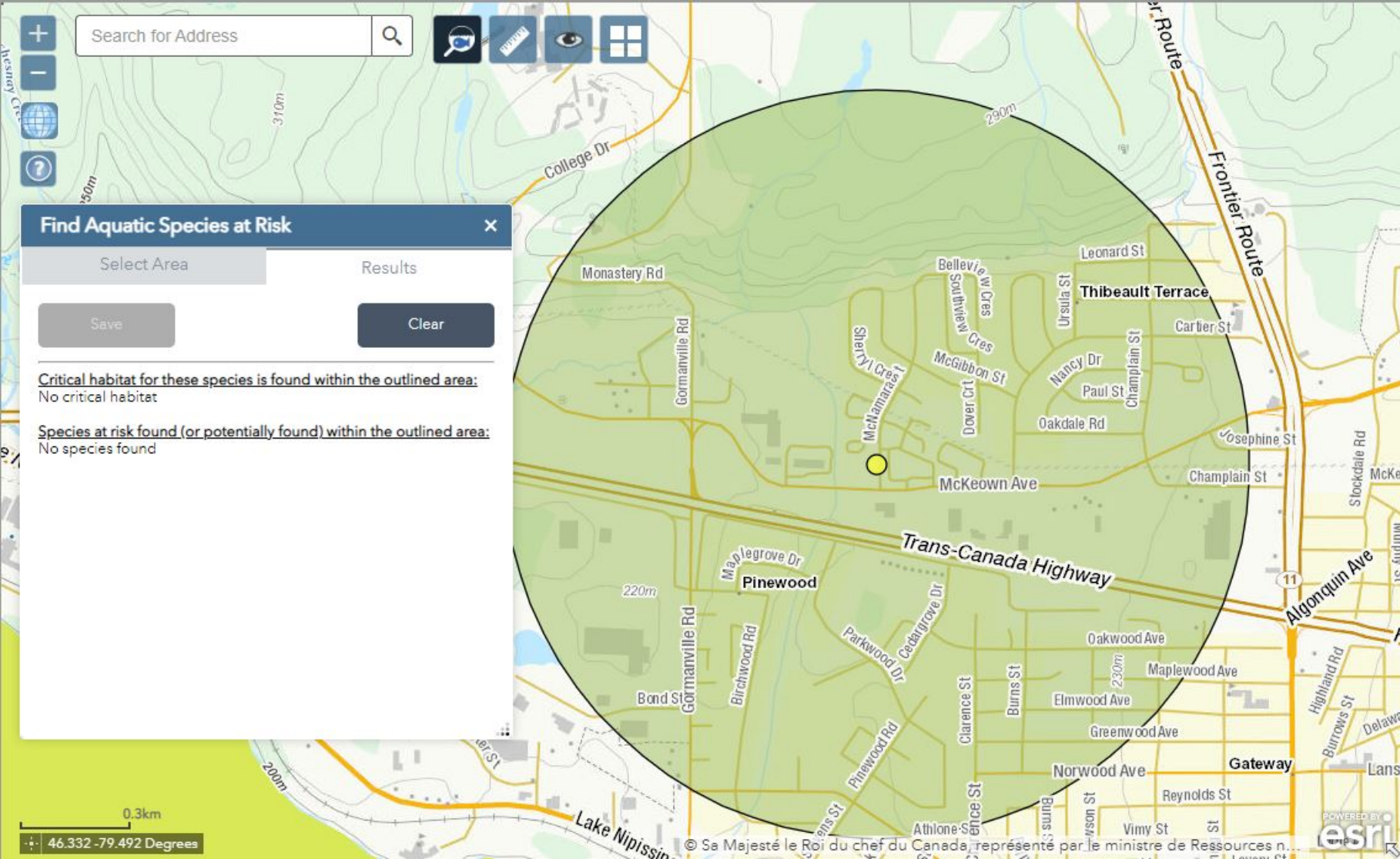
Designer:	Checked by:
J.R.	J.M.B.
Date:	**Approved by:**
06/23/2022	J.R.

Scale: 1:250 / 1:50 (2.5 0 5 10 / 0.5 0 1 2)

Drawing Number:	Drawing Set:
C-4	14 of 31

ATTACHMENT C

Aquatic Species at Risk Mapping


Search for Address
Find Aquatic Species at Risk
Select Area
Results
Save
Clear
Critical habitat for these species is found within the outlined area:
No critical habitat
Species at risk found (or potentially found) within the outlined area:
No species found
College Dr
Monastery Rd
Gormanville Rd
Frontier Route
Leonard St
Thibeault Terrace
Cartier St
Champlain St
Nancy Dr
Paul St
Oakdale Rd
McGibbon St
McKeown Ave
Josephine St
Trans-Canada Highway
Maplegrove Dr
Pinewood
Parkwood Dr
Cedargrove Dr
Birchwood Rd
Bond St
Oakwood Ave
Maplewood Ave
Elmwood Ave
Greenwood Ave
Norwood Ave
Gateway
Reynolds St
Vimy St
Athlone St
Clarence St
Burns St
Algonquin Ave
Highland Rd
Stockdale Rd
Lake Nipissing
310m
290m
220m
230m
200m
0.3km
46.332 -79.492 Degrees
© Sa Majesté le Roi du chef du Canada, représenté par le ministre de Ressources n...
esri

ATTACHMENT D

Site Photographs



1 – 20220809 – Tributary to Lake Nipissing – Open grass swale with minor standing water north of McKeown Ave, facing north.



2 – 20220809– Tributary to Lake Nipissing – Small HDPE pipe with grate on inlet within grass swale north of McKeown Ave, facing south.



3 – 20220809 – Tributary to Lake Nipissing – Standing on top of the round concrete culvert, facing downstream, south of McKeown Ave.



4 – 20220809 – Tributary to Lake Nipissing – Standing in the middle of channel, facing upstream (north) toward the culvert outlet. Pool present at culvert outlet.



5 – 20220809 – Tributary to Lake Nipissing – Buried pipe outlet along the right upstream (southeast) bank within the watercourse



6 – 20220809 – Tributary to Lake Nipissing – Meadow and deciduous trees and shrubs along the right upstream bank and left upstream bank, respectively.



7 – 20220809 – Tributary to Lake Nipissing – Riffle-run sequence downstream of the culvert outlet pool, facing downstream (south).



8 – 20220809 – Tributary to Lake Nipissing – Sand and fine gravel substrate.



9 – 20220809 – Tributary to Lake Nipissing – Coarse gravel and cobble substrate.



10 – 20220809 – Tributary to Lake Nipissing – Run channel morphology with in-stream/overhanging woody debris and concrete, facing downstream (south).



11 – 20220809 – Tributary to Lake Nipissing – Minimal shade along the right upstream bank with some shade along the left upstream bank.



12 – 20220809 – Tributary to Lake Nipissing – Pool habitat and riparian shade before flowing under a chain-link fence upstream of Highway 17.

Connor MacIsaac

From:	Connor MacIsaac
Sent:	February 7, 2023 3:10 PM
Cc:	Jimmy Rathod; 'reid.porter@northbay.ca'
Subject:	RE: City of North Bay - McKeown Avenue Reconstruction Schedule “C” Class Environmental Assessment Addendum - Notice of Public Information Package - Revised Study Area and Indigenous Community Follow-Up (RVA 216166)

Dear Sir / Madam,

On behalf of the City of North Bay, we would like to provide your community an update on the McKeown Avenue Reconstruction Addendum to the 1999 Environmental Study Report. Based on the comments received from members of the public, stakeholder groups, businesses and technical agencies, on the Public Information Package (PIP), the City has extended the study area easterly of the highlighted area below to include the intersection of McKeown Avenue at Champlain Street.

Based on the advice from the Ministry of Citizenship and Multiculturism, the project team has initiated both a Stage 1 Archaeological Assessment as well as a Cultural Heritage Report as part of the Addendum. As part of the Cultural Heritage Report, we would like to inquire whether there are any know areas of significance or interest within or adjacent to any of the study corridor from your community’s perspective. We would also be happy to provide a draft copy of the Stage 1 AA Report, should you be interested.

A summary of the comments received, and how these comments were considered by the project team, along with next steps of the project, are summarized in a PIP Summary Report, available on the City’s website at: https://www.northbay.ca/projects/mckeown-avenue-reconstruction-schedule-c-class-environmental-assessment-addendum/.



The project team values the participation of all stakeholders and wishes to ensure that the community’s interests and c oncerns are taken into consideration. Details of the final study recommendations will be documented in an Addendum to the Environmental Study Report (ESR) and made available for a 30-day public review period. A Notice of Filing of Addendum will be issued at that stage (expected Spring 2023). Please do not hesitate to contact the if you have any questions about the process, or to be removed from the contact list.

Reid Porter
Infrastructure Engineer

City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Regards,

Connor MacIsaac, ENV SP, EPt

Environmental Planner, EA & Approvals

R.V. Anderson Associates Limited
43 Church Street, Suite 104, St. Catharines ON L2R 7E1
t 905 685 5049 ext. 4218
LinkedIn | Facebook | Website

From: Connor MacIsaac
Sent: October 25, 2022 2:50 PM
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum | City of North Bay.

Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt

ENVIRONMENTAL PLANNER, EA & APPROVALS

t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1



APPENDIX 9-3

Indigenous Community Correspondence

R.V. Anderson Associates Limited
436 Westmount Avenue, Unit 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 **F** 855 833 4022
rvanderson.com

COMMUNICATION RECORD

Date:	July 24, 2023	Time:	3:08 p.m.
By:	Connor MacIsaac	Project No.:	RVA 216166
Project Name:	McKeown Avenue Reconstruction		

☐ Call From ☒ Call To ☐ Meeting With ☐ Memo to File

Name: Dwayne Nashkawa, Strategic Advisor, Nipissing First Nation

Details:

- In response to the MECP recommending that the project team follow-up with identified Indigenous communities that didn't respond to project notifications, and in following up from emails to Nipissing First Nation on October 25, 2022 and February 7, 2023, phone call was made to Nipissing First Nation Staff, to ensure they are aware of the project and their opportunity to participate in consultation and engagement activities.
- The phone call was not answered, however a message was left providing a brief summary of the project, with contact information provided, should further information be desired.
- The phone call was not immediately returned.

R.V. Anderson Associates Limited
436 Westmount Avenue, Unit 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 **F** 855 833 4022
rvanderson.com

COMMUNICATION RECORD

Date:	July 24, 2023	Time:	3:43 p.m.
By:	Connor MacIsaac	Project No.:	RVA 216166
Project Name:	McKeown Avenue Reconstruction		

☐ Call From ☒ Call To ☐ Meeting With ☐ Memo to File

Name: Jeannie Vaillancourt, President, MNO Region 5 - North Bay Métis Council

Details:

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R.V. Anderson Associates Limited
436 Westmount Avenue, Unit 6
Sudbury ON P3A 5Z8 Canada
T 705 560 5555 **F** 855 833 4022
rvanderson.com

COMMUNICATION RECORD

Date:	July 24, 2023	Time:	3:25 p.m.
By:	Connor MacIsaac	Project No.:	RVA 216166
Project Name:	McKeown Avenue Reconstruction		

☐ Call From ☒ Call To ☐ Meeting With ☐ Memo to File

Name: Dokis First Nation, Reception Staff

Details:

- In response to the MECP recommending that the project team follow-up with identified Indigenous communities that didn't respond to project notifications, and in following up from emails to Dokis First Nation on October 25, 2022 and February 7, 2023, phone call was made to Dokis First Nation Staff, to ensure they are aware of the project and their opportunity to participate in consultation and engagement activities.
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Connor MacIsaac

From:	Connor MacIsaac
Sent:	February 7, 2023 3:10 PM
Cc:	Jimmy Rathod; 'reid.porter@northbay.ca'
Subject:	RE: City of North Bay - McKeown Avenue Reconstruction Schedule “C” Class Environmental Assessment Addendum - Notice of Public Information Package - Revised Study Area and Indigenous Community Follow-Up (RVA 216166)

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Reid Porter
Infrastructure Engineer

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Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Regards,

Connor MacIsaac, ENV SP, EPt

Environmental Planner, EA & Approvals

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Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt

ENVIRONMENTAL PLANNER, EA & APPROVALS

t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1



APPENDIX 9-4

PIP Summary Report

McKeown Avenue Reconstruction

Addendum to the 1999 Schedule 'C' Class Environmental Assessment Environmental Study Report

Public Information Package Summary Report

FINAL

City of North Bay

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RVA 216166

February 2, 2023

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1.0 INTRODUCTION

R.V. Anderson Associates Limited (RVA) was retained by the City of North Bay to complete the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR), in accordance with the *Municipal Class Environmental Assessment (October 2000, amended in 2007, 2011 & 2015)*. Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations.

1.1 Public Information Package

The purpose of the Public Information Package (PIP) was to share and receive input from members of the public and local residents, as well as the technical agencies, stakeholder groups, and Indigenous communities who were involved in the 1999 EA, and / or the City has identified as having potential interest in the updated recommendations. The display materials presented information on the EA Addendum process including the need and justification, alternatives considered, and revised recommendations.

The PIP was posted to the City's project webpage on October 25, 2022, and were available for comment for 18 days, until November 11, 2022. Display materials were posted to the project website, and were available in an alternate format (i.e., hard copy) upon request. Refer to **Appendix 1** for copies of the materials made available for comment.

2.0 STAKEHOLDERS AND NOTIFICATION

Notification of the PIP was provided through various methods and media, as outlined below.

- **General Public**
  - Notice posted on the City's website on October 25, 2022

- **Local Residents & Businesses**
  - Notice mailed to all property owners within the study area

- **Technical Agencies, Local Interest Groups and Indigenous Communities**
  - Emails containing the notice and details of the PIC were sent on May 30, 2022

- **Project Mailing List (other parties who previously submitted comments on the original ESR or indicated interest in the project)**

- Email containing the notice and details of the PIP was sent on October 25, 2022

Refer to **Appendix 2** for copies of the published notifications, stakeholder contact list and notice distribution mailing area.

3.0 PARTICIPATION AND COMMENT SUMMARY

Members of the public and local residents, as well as technical agencies, stakeholder groups, and Indigenous communities who were involved in the 1999 EA were encouraged to provide input to the project team following review of the materials within the information package by providing their comments to the project team directly via mail e-mail, and/or phone.

3.1 Residents and General Public

A total of 27 comments were received during the commenting period. A summary of the comments received, and how these comments were considered in the Addendum to the ESR is provided below in Table 3.2. All comments received are included in **Appendix 3.**

Table 3.1 – Summary of Residents and General Public Comments Received

TOPIC OF COMMENT RECEIVED	COMMENT SUMMARY	CONSIDERATION OF COMMENTS IN CLASS EA
Recommended Cross-Section	- Some residents expressed a desire for a 3-lane cross-section. - Residents expressed a desire for improved cyclist and pedestrian facilities, with separation from vehicles. - Some residents expressed a desire to limit the number of driveway entrances onto McKeown Avenue, while property owners expressed desire to maintain current accesses. - Some residents preferred a multi-use path on the north side of the road, as opposed to the recommended south side.	- The 1999 EA recommended implementing a 5-lane cross-section. The 2006 Traffic Impact Study (TIS) reassessed the need to widen to 5 lanes, and it was determined that a 4-lanes cross-section was sufficient. The Transportation Needs Assessment undertaken for the Addendum to the ESR confirmed that a 4-lane cross-section is sufficient. 3-lane cross-section is not considered desirable based on the 4-lane cross-section east of the study area. - Pedestrians and cyclists will be accommodated via a 1.5-meter-wide sidewalk on the north side of the road, and a 3-meter-wide multi-use-path on the south side of the road, separated from the roadway by barrier curb and gutter. - Driveway entrances will remain in their current configurations. - Due to property and utility constraints, the new multi-use path is recommended to remain on the south side of the roadway. Additional traffic signal at McNamara and improvements to existing traffic signals will improve crossing ability for pedestrians and cyclists between the north and south side of the roadway.
McNamara Street at McKeown Avenue Intersection	- Residents expressed desire for improvements to the McNamara Street at McKeown Avenue including the desire to signalize the intersection including a controlled pedestrian crossing.	- Recommendations have been revised to signalize the intersection at McKeown Avenue and McNamara Street with a controlled pedestrian crossing.
Cartier Street at McKeown Avenue Intersection	- Residents expressed concerns regarding pedestrian and vehicular safety and operations and expressed desire for improvements to the Cartier Street at McKeown Avenue intersection.	- City has initiated a safety assessment of this intersection to confirm improvements required.
Midblock Intersection	- Residents expressed concerns regarding pedestrian and vehicular safety and operations and expressed	- City has expanded the study area to include the reconfiguration of the midblock intersection to address geometric, traffic control

TOPIC OF COMMENT RECEIVED	COMMENT SUMMARY	CONSIDERATION OF COMMENTS IN CLASS EA
between Cartier Street and Champlain Street	desire for improvements to the midblock intersection between Cartier Street and Champlain Street at McKeown Avenue.	and traffic volume requirements. This will include accommodation of additional traffic from Trussler School site development, need for additional left turn lanes on McKeown Avenue and signal & pavement marking modifications.
Champlain Street at McKeown Avenue Intersection	- Residents expressed desire for improvements to the Champlain Street at McKeown Avenue intersection including concerns regarding pedestrian safety, the ability to accommodate additional traffic from Trussler School, and operational concerns of the signal (left-turn queues, long wait times).	- City has expanded the study area to include the Champlain Street at McKeown Avenue intersection to address geometric, traffic control and traffic volume requirements. This will include accommodation of additional traffic from Trussler School site development, and consider the need for additional left turn lanes on McKeown Avenue and signal & pavement marking modifications. - City has initiated a safety assessment of this intersection to confirm improvements required.
Broader Network Improvements	- Residents expressed desire for improvements to various roadways including Champlain Street, McKeown Commons, and Algonquin.	- While these areas are beyond the scope of the Addendum, the comments will be considered by City staff for any potential future improvements.
Street Trees	- Residents expressed a desire for street trees.	- Impacted trees will be replanted in existing or similar locations.
Access to Businesses During Construction	- Property owners expressed concern regarding access to businesses during construction, especially after the impacts of Covid-19.	- Local businesses are to be notified well in advance of the start of construction to minimize impacts to adjacent businesses along the corridor. To this end, every effort will be made to keep business entrances open for as long as possible during construction. - The City /contractor will work with the owner to ensure construction activities are communicated well in advance of any disruption so that this information can be passed on to their clients. - Temporary directional signage directing vehicles to businesses in the study area will be added at specific locations along the detour routes.

TOPIC OF COMMENT RECEIVED	COMMENT SUMMARY	CONSIDERATION OF COMMENTS IN CLASS EA
Storm and Sanitary Sewer Improvements	- Some residents expressed concern regarding the feasibility of storm and sanitary sewer improvements.	- Storm and Sanitary Sewer Improvements to be confirmed during detailed design to ensure widening and future development is accommodated by City's infrastructure.
Development of former Trussler School	- Residents expressed concern regarding the redevelopment of the Trussler School property, including that the road network will not be able to accommodate the increase in vehicles associated with the development.	- While details of the development of the property are not within the scope of the EA Addendum, the Transportation Needs Assessment completed as part of this study included the expected site generated traffic volumes for potential development along the corridor, including the Trussler School property, to ensure the study recommendations accommodate future traffic, pedestrian, and cyclist volumes. - The assumptions made in the Traffic Impact Study (completed by owner of Former Trussler School property) for trips generated from this site are very similar to the assumptions made in the EA Transportation Needs Assessment.

3.2 Technical Agencies and Stakeholder Groups

An email containing the notice and details of the PIP was sent to relevant technical agencies and stakeholders on October 25, 2022. The complete list of Technical Agencies and Stakeholders who received the PIP Notification is provided in **Appendix 2**. Comments on the PIP display materials were received from the City of North Bay.

Table 3.2 - Summary of Technical Agency Comments Received summarizes the comments received from various technical agencies in review of the PIP.

Table 3.2 - Summary of Technical Agency Comments Received

AGENCY/ GROUP	COMMENT SUMMARY	CONSIDERATION OF COMMENTS IN CLASS EA
Ministry of the Environment Conservation and Parks (MECP)	- MECP noted that they expect a qualitative air quality assessment be completed and recommended that the original noise report be updated.	- Based on MECP's advice, the project team initiated a Traffic Air Quality Assessment and Traffic Noise Assessment.
North Bay-Mattawa Conservation Authority (NBMCA)	- NBMCA identified a watercourse feature regulated by NBMCA under Ontario Regulation 177/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourse (DIA) within the study area, noting that in any future planning for work in this area, a DIA permit would be required which would set out appropriate sediment and erosion controls and in-water work measures.	- It was noted that for any future planning for work in this area, a DIA permit would be required which would set out appropriate sediment and erosion controls and in-water work measures.
Ministry of Citizenship and Multiculturalism (MCM)	- MCM recommended that archaeological potential and potential for built heritage resources and cultural heritage landscapes within the study area should be reconsidered.	- Based on MCM's advice, the project team initiated a Stage 1 Archaeological Assessment and a Cultural Heritage study.

All comments received, meeting agendas and follow-up discussions involving Technical Agencies and Stakeholder Groups are included in **Appendix 3**.

3.3 Indigenous Communities

Various Indigenous communities were notified of the study through the Notice of the PIP, in order to identify any potential issues or concerns regarding possible impacts to Aboriginal and Treaty Rights, or any other interests or questions that the community may

have with regard to this study. The following Indigenous Communities were notified of the study and PIP:

- Nipissing First Nation
- Dokis First Nation
- MNO Region 5 - North Bay Métis Council
- Métis Nation of Ontario
- Anishinabek Nation

The North Bay Indian Friendship Centre was also notified of the study. An email containing the notice and details of PIP was sent to these Indigenous communities on October 25, 2022. No correspondence was received from any of the communities. The complete list of Indigenous communities that the Notice of the PIP was distributed to is provided in **Appendix 2**.

4.0 REVISED STUDY AREA AND NEXT STEPS

4.1 Revised Study Area

As noted above, based on the comments received, the City has extended the study area easterly to include the intersection of McKeown Avenue at Champlain Street. The revised study area is highlighted in **Figure 4.1**.

Improvements to this portion of McKeown Avenue were included in the 1999 ESR, and as such, the recommendations will be reflected in the Addendum to the Environmental Study Report (ESR) as discussed below.



Figure 4.1 - Revised Study Area

4.2 Next Steps

The next step in the Class EA Addendum process is to complete the Addendum to the Environmental Study (ESR) Report and issue the Notice of Filing of Addendum. This will

begin a 30-day review period for interested public, agencies, Indigenous Communities to review and provide comments to this Addendum to the ESR.

The Notice of Filing of Addendum will also advise the public that during the 30-day review period, a request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), **only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights.**

Following the public review period, the MECP has an additional 30 days to consider the project and review any potential Section 16 Order requests submitted. Following MECP review period, the project may proceed to detailed design and construction, provided the ministry is not reviewing Section 16 Order requests related to the project, and subject to any other permits and approvals that may be required.

Subject to comments received on the Project File Report, the City intends to proceed with the detailed design of this project in 2023. Due to utility relocation and permitting consideration, the anticipated road construction is expected in 2024, subject to budget approval. A summary of the next steps as anticipated timeline is described in the table below.

Table 4.1 – Anticipated Timeline of Next Steps

Activity	Timing
Project File Report and Notice of Study Completion	Spring 2023
Project File Report Public Review Period	30-days following Notice of Study Completion
Additional MECP Review Period	30-days following close of public review period
Detailed Design	2022-2023
Anticipated Road Construction (Subject to All Approvals)	2023

APPENDIX 1

PIP MATERIALS

McKeown Avenue Reconstruction

Schedule “C” Class Environmental Assessment Addendum



Online Public Information Package (PIP)

R.V. Anderson Associates Limited
engineering • environment • infrastructure

CANADA'S BEST MANAGED COMPANIES
Platinum member

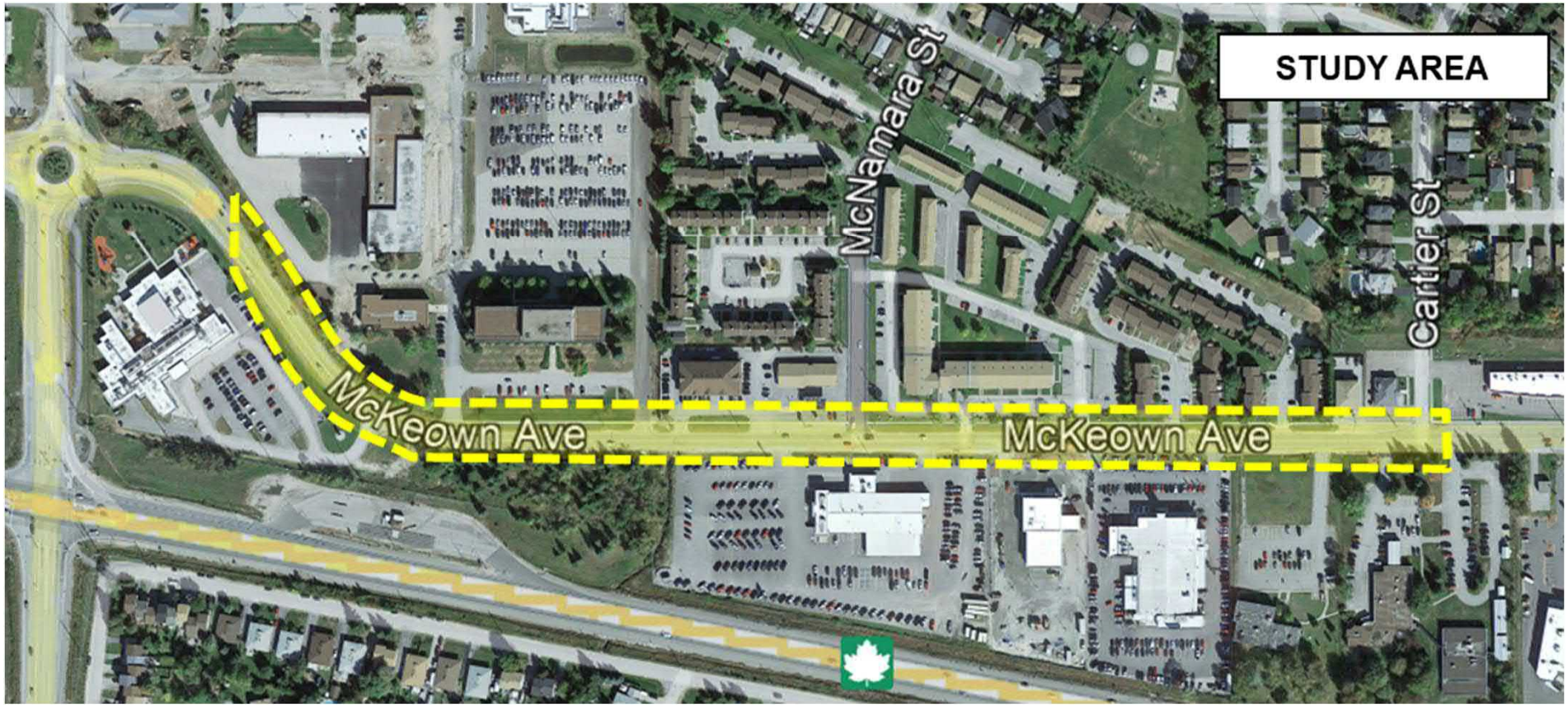
Purpose of the PIP

The purpose of this Public Information Package is to:

- Provide an overview of the:
  - Study area
  - Municipal Class Environmental Assessment Addendum Process
  - Background of the McKeown Avenue Reconstruction 1999 Class Environmental Assessment and relevant changes
- Present and gather your feedback on the:
  - Problem and opportunity statement
  - Alternative Solutions considered
  - Revised study recommendations
  - Preliminary impacts and mitigation measures

Study Area

The study area includes McKeown Avenue from Cartier Street to the Gormanville Road roundabout approach, the surrounding road approaches, as well as adjacent lands that may be affected.



Class EA Addendum

What is a Class Environmental Assessment (EA)?

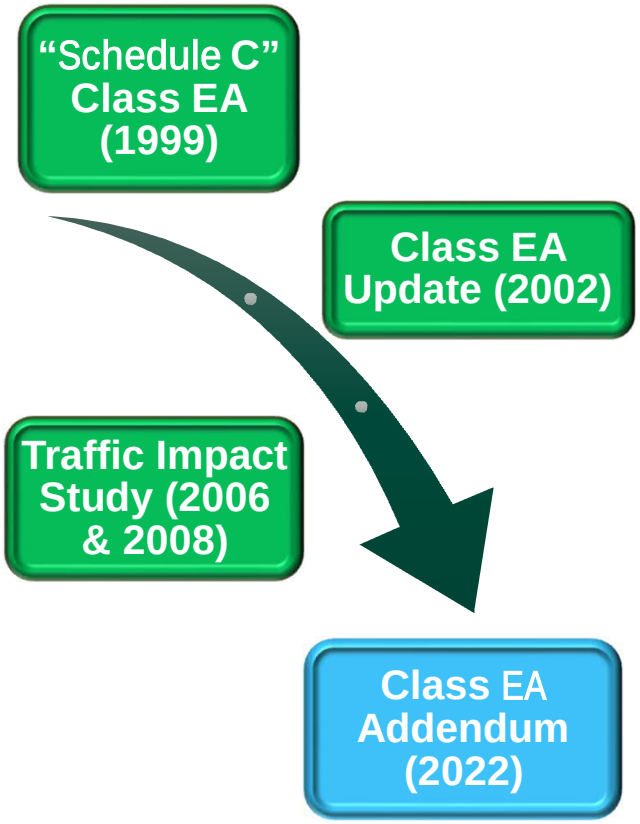
The Class EA is a planning process followed by municipalities in Ontario when planning for new infrastructure, which allows for public, technical agencies, and Indigenous community consultation and input.

What is a Class EA Addendum?

A Class EA report is valid for 10 years, after which an addendum needs to be completed prior to commencement of construction. A Class EA Addendum is a process to revise or update a Class EA's recommendations, to reflect changing regulations and site conditions since the original EA report.

Why are we doing it?

Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this 2022 Class EA addendum to reassess the widening of McKeown Avenue.



Timeline of McKeown Avenue Reconstruction

Schedule "C" Class EA (1999)



- Determined how to accommodate future traffic associated with planned developments along McKeown Avenue.
- Recommended widening to a five-lane cross section with 2 lanes in each direction, and a continuous centre left turn lane.

Class EA Update (2002)



- Re-evaluated the 1999 study recommendation, in consideration of additional traffic associated with the New North Bay Regional Health Centre, and general corridor development.
- Confirmed recommendation that McKeown Avenue be widened to a five-lane cross section.

Traffic Impact Study (2006) And Update (2008)



- Assessed the transportation needs of McKeown Avenue based on the implementation of commercial developments within the corridor.
- Concluded that the centre turn lane is not required, however a four-lane cross-section (two through lanes per direction) was still required.

Class EA Addendum (2022)



- As 10 years have passed since the 1999 ESR and 2002 Class EA Update, the 2022 Class EA Addendum was initiated to reassess the recommendations.

Changes to the Area since 2002

Changes to the study area include development along the corridor, and an associated increase in traffic, pedestrians and cyclists.

Changes in Land Use and Development

- Commercial development along the corridor
- New North Bay Regional Health Centre developed west of corridor
- Residential development in adjacent areas

Changes in Transportation Needs

- Current traffic volumes are 9,500 cars per day, which is expected to increase to 13,000 vehicles per day by 2041 (1999 Class EA anticipated 20,000 vehicles per day by 2004)
- Increased focus on accommodating cyclists and pedestrians

Problem or Opportunity Statement

The Problem / Opportunity Statement outlines the need and justification for the overall project and establishes the general parameters, or scope, of the study.

The Class EA (1999) and Class EA Addendum (2002) project objective was reviewed, and the Class EA Addendum Problem and Opportunity Statement was updated as follows:

- McKeown Avenue does not accommodate projected traffic volumes.
- McKeown Avenue does not balance the full range of potential users within the community, including users of all ages and abilities, pedestrians, cyclists, transit vehicles and motorists.

Alternative Solutions

The following alternative solutions to address the problem and opportunity statement were identified and developed for evaluation:

- **Alternative 1: Do Nothing** – Maintain existing cross-section, with no improvements.
- **Alternative 2: 4-Lane Cross-Section –** Widen the roadway to include 1 additional lane of through traffic in each direction.
- **Alternative 3: 5-Lane Cross-Section –** Widen the roadway to include 2 additional lanes of traffic in each direction, and a continuous centre left turn lane. (2002 recommendation).

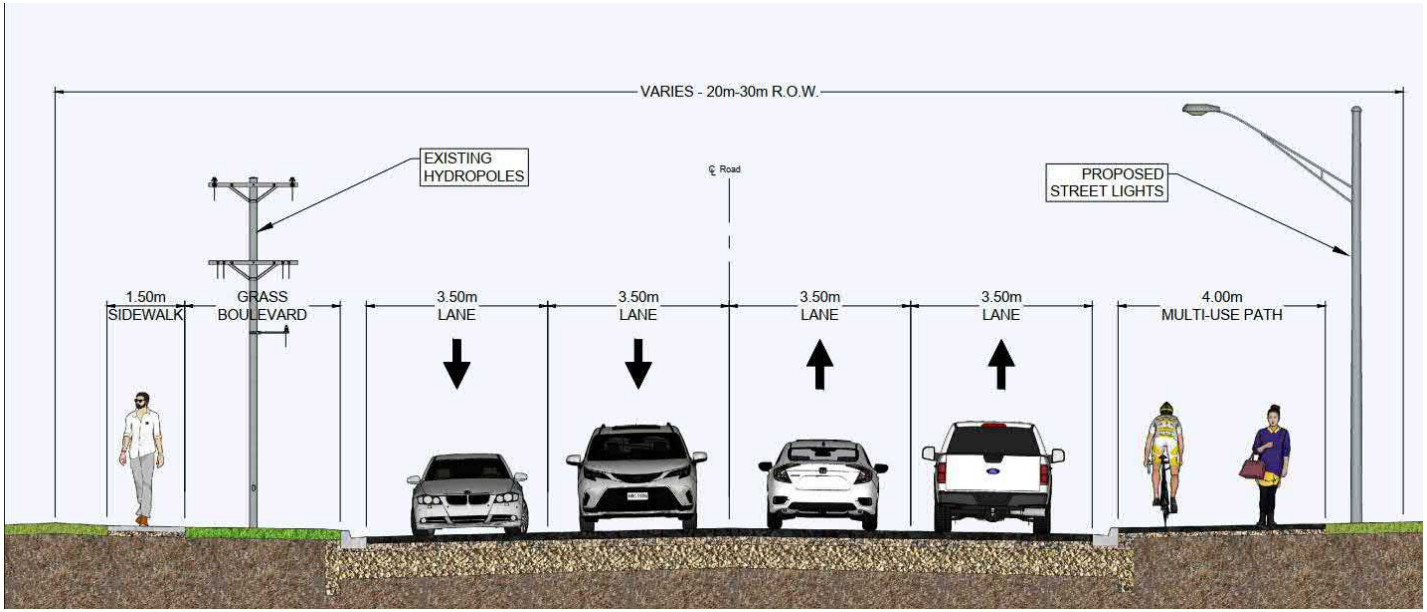
Alternative 1 – Do Nothing



- Does not accommodate projected traffic volumes and does not improve active transportation facilities
- Does not address the problem / opportunity statement

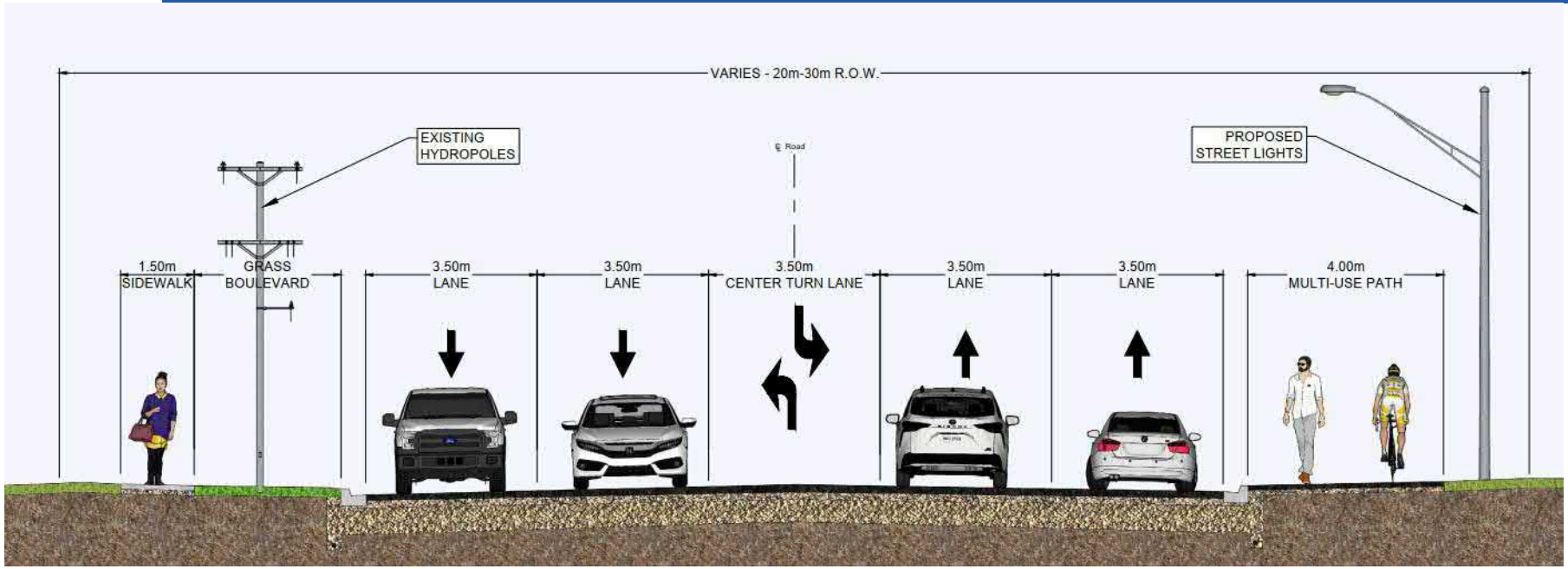
Note: This alternative is required to be considered under the Municipal Class EA planning process as a baseline for the comparison of alternative solutions.

Alternative 2 – 4-Lanes



- Relieves existing traffic congestion and accommodates projected traffic volumes.
- Provides continuity with the 4-lane cross sections of McKeown Road east of Cartier Street, and College Drive west of Gormanville Road.
- Utilizes existing sidewalk on the north side of the road, with a new multi-use path to accommodate pedestrians and cyclists on the south side of the road.
- Reduces property impacts, utility relocations, construction costs, and environmental impacts in comparison to wider cross-section.
- Provides more opportunities to motorists trying to turn into McKeown Ave from side streets

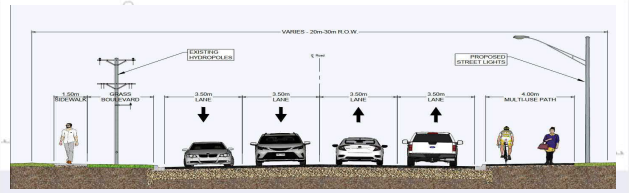
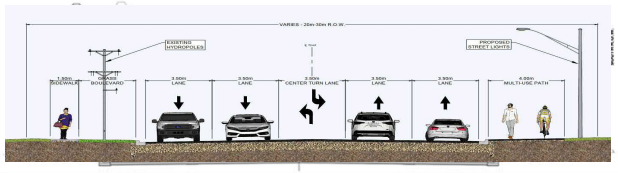
Alternative 3 – 5-Lanes



- Exceeds requirements of projected traffic volumes.
- Requires new sidewalk on the north side of the road, and a new multi-use path to accommodate pedestrians and cyclists on the south side of the road.
- Additional property acquisition, utility relocations, construction costs, and environmental impacts to accommodate wider cross-section.

Evaluation of Alternative Solutions

The alternative solutions were comparatively evaluated based on criteria representing the broad definition of the environment, as described in the EA Act.

Alternative Solutions	Traffic Operations & Safety	Social Environment	Natural Environment	Cultural Heritage Resources	Cost	Evaluation Summary
Alternative 1 - Do Nothing	○	◕	●	●	◑	Not Recommended
 Alternative 2 - 4-Lanes	●	◑	◕	●	◑	Recommended to be Carried Forward
 Alternative 3 - 5-Lanes	◑	○	◑	●	○	Not Recommended

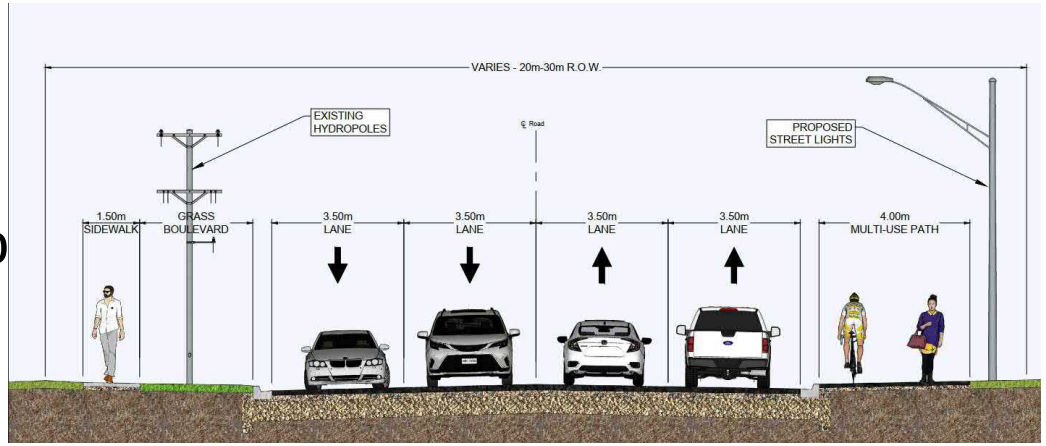
Legend for Factor Evaluation

Least Preferred → Most Preferred

○ ◔ ◑ ◕ ●

Alternative 2 – 4-lanes is the recommended solution to be carried forward.

Summary of Study Recommendations



Transportation Recommendations

- Widen roadway to 4-lanes
- Introduce new multi-use pathway to accommodate pedestrians and cyclists.

Stormwater Recommendations

- Install new underground infiltration facility to accommodate road widening, in consideration of climate change.

Sanitary Sewer Recommendations

- Existing sanitary sewer to be removed and replaced with larger diameter trunk main to accommodate current flows.

Key Impacts and Mitigation Measures

While implementing the 4-lane cross section has fewer impacts than the 2002 recommendation of 5 lanes, some impacts are anticipated.

Vehicle Traffic, Pedestrians and Cyclists	• Improved traffic operations and active transportation facilities.
Social Environment Impacts	• Approximately 710 m² of property acquisition required • Approximately 591 m² of easement required to accommodate underground infiltration facility.
Natural Environment and Climate Change Impacts	• Minor impact on existing trees due to widening. • Minor impacts to aquatic environments from works adjacent to Pinewood Creek and from culvert works
Utility Impacts	• Minimum relocation of utility poles is anticipated, and relocation of underground Bell line may be required. No major impacts to watermain or gas is anticipated.

Mitigation measures will be further developed during detailed design, to reduce the severity and duration of any impacts.

Next Steps



- Review and address the comments submitted on this PIP (please submit comments by **November 11th,2022)**.
- Consult with additional stakeholders and technical agencies, as required.
- Prepare and submit a Notice of Filing of Addendum for 30-Day public review.
- Proceed with detailed design with construction to begin in 2023 (pending Council approval and budget).

Thank you!

Thank you for reviewing the materials. Your input is important!

You can provide your comments, questions, or concerns to the contact listed below by **November 11th , 2022.**

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

APPENDIX 2

NOTIFICATION MATERIAL

APPENDIX 2-1

Notices

NOTICE OF PUBLIC INFORMATION PACKAGE

McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum

The Study

The City of North Bay is preparing an Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). The study area includes McKeown Avenue from Cartier Street to the Gormanville Road roundabout approach as shown in the key plan below. The project is being completed in accordance with requirements for Schedule 'C' projects within the Municipal Class Environmental Assessment (October 2000, amended in 2007, 2011 & 2015) process under the *Ontario Environmental Assessment Act*.



Why We're Completing It

Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations.

Get Involved

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: https://www.northbay.ca/projects/mckeown-avenue-reconstruction-schedule-c-class-environmental-assessment-addendum/. Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, or request a hard copy of the online material, contact the below by **November 11th, 2022**.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

This notice was first issued October 25, 2022

*Information collected will be used in accordance with the Freedom of Information and Protection Privacy Act. With the exception of personal information, all comments will become part of the public record.

Connor MacIsaac

From: Connor MacIsaac
Sent: October 25, 2022 2:50 PM
Cc: Jimmy Rathod; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package
Attachments: 216166-McKeownRoadEA_NoticeofOnlinePIP_Final.pdf

Categories: Filed by Newforma

Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

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Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by **November 11th, 2022**.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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McKeown Avenue Reconstruction - Schedule “C” Cla...



Timeline

- [ ] **The time to provide your comments, questions, or concerns to the contact listed below has been extended until November 11th, 2022**

Reid Porter Infrastructure Engineer City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Related Documents

McKeown Avenue Reconstruction Schedule “C” Class Environmental Assessment Addendum

Contacts

Reid Porter
Infrastructure Engineer
reid.porter@northbay.ca
(705) 474-0400 ext. 2304

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APPENDIX 2-2

Technical Agency Stakeholder List

McKeown EA Addendum

Updated: 2023-01-24

Agency	Contact	Title	Notice of PIP (date sent)
Provincial Ministries, Agencies and Departments			
Ministry of the Environment, Conservation and Parks (MECP)	Northern Region		2022-10-25
Ministry of the Environment, Conservation and Parks (MECP)	Mira Majerovich	Northern Region Environmental Planner	2022-10-25
Ministry of the Environment, Conservation and Parks (MECP)	Ellen Cramm	EA Co-ordinator	2022-10-25
Ministry of Transportation	Sylvie Lauzon	Corridor Management Officer	2022-10-25
Ministry of Natural Resources and Forestry (MNRF)	Mitch Baldwin	District Manager	2022-10-25
Ministry of Tourism, Culture and Sport (MTCS)	Karla Barboza	Team Lead(A), Heritage Heritage Planning Unit Programs and Services Branch	2022-10-25
Ministry of Tourism, Culture and Sport (MTCS)	Dan Minkin	Heritage Planner (Culture Services Unit)	2022-10-25
Ministry of Tourism, Culture and Sport (MTCS)	Rosi Zirger	Heritage Planner (Culture Services Unit)	2022-10-25
Ministry of Indigenous Affairs	Lise Chabot	Manager, Ministry Partnerships Unit	2022-10-25
Environmental Assessment and Permissions Branch		Director	2022-10-25
Conservation Authority			
North Bay-Mattawa Conservation Authority	Paula Scott	Director - Planning & Development	2022-10-25
North Bay-Mattawa Conservation Authority	Chitra Gowda	CAO, Secretary Treasurer	2022-10-25
City Services			
City of North Bay Fire Department	Jason Whiteley	Chief	2022-10-25
City of North Bay Police Department			2022-10-25
City of North Bay Transit	Drew Poera	Manager	2022-10-25
North Bay General hospital			2022-10-25
District of Nipissing Social Services Administration Board (DNSSAB	CATHERINE MATHESON	Chief Administrative Officer	2022-10-25

Agency	Contact	Title	Notice of PIP (date sent)
Heritage North Bay	Naomi Rupke	Museum Director	2022-10-25
Education			
Canadore College	George Burton	President and CEO	2022-10-25
Nippising University	Dr. Kevin Wamsley	President, Vice-Chancellor	2022-10-25
Near North District School Board			2022-10-25
Nippissing Parry Sound Catholic District School Board			2022-10-25
Conseil scolaire catholique Franco-Nord			2022-10-25
Indigenous Groups			
Union of Ontario Indians	Gary Dokis	Chief Administrative Officer	2022-10-25
Dokis First Nation	Gerry Duquette	Chief	2022-10-25
North Bay Indian Friendship Centre	Justin Plouffe		2022-10-25
North Bay Indian Friendship Centre	Brandon Manuel	Asst. Director	2022-10-25
North Bay's urban Aboriginal Strategy - North Bay Indian Friendship Centre	Dawn Lamothe	Urban Aboriginal Strategy Coordinator	2022-10-25
Nipissing First Nation	Scott McLeod	Chief	2022-10-25
Nipissing First Nation	Joan McLeod	Lands Manager	2022-10-25
Nipissing First Nation	Dwayne Nashkawa	Executive Director	2022-10-25
Additional Stakeholder Groups			
Downtown Improvement Area	Jeff Serran	Executive Director	2022-10-25
Community Waterfront Friends	Rod Johnston		2022-10-25
Heritage Gardeners	Monica McLaren		2022-10-25
Rotary Club of North Bay	Brett Tucker	President	2022-10-25
Kiwanis Club of North Bay	Sheldon Forgette	President	2022-10-25
Lions Club of North Bay	Raymond Weiler	President	2022-10-25
Nippissing Naturalist Club			2022-10-25
Northwatch			2022-10-25
North Bay and District Chamber of Commerce	Patti Carr	Executive Director	2022-10-25
North Bay and District Chamber of Commerce	Kyle Thomas	Chair Young Professionals	2022-10-25
Invest North Bay Economic Develpoment Corporation	George Burton	Chair	2022-10-25
Discovery North Bay	Naomi Rupke	Museum Director	2022-10-25
Downtown Inc	Rob Jamieson		2022-10-25

Agency	Contact	Title	Notice of PIP (date sent)
Downtown Inc	Brad Minogue		2022-10-25
Municipal Heritage Committee	Peter Carello		2022-10-25
MAAC	Nora Long		2022-10-25
Coordinating Body of Arts Culture and Heritage North Bay	Katie Beaven		2022-10-25
Developers Liason Advisory Committee	Rick Miller	Miller and Urso Surveying	2022-10-25

APPENDIX 2-3

Notice Distribution Area



LEGEND:

PIP NOTIFICATION DISTRIBUTION AREA

NORTH BAY	MCKEOWN AVENUE RECONSTRUCTION SCHEDULE 'C' MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT ADDENDUM TO THE ESR
arva R.V. Anderson Associates Limited engineering ● environment ● infrastructure	PIP NOTIFICATION DISTRIBUTION AREA

APPENDIX 3

COMMENTS RECEIVED

APPENDIX 3-1

Comments Received: General Public and Residents

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 11, 2022 6:15 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Ave

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Hi Reid,

With regards to McKeown Ave and upcoming possible expansion I was wondering if widening is the best solution.

North bay spent so much money trying to improve active living infrastructure. And traffic and pedestrians continue to be so close together. Has the option of a single lane in each direction,as we have now, with an additional center left turn lane and possible paved areas for the occasional bus stop along the route been considered? This would permit continuous flow of traffic without hold ups from turning vehicles and bus merging and would also preserve some green space on the shoulders and leave the option of a multi use path or sidewalk not immediately adjacent to the vehicles. This would be so much nicer for pedestrians vs having a multi lane road running parallel to a large highway a few hundred feet away.

A single lane each way reduces the issue of more aggressive traffic weaving in and out 'trying to get ahead' like we have on Lakeshore and trout Lake road. Resulting in a safety city

A lot of Europe countries manage traffic so much better than our north american ways. As a resident of North bay who would like to grow and raise a family here I'd love to see a more pedestrian/ active lifestyle oriented city. Now is the perfect time to make our community safer and more inviting to new residents and tourism.

I'd love to hear your take on it. Thanks for hearing mine.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 9, 2022 10:07 AM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>; Jonathan Kapitanchuk <Jonathan.Kapitanchuk@northbay.ca>; John Severino <John.Severino@northbay.ca>; Peter Carello <Peter.Carello@northbay.ca>; Mark King <Mark.King@northbay.ca>; Tanya Vrebosch (Council) <Tanya.Vrebosch@northbay.ca>
Subject: [EXTERNAL] feedback on the McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum

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Good afternoon folks.

I'm writing today to express my concerns with regards to the proposed development of a 120 unit residential building situated at the former Trusler school. My concerns specifically revolve around both pedestrian and motorist safety. Being the proprietor of a construction company for 15 years in this City, I know first hand the importance of understanding traffic and how it relates with traffic flow and pedestrian safety. We practice safe traffic plans on a daily basis in order to ensure proper communication for all drivers and pedestrians alike. In addition to my experiences coordinating traffic plans and working directly with traffic over the years, being a resident at [redacted] I get to see first hand how the traffic behaves in this area and I must say, I am concerned. My understanding is that the City is proposing a new traffic plan development on McKeown Ave from Cartier St to Gormanville Ave which will undoubtedly make it easier to enter McKeown from Cartier St but only if you are heading West. If motorists aren't heading West and they want to go East, we all know that when a motorist has a route in mind they are going that way regardless and with the majority of businesses being in the East end of McKeown most motorists will not go around to Gormanville, the highway and back up Algonquin to get to these places, they will sit there and wait, which will back up traffic or they will panic and rush which will increase the chances for accidents for both drivers and pedestrians. We are seeing these "increased risk" opportunities today with the moderate numbers of vehicles exiting Cartier St, these risks will only increase when we add 180 additional vehicles to the mix. In my opinion,

altering McKeown west to Gormanville alone will not suffice. In order to ensure safe passage for all, I believe the City needs to also consider traffic options for Champlain St along with its intersection at McKeown Ave. Champlain street today is a problem area for most motorists for a number of reasons and adding an additional 180 vehicles to the mix along with visitor-vehicles for this proposed housing development will only further complicate matters. It is common to see traffic backed up on Champlain st from all the cars parked on the West side of Champlain between Nancy and Oakdale. While there may be just enough room for two lanes of traffic for the experienced drivers, the majority of drivers must stop in at least one direction to allow the other lane to proceed. This is the cautious way for most but you always get the odd one who zooms by without care for others. Add garbage or recycling days to the mix and it becomes even more apparent how congested that street can be. Just the other day I saw a bus driver with its lights on waiting over 5 minutes for the kids to come out which caused the traffic to back up from Paul St to Leonard st. Once you've managed to get through this congested area then you have to deal with the traffic lights at McKeown. Early in the morning, if you're heading South bound on Champlain towards the intersection, you are waiting longer than normal for the light to turn green. I have seen on several occasions vehicles going through the red light because the light just won't turn green. During peak hours when traffic flow is high, the flow will come to a halt as soon as there's a left turning vehicle (vehicle heading Eastbound coming from Champlain). It is in that scenario that I have personally witnessed many close calls for both vehicles and pedestrians. When traffic gets halted for too long, people get impatient and then they take risks.

Please consider these concerns that we, the residents of Thibeault Terrace, notice everyday. I don't feel that too many of us are opposed to the development of the Trusler property because we all know this city needs more housing but not at the expense of motorist and pedestrian safety.

Thank you for your time.





From: J[redacted]
Sent: November 3, 2022 8:16 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Ave

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Hello Reid.

McKeown Ave is quickly becoming the new Lakeshore Drive which still has issues at some intersections lacking left turn lanes and insufficent advance green signals. Having the signals set up better so you don't have to sit waiting for the light at 5 or 6am when absolutely no traffic is traversing Champlain St should be addressed. The syncronized light set up on McIntyre St was a big improvement a number of years ago to keep traffic flowing. Turning left at Canadian Tire should be terminated off McKeown as it impeds traffic at Champlain. There is no reason the Cdn Tire entrance off Champlain cannot be used or enter at the A&W and make your way there as much traffic currently does anyway. I was skeptical years ago when the roundabout was proposed but I travel it frequently and it was the best thing the city ever did. There is probably not enough real estate to put one at Champlain St? During a visit to Oshawa a while back they are installing them at just about every intersection in a new developement. Traffic flows and there is no expensive traffic light systems to buy or maintain. The city bus drivers may not like it but having a pull off area to get out of the flow of traffic. Especially now the many are taking bikes with them on the transit buses. The exit at McDonalds needs a better fix to prevent traffic from continuing to illegally turn left out of there. Lastly the intersection at Lucky 13 also needs better lighting and restrictions on those mobile sidewalk signs they use that obstruct the view when trying to enter McKeown. There should be a minimum distance requirement from any intersection for those if there is not already?

Regards,

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 1, 2022 3:45 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] feedback on the McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum

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To: Reid Porter, Infrastructure Engineer, City of North Bay

From: [redacted] Ursula St, North Bay

Dear Reid,

Per the "McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum", I am submitting my comments about this plan. Thank you for enabling me to provide my thoughts through the public engagement process. My wife and I live on Ursula St, so I am writing to you in that context.

My main concern is the current and future difficulty entering and exiting my neighbourhood via the 3 existing access points to McKeown. As it stands today, it is extremely difficult to turn left (East) onto McKeown from our neighbourhood from either Cartier or McNamara. In my opinion, adding 2 more lanes to McKeown will improve our ability to turn right (West) but will make it even more difficult to safely turn left from these 2 streets. Thanks to the traffic circle to the west, which has greatly improved traffic flow at Gormanville, there are no breaks in traffic flow from the west whenever things are busy. The traffic circle prevents traffic from stopping, so it moves better at Gormanville but provides a steady non-stop stream of vehicles that make turning left (East) dangerous from our neighborhood at both Cartier and McNamara.

One might suggest that anyone turning left (East) should go to the Champlain intersection, which is controlled by lights. On the surface, it seems like a good idea but as your own traffic studies have indicated, that intersection already suffers from safety issues, especially for pedestrians. Nothing in your plan alleviates that problem. Also, the natural traffic flow from the streets in the west end of Thibeault Terrace draws people to enter/exit via McNamara or Cartier. People who live west of the Cartier-McGibbon intersection are unlikely to use Champlain.

Given that the City is approving a new multi-story apartment building on the former Trusler School property, there will be even more traffic at the Champlain-McKeown intersection, which can only make the safety of that intersection worse. The plan for the new apartment indicates parking for 180 vehicles (120 households). I do not see any consideration in your plan to handle the extra vehicles from the new Trusler apartment building. The current residents have 26 households accessing Justin and Cartier – adding 120 more households will result in roughly five times more traffic in morning and evening rush hours. Some of this will likely spill over onto Cartier and McNamara as people grow frustrated with the long wait for the Champlain-McKeown light. This will exacerbate the limited traffic flow that is available on both Cartier and Champlain due to the large number of cars that are parked on the street due to the number of multi-use residences (single family homes used as 4-6 bedroom apartments) permitted in our neighbourhood. I suggest your plan be extended to include examination of the McKeown-Champlain intersection, particularly with the new apartments in mind and how they will impact traffic flow to/from McKeown.

With respect to the recent traffic study used to justify increased vehicle traffic from the new Trusler Apartments, I believe elements of that study were flawed. The study was completed during Covid, resulting in reduced traffic flow from people who were no longer driving to/from work as well as the much-reduced number of students who would normally be living in our neighbourhood but who stayed home to study remotely during Covid. Despite the authors indicating that they added 10% to their numbers, if you are using that traffic study as a basis for considering the issues I am bringing up, I suggest that you should try a new traffic study in 2023 that includes all 3 exit points (Champlain, Cartier and McNamara) while college and university students are resident and ensure it includes mid-winter, when the snowbanks and the on-street parking make it more difficult to navigate these streets. I believe you will find Champlain becomes very dangerous and that Cartier and McNamara suffer from reduced safety and increased congestion issues, greater than what has been reported in the most recent traffic study.

The multiuse path planned for the south side of McKeown will be useful for those people who are already on the south side of the street, but few residents live on the south side. Accessing the path from our neighbourhood is fraught with danger. Crossing at Champlain, as I earlier stated, has been shown to be dangerous by your own traffic studies. People using McNamara or Cartier will not be able to benefit from the multiuse path except by running across 4 lanes of traffic or by using the light at A&W or Champlain St. I do not foresee pedestrians or cyclists who are currently accessing McKeown from McNamara changing their habits to either walk or cycle to Champlain or to the light at A&W.

The light at the A&W has its own set of problems in the current context. It works well on the south side, with plenty of lane space for people exiting onto McKeown from the businesses on the south side. However, on the north side, you cannot have more than a single vehicle waiting for the light to change while exiting onto McKeown from those businesses. If there are 2 or more vehicles waiting to enter McKeown from the north side, the parking lot is divided in two and nobody can enter or exit safely from/to McKeown. Adding more lanes to the west will not make this any easier. I suggest you expand the scope of your project to include this intersection.

Although I applaud the expansion from 2 to 4 lanes to ensure better traffic flow for the full length of McKeown, I think we need to examine more closely how it affects the people living on the north side and make plans to accommodate our access to/from McKeown.

Respectfully,

J[redacted]
[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 4, 2022 9:35 AM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] reconstruction of McKeown Avenue

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Good morning,

Trees, this road needs trees to shade the sidewalk. I don't know if you've walked down McKeown or not, but during the warmer months, this street is a heatsink and is extremely hot and sunny. Planting trees down the road would be a cheap fix and would make a massive difference. Not many people walk down this road because it's not a pleasant walk. Having more trees might increase foot traffic and cut down on the number of cars on the road.

Also, it needs more areas for pedestrians to cross. This street is near so many homes, stores, and the college and university...and yet it is not pedestrian friendly.

That's all I have to add, thank you for reading this.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 3, 2022 6:56 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown ave

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Why is the center turn lane with two different directions of traffic not feasible ???? Do the curbs & infrastructure with the pedestrian paths ...DUHHHH.The only thing holding up traffic is the people turning .As I said turning lane in the middle.

Sent from Mail for Windows

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 9, 2022 11:04 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>; Jonathan Kapitanchuk <Jonathan.Kapitanchuk@northbay.ca>; John Severino <John.Severino@northbay.ca>; Mark King <Mark.King@northbay.ca>; Peter Carello <Peter.Carello@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue 1999 Schedule C Class Environmental proposal

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Nov.9, 2022

Dear Mr. Porter

I'm writing to express my concern with the McKeown Avenue 1999 Schedule C Class Environmental proposal re proposed expanded laning of McKeown Avenue.

I know that we are in desperate need of affordable housing in North Bay. However, I have numerous concerns with the lack of green space, safe walking and crossing for pedestrians, parking, as well as the already problematic traffic flow into and out of the Thibeault Terrace area.

The housing development scheduled to take place on the site of the former Trusler school and it's concomitant impact on vehicular and pedestrian safety along the McKeown Avenue corridor will only serve to exacerbate the traffic flow problem.

It is already extremely difficult to access McKeown Avenue from Champlain St. due to the long length of the east/west traffic light. Depending on pedestrian traffic and turning cars, rarely can more than four cars move through the light before it changes. The only other access to Champlain would be to take the Cartier Street entrance. Because McKeown at Cartier is extremely busy with traffic headed both to Nipissing University and the Regional Health Centre as well as all the commercial enterprises along McKeown, it is very difficult to turn left from Cartier St. onto McKeown especially during the busiest hours. One lane to turn right into is not much help either.

Has consideration being given to advanced green lights and or a traffic light being installed at the Cartier Street entrance to McKeown?

I know the plans call for maintaining the existing sidewalk on the north side of McKeown and a multi use bike/ pedestrian path on the south side of McKeown. What measures will be made to ensure the safety of pedestrian and bike traffic along McKeown, especially for those residents from the heavily populated north side of McKeown who wish to cross McKeown on foot, on bike or in a vehicle? We need only look at the result when pedestrians crossed Algonquin Avenue to the Medical Arts Building. Can we anticipate stop lights at McNamara and Cartier Street intersections as well as Champlain to ensure the safety of pedestrians and drivers alike?

Thank you for your consideration



[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 12, 2022 12:59 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] widening McKeown Ave

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My apologies for the delayed input, I will provide my comments and questions for your consideration and look forward to your response. Thank you.

- I have lived, worked and travelled daily within the boundaries of the proposed widening and although the projected traffic volumes are far, far below what was anticipated, I can say assuredly that neither current nor future traffic volumes warrant a four or five lane reconstruction.

- The traffic volume projection to 2041 is without merit since there is no residential or business expansion available within the designated area or beyond that would suggest a 50% increase in traffic is conceivable (much like the 1999 errant 2004 projection).

- With reference to the current volumes of 9,500 daily vehicles, at what exact location(s) was this measured, and is that traffic count study available for scrutiny?

- In my almost 50 years or travel along the entire stretch of McKeown, never has there been congestion, a collision or traffic related incident within the limits of the proposed reconstruction that would lead one to believe that expansion is necessary, particularly since detour around any incident can be easily overcome vis-à-vis the use of existing side streets.

- The Evaluation of Alternative Solutions (Page 12 of the Assessment Addendum) is speculative and misleading in its recommendation.

- What would, in opinion, complement uninterrupted vehicular travel is a left turn lane (for eastbound traffic) at McNamara Street.

- Both east and westbound traffic would be enhanced with the construction of public transit pull-by's - at the current bus stop locations.

- A multi-use path should be incorporated into the existing infrastructure on the north side of the roadway, (not the south as shown) since between Cartier and McNamara, all residential access as well as retail business (excluding auto dealerships) is located on the north side. This would prevent cyclist from having to cross the roadway to get home or access the customer-focused businesses.

Again, thank you for the opportunity to comment.

Regards,



[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 3, 2022 4:33 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Ave reconstruction

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Good afternoon,

I am inquiring if the plan will introduce new lights at Lucky13 - McNamara?

I did not see anything about the addition of lights. My apologies if it did and I missed it.

As traffic increases, and speed of traffic (which it will), I would be concerned of an increase in accidents from people turning left from McNamara onto McKeown during rush hour without lights.

Thanks,

[redacted]

[redacted].

[redacted]

[redacted]

From: Peter Chirico <mayorchirico@northbay.ca>
Sent: December 9, 2022 3:09 PM
To: 'les cott' <alderca@hotmail.com>
Cc: David Euler <David.Euler@northbay.ca>; Erin Richmond <Erin.Richmond@northbay.ca>
Subject: RE: [EXTERNAL] McKeown Ave reconstruction, and former Trusler school plan

Good afternoon Les:

My apologies for the late reply. I have copied your e-mail to David Euler (CAO) for follow up and a reply.

Appreciate your information.

Peter

Peter Chirico
Mayor
The Corporation of the City of North Bay
200 McIntyre Street East, North Bay ON P1B 8V6
Tel: 705-474-0400 ext. 2517
Email: mayorchirico@northbay.ca
Website: www.northbay.ca

The **Growth Community Improvement Plan (GCIP)** is designed to help grow and improve our community through targeted city-wide programing for housing, industrial, downtown and waterfront projects. Click here to see if you are eligible.

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From: [redacted]
Sent: December 4, 2022 8:30 PM
Subject: [EXTERNAL] McKeown Ave reconstruction, and former Trusler school plan

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To: the Mayor and relevant City Councillors
Peter Chirico, Maggie Horsfield, Lana Mitchell, Justine Mallah,
Sara Inch, Gary Gardiner.

I'm writing as a resident of the area known as Thibeault Terrace to express my concerns regarding the proposed developments to the McKeown St. traffic corridor ("McKeown Ave Reconstruction Plan") and also the rubber stamped approval of the very rudimentary plans for the last large parcel of developable land in the area, the site of the former Trusler public school.

While further development and improvements for the very busy and frequently congested McKeown St. corridor is needed, I'm not convinced all the relevant data needed from the area has been considered. I'm especially concerned that the traffic data for the plan wasn't all encompassing or even accurate, in terms of how current it was, or that it took in the mitigating environment of the health lockdowns. Also, and by no means least, to my knowledge the significantly increased traffic from the completed proposed build on the former Trusler school site was not factored into the new traffic plan. (However, it's difficult to surmise at what level the traffic plan, or indeed the surrounding residents, will be impacted given the sketchy development plan submitted by the developer; he/they seems to have been given approval on the honour system, so little was submitted for the area residents to look at.) For example, will year round on-street parking be allowed with the new plan between Cartier St and McKeown Ave. on Champlain? If it will be allowed, it shouldn't be, and how that seemingly small aspect can impact on the plans for the area. Also, as the secondary but no less busy entrance to the Terrace, at Cartier St. and McKeown, what solutions to the congestion and safety issues are being considered? Also, are dedicated right-hand turn lanes in all directions at the Champlain and McKeown intersection being considered?

I might also add that in general, if I may speak for them, the residents of the area feel on the whole that very little has been done to communicate in an informative way, on the future plans in and adjacent to the area, from the respective offices at City Hall. The general consensus as to the site development on the former Trusler school land is one of resignation and low expectations given how little visualization was given to the residents. And I might add, as a result of the shocking lack of regard to the surrounding residents that the buyer of the school and land has; over a period of several years the maintenance and general upkeep has been completely neglected, with the additional impact of what is basically junk accumulating all over the property, with the result that the area residents have been living with what looks like a junk yard.

Future development is unavoidable. But perhaps a better rendering and availability of the nature and scope of the proposed developments is needed and possible so that the people who's lives all this development impacts for the next decades, can have their say and input into their futures.

Sincerely,
[redacted]

[redacted]

November 8, 2022

E-Mail only to: reid.porter@northbay.ca

Reid Porter, P.Eng.
Infrastructure Engineer
City of North Bay
200 McIntyre Street East
North Bay, ON P1B 8H8

Dear Sir:

Re: McKeown Avenue Reconstruction
Update to Schedule 'C' Municipal Class Environmental Assessment (EA)
Public Information Package (PIP) | Comments

We are the owners of residential and commercial properties known as 501, 555, and 579 McKeown Avenue (the Subject Properties) which are generally located on the north side of McKeown Avenue and on the east side and west side of McNamara Street; as such, we have an interest in this EA.

I have not reviewed the previously filed Environmental Study Report of decades past. The only material available to me seems to be the slide presentation entitled "Online Public Information Package (PIP)" which provides a quick summary of the project. I provide my comments as follows:

- Scheduling

  Upfront, over the past two years, COVID-19 has had detrimental effects on our commercial tenants' businesses. It will be vital that impacts to these businesses be minimized during construction and access maintained. If vehicular traffic is impeded, customers will likely take the path of least resistance by shopping elsewhere and these businesses have suffered enough already. Therefore, scheduling and budgeting need to take this into consideration.

- Alternative 2 (4 Lanes)

  - Road Cross-Section

  I am somewhat confused as to what the current traffic counts are and the future projections. The PIP makes mention that the previous EA projected 20,000 ADT by 2004 and this is clearly wrong because the PIP also mentions the current count as 9,500 projected to 13,000 by 2041. Therefore, I question the need for 4 lanes if the planning horizon is 2041. Perhaps as a fourth alternative, two lanes and a two-way center left turn lane should be investigated and given the distinct difference of land uses east of Cartier Street versus west of Cartier, this may be the most economical and viable alterative.

- ROW Widening

It's important to recognize that the Subject Properties are built and fixtures installed (eg. gas station fuel tanks) with parking for the businesses already configured. We would be opposed to any widening of the ROW on the north side. Conveying any land from the Subject Properties would create a loss of parking and severely hurt business. We want to ensure that the final design does in fact make use of the existing sidewalk on the north side as mentioned in the PIP.

- Active Transportation

A Multi-Use Pathway (MUP) seems to be contemplated on the south side of the ROW and the cross-sections show a width of 4.0 meters. I question the need of this width as 2 to 3 meters should be sufficient for an MUP in this location. Furthermore, the project should not only look at the initial capital cost to install the works, no matter where the financing comes from, but also look at the ongoing maintenance costs which are borne by the rate payer.

- Access to Subject Properties

The Subject Properties have existing curb cuts fronting McKowen with full left and right turn access. We'd like to ensure that the existing location of the curb cuts are carried forward into the design and no changes are made to our accesses.

- Stormwater Management

We are all aware of climate change and the spring snow thaws that wreak havoc in this area that is prone to flooding – it must be corrected as part of the works. The PIP mentions installing a new infiltration gallery and I would oppose this option. Firstly, this area has a high groundwater table; if there is not enough clearance, it may not even work. My next concern is the ongoing maintenance as these facilities clog up with time. I also question the current sizing and state of repair of the existing STM pipe. I'd like to see the entire STM system replaced with an increased size and a quality control device added downstream.

- Sanitary Sewer

The PIP mentions replacing this pipe to accommodate current flows. It would be my position that this area suffers from an inflow and infiltration problem; when there is a spring thaw event, we experience sanitary backflows into residential units. This does not mean the SAN sewer should be replaced – it means it should be retrofitted to eliminate I&I.

In short, I am much more concerned with the below ground infrastructure than the current road configuration as it stands today. If there are any plan plates available, we would appreciate a copy be provided to us so we may assess any impacts including utility re-location.

As an interested stakeholder, we would appreciate being kept updated on this project and circulated when an ESR is available.

We thank you for the consideration of these comments and would be willing to meet to discuss our comments further.

Yours truly,

NEW ERA HOMES LIMITED

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 11, 2022 3:09 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Reconstruction EA

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Hi Reid

Just a couple of questions regarding the McKeown Reconstruction:

- Will the multi-use component run the whole length?
- Will any trees be planted? If so, where? I've walked along that stretch and it's extremely hot in the summer with no trees.

Thanks for the opportunity to respond.

Best Regards,

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

-----Original Message-----
From: [redacted]
Sent: November 3, 2022 7:42 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>; Jonathan Kapitanchuk <Jonathan.Kapitanchuk@northbay.ca>; John Severino <John.Severino@northbay.ca>; Peter Carello <Peter.Carello@northbay.ca>; Mark King <Mark.King@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue Reconstruction Schedule "c" Class Environmental Assessment Addendum

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Greetings,
As a resident in the Thibault Terrace area and a daily user of McKeown Ave, I would like to recommend an possible solution to the traffic congestion which will soon be at least double in the area.
Instead of a costly 4 lane expansion of the entire avenue, I believe a third center-turning lane would suffice to ensure a continuous flow of traffic. It should be made wider than the current turning lane on Algonquin Ave however, as that lane is too narrow for safe traffic flow when there are numerous cars in the turn lane.
Traffic lights at the Dairy Queen and A&W intersections help regulate the current flow of traffic and it only backs up when drivers needing to make a left turn are forced to hold up traffic behind them while waiting for a safe opening in a long line of vehicles coming from the opposite direction.
The Avenue-long turn lane would alleviate this and allow traffic to flow better while reducing overall reconstruction costs.
I realize there are likely many other considerations that the engineering department must take into the final decision but surely three lanes are easier and less expensive than four.
Best regards,
[redacted]
[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Date: Thursday, Nov 10, 2022, 8:46 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Av Reconstruction and Environmental Assessment Addendum

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Mr. Porter

My husband Alex and I have lived at [redacted]Ursula St for 44 years and therefore have lived through all the changes to our neighbourhood, good and bad. The traffic issue has been a recurring problem for years starting with the construction of Canadian Tire, the extension of McKeown Av, the introduction of a great number of housing units and last but certainly not least the vast number of students with vehicles. They have nowhere to park, as the driveways were not intended for five or six individuals living in a home all with a vehicle, so they park on the streets causing safety issues for pedestrians as well as regular traffic. Once we navigate our way out we then have to face McKeown. That street cannot accommodate all the existing traffic and you would like to add another 120 to 150 or 160 vehicles trying to get onto McKeown using one traffic light. How do plan on keeping us, your law abiding taxpayers safe? Cars speed, cut in and out causing people to break quickly hoping that the person behind is going to react quickly as well. Then you have the pedestrians who cross anywhere. We need turning lanes in both directions, two lanes for through traffic just to handle the existing flow, adding this number of vehicles is asking for an escalation in accidents or road rage.

I understand that building must go on, however it might be prudent to cut down on the number of units therefore lessening the volume of cars on the road.

Regards,

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Date: Friday, Nov 11, 2022, 9:28 AM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>, Jonathan Kapitanchuk <Jonathan.Kapitanchuk@northbay.ca>, john.sererino@northbay.ca <john.sererino@northbay.ca>, Peter Carello <Peter.Carello@northbay.ca>, Mark King <Mark.King@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue reconstruction

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We welcome the opportunity to offer our input. Please see the attached letter. Thank you

--

[redacted]

[redacted]

November 10, 2022

To Whom it may concern:

As a resident of Thibeault Terrace, precisely [redacted] for over 52 years we welcome the opportunity to offer our opinion.

The infrastructure and traffic out this way is not adequate to support the current plans for our area. There are only three accesses all off of McKeown Avenue. There have been many accidents at some of the access points and at given times of the day is a nightmare to get out into traffic not to mention all the vehicles parked along the narrow streets

We have been in the area since before Canadore College, Nipissing U, strip malls, restaurants, grocery stores etc. We are aware that the city has got to grow but at what cost. Apparently, there are two 60 unit, two- and three-story apartment projects scheduled for the old Trussler School property. Considerations and bonified surveys must be made before undue stress is put on the currently overburdened area. Perhaps the construction of single-family dwellings or semi-detached homes would more suit this progress. Still, can the traffic and infrastructure take it?

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[redacted]

[redacted]

[redacted]

[redacted]

From: Reid Porter
Sent: November 1, 2022 2:22 PM
To: [redacted]
Cc: Gord Young <Gord.Young@northbay.ca>
Subject: RE: [EXTERNAL] McKeown Avenue PIP

[redacted]

We have completed field investigations within the McKeown Avenue project study area, including fish habitat survey and community inventory, Ecological Land Classification (ELC) of vegetation communities within the road right-of-way (ROW), and targeted surveys for potential Species at Risk (SAR). No SAR habitat was observed.

The results of the completed surveys identified that the widening of McKeown Avenue will result in the removal of a number of common, planted street trees, as well as the loss of small amounts of existing human-influenced vegetation communities (i.e. anthropogenic vegetation communities) to accommodate the additional width.

No aquatic SAR were observed or have been recorded in the study area. Impacts to fish habitat as a result of the road widening are limited to an approx. 5 m culvert extension and the associated loss of open-channel habitat. Measures implemented during construction, such as timing windows, site isolation, and erosion and sediment controls, are anticipated to mitigate temporary impacts to the surrounding vegetation, wildlife and fish habitats and communities.

I hope this helps you better understand the project's impact to the environment.

Regards,
Reid

From: [redacted]
Sent: October 31, 2022 3:20 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Gord Young <Gord.Young@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue PIP

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Hi Reid, I am hoping you would be more specific about this section of the PIP:

Natural Environment and Climate Change Impacts
• Minor impact on existing trees due to widening.
• Minor impacts to aquatic environments from works adjacent to Pinewood Creek and from culvert works

What sort of minor impacts are anticipated? Do these involve species at risk or other environmental factors?

Thanks,

[redacted]

[redacted]

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To: Reid Porter, Infrastructure Engineer, City of North Bay
F[redacted]

Dear Mr. Porter,

Per the "McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum", I am submitting my comments about this plan. I live on Ursula St, so I am writing to you in that context.

My main concern is the current and future difficulty entering and exiting my neighbourhood via the three existing access points to McKeown. As it stands today, it is extremely difficult to turn left (East) onto McKeown from our neighbourhood from either Cartier or McNamara. In my opinion, adding 2 more lanes to McKeown will improve our ability to turn right (West) but will make it even more difficult to safely turn left from these 2 streets. Thanks to the traffic circle to the west, which has greatly improved traffic flow at Gormanville, there are no breaks in traffic flow from the west whenever things are busy. The traffic circle prevents traffic from stopping, so it moves better at Gormanville but provides a steady non-stop stream of vehicles that make turning left (East) dangerous from our neighborhood at both Cartier and McNamara.

One might suggest that anyone turning left (East) should go to the Champlain intersection, which is controlled by lights. On the surface, it seems like a good idea but as your own traffic studies have indicated, that intersection already suffers from safety issues, especially for pedestrians. Nothing in your plan alleviates that problem. Also, the natural traffic flow from the streets in the west end of Thibeault Terrace draws people to enter/exit via McNamara or Cartier. People who live west of the Cartier-McGibbon intersection are unlikely to use Champlain.

Given that the City is approving a new multi-story apartment building on the former Trusler School property, there will be even more traffic at the Champlain-McKeown intersection, which can only make the safety of that intersection worse. The plan for the new apartment indicates parking for 180 vehicles (120 households). I do not see any consideration in your plan to handle the extra vehicles from the new Trusler apartment building. The current residents have 26 households accessing Justin and Cartier – adding 120 more households will result in roughly five times more traffic in morning and evening rush hours. Some of this will likely spill over onto Cartier and McNamara as people grow frustrated with the long wait for the Champlain-McKeown light. This will exacerbate the limited traffic flow that is available on both Cartier and Champlain due to the large number of cars that are parked on the street due to the number of multi-use residences (single family homes used as 4-6 bedroom apartments) permitted in our neighbourhood. I suggest your plan be extended to include examination of the McKeown-Champlain intersection, particularly with the new apartments in mind and how they will impact traffic flow to/from McKeown.

With respect to the recent traffic study used to justify increased vehicle traffic from the new Trusler Apartments, I believe elements of that study were flawed. The study was completed during Covid, resulting in reduced traffic flow from people who were no longer driving to/from work as well as the much-reduced number of students who would normally be living in our neighbourhood but who stayed home to study remotely during Covid. Despite the authors indicating that they added 10% to their numbers, if you are using that traffic study as a basis for considering the issues I am bringing up, I suggest that you should try a new traffic study in 2023 that includes all 3 exit points (Champlain, Cartier and McNamara) while college and university students are in residence and ensure it includes mid-winter, when the snowbanks and the on-street parking make it more difficult to navigate these streets. I believe you will find Champlain becomes very dangerous and that Cartier and McNamara suffer from reduced safety and increased congestion issues, greater than what has been reported in the most recent traffic study.

The multiuse path planned for the south side of McKeown will be useful for those people who are already on the south side of the street, but few residents live on the south side. Accessing the path from our neighbourhood is fraught with danger. Crossing at Champlain, as I earlier stated, has been shown to be dangerous by your own traffic studies. People using McNamara or Cartier will not be able to benefit from the multiuse path except by running across 4 lanes of traffic or by using the light at A&W or Champlain St. I do not foresee pedestrians or cyclists who are currently accessing McKeown from McNamara changing their habits to either walk or cycle to Champlain or to the light at A&W.

The light at the A&W has its own set of problems in the current context. It works well on the south side, with plenty of lane space for people exiting onto McKeown from the businesses on the south side. However, on the north side, you cannot have more than a single vehicle waiting for the light to change while exiting onto McKeown from those businesses. If there are 2 or more vehicles waiting to enter McKeown from the north side, the parking lot is divided in two and nobody can enter or exit safely from/to McKeown. Adding more lanes to the west will not make this any easier. I suggest you expand the scope of your project to include this intersection.

Although I applaud the expansion from 2 to 4 lanes to ensure better traffic flow for the full length of McKeown, I think we need to examine more closely how it affects the people living on the north side and make plans to accommodate our access to/from McKeown.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]s
Reid

From: [redacted]
Sent: November 7, 2022 7:50 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>; John Severino <John.Severino@northbay.ca>; johathan.kapitanchuk@northbay.ca; Peter Carello <Peter.Carello@northbay.ca>; Mark King <Mark.King@northbay.ca>
Subject: [EXTERNAL] Feedback on the McKeown Avenue Reconstruction Schedule "c" Class Env. Assessment Addendum

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Mr. Porter:
It has been already stated McKeown Avenue does not accommodate projected traffic volumes, plus McKeown Avenue does not balance the full range of potential users within the community including users of all ages, abilities, pedestrians, cyclists, transit vehicles and motorists.
Most importantly the Traffic Study of September 2020 states, "The collision record at McKeown/Champlain justifies a special detailed review of all aspects of how the intersection operates, including the physical layout, the signal timing, sightlines, pavement markings and signage." It also states, "The seriousness of the collisions is very noteworthy." This all stated, before an additional 180 vehicles are added to the Trusler School site, plus additional business on the McKeown throughfare.

1. Champlain meets McKeown both sides north and south require to be widened to allow right turning lanes, one to exit Thibeault Terr. unto McKeown heading toward Twiggs and one exiting from the top end of Champlain heading toward Shoppers, to prevent long wait times.
2. Champlain meets McKeown both sides north and south require advanced green turning lanes, in order to exit Thibeault Terrace and well as exit traffic from CT, Sobeys and provide safety for pedestrians.
3. Champlain meets McKeown both sides east and west require advanced turning lanes. The present McKeown advanced green light heading west is not long enough to clear the traffic from this intersection. This intersection requires advanced green lights heading in both east and west directions

to clear all traffic from this intersection. To many cars travelling east on McKeown are crossing 2 lanes of oncoming traffic and being T-boned.

4. Intersection of Cartier and McKeown without a doubt requires traffic lights. Cartier requires these lights to safely exit Thibeault Terrace. Without them Cartier motorists will be crossing 2 lanes of oncoming traffic heading west, plus attempting to gain entrance into the east lanes (lanes 3-4) heading towards Canadian Tire.
5. Intersection of Cartier and McKeown, Cartier to be widened to allow a right turning lane unto McKeown, to exit Thibeault Terrace.
6. The city appears to have put all the concentration into entering Thibeault Terr., but Thibeault Terr. needs as much priority exiting as well, safely, without always facing oncoming traffic and pedestrians. Knowing very well the extensive number of students in this area, plus the additional 180 cars from the Trusler School site require implemented preventative measures.
7. McKeown Avenue is very busy as we all acknowledge, once again we have people coming from the GTA informing us what a busy, crazy intersection McKeown/Champlain is. I would strongly recommend that these suggestions, advice, recommendations and urgings are completed before any construction takes place on the Trusler School site. Knowing very well that from Twiggs to Gormanville will be under construction for one year leaving only Champlain/McKeown the only safe entrance and exit because it has lights to the Thibeault Terr. area. Construction on McKeown Avenue and construction at the Trusler School site with excavators, back hoes, front end loaders and dump trucks will only wreak great havoc on Thiebeault Terr. residents.
8. There should be no on street parking allowed on Champlain St. from Cartier down to Oakdale. Residents of TT are constantly weaving back and forth against oncoming traffic due to the amount of parking on Champlain Street. Now add excavators, back hoes, front end loaders and dump trucks to the mix, while Trusler is under construction and an additional 180 vehicles upon completion of construction.
9. I sincerely hope the engineering department of North Bay takes a long look at what the residents of Thibeault Terr. have to say in regards to the McKeown Avenue Reconstruction. Because we are the residents who live in this community 12/365, know it best and will constantly have to live with the discretion of others.
10. All residents of Thibeault Terrace would be extremely interested on how the engineering department will improve McKeown Avenue. Is it possible to have a town hall meeting to keep us all informed of your decisions?
11. Looking forward to hearing from you in the near future.
12. True fear isn't being scared; it's not having a choice on the matter.

9. Regards

[redacted]

•

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 4, 2022 3:57 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] Comments RE McKeon

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Hi Reid

A couple of comments.

1. It was noted in Ottawa in the 1980s that having storm sewer grates aligned with the slits parallel to the curb allows bicycle tires to pass through the slits at significant hazard to the bicyclist. So, I would like to see them rotated 90 degrees, perpendicular to the curb or the Vee style grates used. (There is also currently an issue where there is a significant physical drop at each grate that requires swerving into traffic to avoid it - this appears to be due to the way the road was repaved as opposed to an original design consideration.) This issue will apply even if there is a multi-use trail since bicycles are allowed to use roadways.
2. The plan for a multi-use path on the south side is not as good as the north side, in my opinion. Any bicyclist with experience uses the back roads such as Macnamara street (because it simply is not safe to be on McKeon between Champlain and Algonquin. Therefore, Cartier is the safer, most convenient alternative. Since Cartier connects to Macnamara, that is the most likely bike route. Having to cross the road at Macnamara during busy times of the day is simply hazardous and you are likely to find the sidewalk or the road used in preference to crossing the street.

Separate from this, it is notable that using the Macnamara - Cartier corridor for bicycles leads to an awkward spot at the intersection of Algonquin and McKeon. The issue being getting from Cartier to Golf Club. Currently there is a requirement to cross three ways to get across to the north side of McKeon on the Golf Club side. While I appreciate a new multiuse trail is being added on the south side of McKeon, it is an annoyance that crossing with the light on the north side McKeon at Algonquin is not considered acceptable and that the

shoulder to golf club is not bike friendly. It would make a huge difference because golf club is so much more bike friendly than Airport.

[redacted]

[redacted]

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[redacted]

worse. Yesterday, for example, the one lane of traffic stopped for us to cross and the one beside it did not. We did not get hit, thankfully. If you do not want to change the traffic circle to a light you need to put a pedestrian crossing there. Historically, North Bay has prioritized cars and trucks over other forms of transportation like busses, bicycles, and walking. McKeown is the corridor for Nipissing and Canadore students and I am confident that you will consider this population and prioritize busses, bicycles, and pedestrians over motorized traffic.

Thank you

[redacted]

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[redacted]

From: [redacted]
Sent: November 9, 2022 3:49 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>; Jonathan Kapitanchuk <Jonathan.Kapitanchuk@northbay.ca>; John Severino <John.Severino@northbay.ca>; Mark King <Mark.King@northbay.ca>; Peter Carello <Peter.Carello@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum

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I currently live on Leonard Street and am responding to / providing my input into the above-mentioned reconstruction.

My concerns are:

- A local developer is planning to build between 120 - 144 apartment units in/on the old Trusler School location, resulting in up to 200 additional vehicles using the Champlain / Cartier Streets to exit onto McKeown.
    - this does not include additional vehicles based on visitors, emergency vehicles, garbage pickup, UPS etc.
    - By reducing the amount of apartment units being built at this site we could have/keep some green space for the neighbourhood children and others to use. The apartments could be part of the landscape vs. having apartments and a parking lot for vehicles while ignoring greenspace for people to escape (think COVID and lockdown)
- No sidewalks on the east side of Champlain making it dangerous for pedestrians (especially children that need to wait for the school bus) especially in the winter
- A traffic study was conducted September 2021 during the COVID lockdown when students / employees were at home. The study concluded that both the McKeown-Champlain and McKeown-Cartier intersections have major safety concerns.

- Cars parked on the road on both sides of Champlain from Justin to McKeown makes navigating around the parked cars a challenge especially in the winter months.
- Not enough exits from Thibeault Terrace in the event there is an emergency evacuation.

Traffic Lights would be beneficial at Cartier-McKeown once the 4 lane road has been installed:

- More vehicles will use Cartier to exit onto McKeown due to the increase in vehicles (new apartments at Trusler School)
- A steady flow of traffic coming from the Gormanville roundabout making it difficult to cross McKeown

Traffic lights would make it safer:

- for vehicles exiting / entering the Twiggs restaurant which is at the corner of Cartier and McKeown
- for vehicles, pedestrians and cyclists to exit left onto McKeown from Cartier
- for pedestrians getting off the eastbound bus to cross McKeown

And lastly, perhaps North Bay could install garbage bins at the bus stops on McKeown Streets. This would help to keep North Bay clean of garbage or at least reduce the amount of garbage on the sidewalks.

Thank you for your consideration.

Regards

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 4, 2022 8:49 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] Four-laning of McKeown Avenue

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To whom it may concern/Council of the City of North Bay,

With respect to the proposed four-laning of McKeown Avenue from Cartier to Gormanville.

I travel this roadway everyday at least twice a day for work. I have never seen congestion with the exception of a cause such as any accidents that have occurred around the roundabout or during construction. What I have seen though, is frequent issues of the public, including parents with strollers, trying to cross the road to access the One Kids Place building. This includes attending any occupational therapy, physiotherapy, speech language therapy, OKP functions, and/or trying to attend a doctor's appointment with the North Bay Pediatric Group (pediatrician's office).

These issues exist with just two lanes... I can't imagine trying to safely cross four lanes on this roadway. Four lanes would cause an increased safety risk for those who need to access the building. We only need to look at Algonquin and Lakeshore and the horrible incidents that have occurred on those four lane roadways to know the reality of what four-laning this stretch of McKeown could bring.

I hope those responsible for making a final decision on this plan take the time to walk the distance from the "MTO building" to the One Kids Place (OKP) building during a regular business day. To truly feel what parents feel like when accessing the OKP building; take the bus, bring a stroller with you, and/or a toddler - perhaps one with disability as these are some of the hundreds of patients and clientele that need to access the OKP building and their child's pediatricians office on a daily basis. Don't just base your opinions on street traffic and driving needs.

If there is a plan to continue with four-laning this section, for the safety of the public, I hope that there is a plan for a safe crosswalk to access 400 McKeown Avenue.

Thank you for your time and consideration,

[redacted]

I do not grant any permission to publish or share my email address. You may share the body of the email to any North Bay City council member or support staff

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: November 3, 2022 5:00 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] City of North Bay McKeown Ave road work

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Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

McKeown road widening project

For the most part - 4 laning is agreeable from Cartier to the round-about

There is a lot more traffic now than there was when the roud-about was installed and the traffic study was completed in 2006

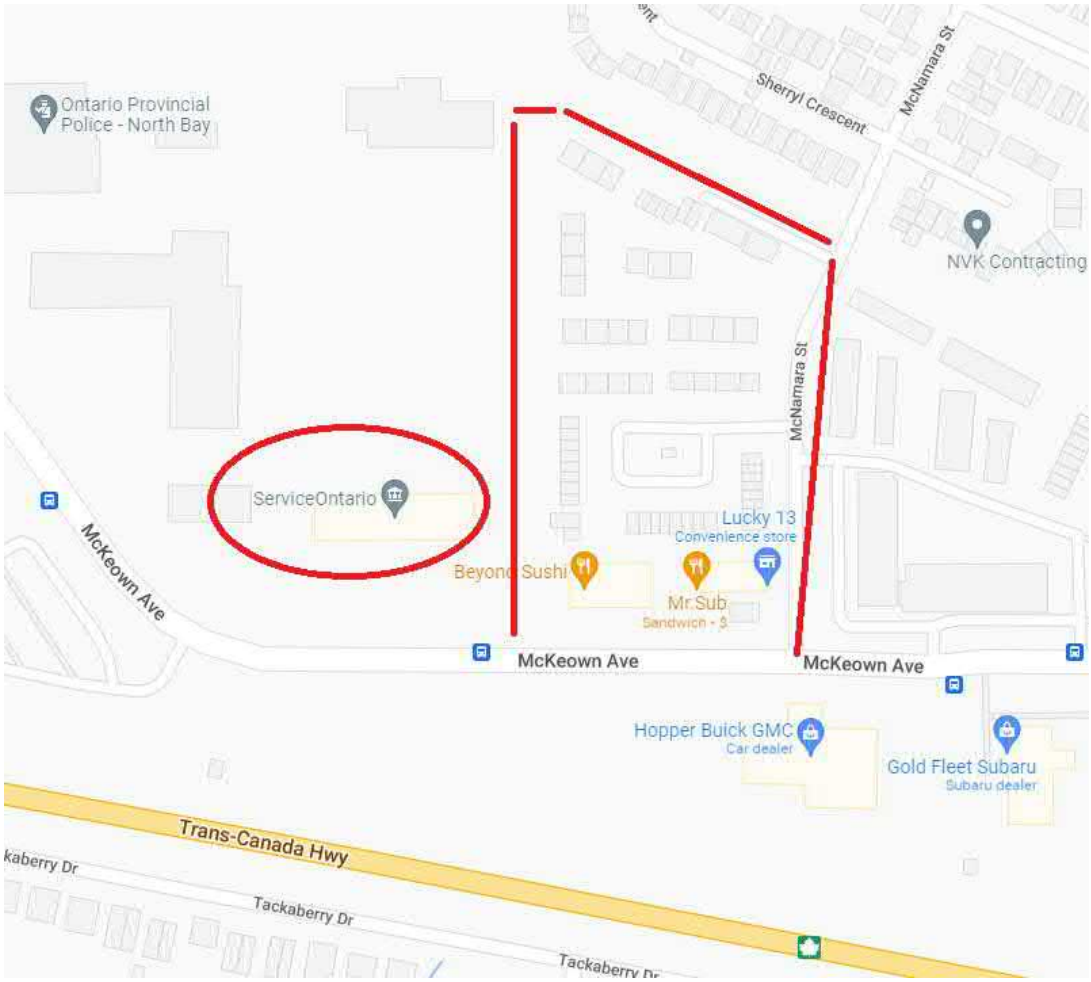
McKeown Ave where McNamara St and Hoppers are located will need to have a set of control lights with left turning lanes.
exiting McNamara St turning east on McKeown would need the control lights. There is a lot of traffic at times and left turning would become risky at times with the 4 lanes. A control light would prevent accidents

and allow a controlled pedestrian crosswalk across the 4 lanes of traffic for those who would need to cross to catch the city bus.

If feasible, a possible redesign of Hopper's entrance could line up like a 4 way intersection

Since traffic flow is heavy at times, Hoppers could possibly reduce the other two entrances and have just one. Not for me to work out but something that can be discussed.

traffic from the round-about might need a center turning lane to get into the MTO building - or possibly search out another working entrance that could route to McNamara - develope the current back street with no name behind the houses on Sherryl Crescent to get to the MTO rear lots and have that be their new entrance closing the MCKeown ave two entrances.
this way the lights will become more effective in use.
possible route in red in my pic of the area for MTO


Ontario Provincial Police - North Bay
Sherryl Crescent
McNamara St
NVK Contracting
McNamara St
ServiceOntario
McKeown Ave
Lucky 13
Convenience store
Beyond Sushi
Mr. Sub
Sandwich · $
McKeown Ave
McKeown Ave
Hopper Buick GMC
Car dealer
Gold Fleet Subaru
Subaru dealer
Trans-Canada Hwy
Tackaberry Dr
Tackaberry Dr

[redacted]

[redacted]

[redacted]
Sent: November 10, 2022 4:40 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Cc: Adam Lacombe <Adam.Lacombe@northbay.ca>
Subject: [EXTERNAL] Thibeault Terrace

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Good afternoon,

We are residents of Thibeault Terrace and understand that an apartment building is to be built at the old Trussler school site.

We have great concerns about the volume of traffic in this area now without an apartment complex. As residents of this area, we can only turn onto McKeown “safely” at Champlain St. If we try to turn left onto McKeown from Cartier, we wait endlessly. Once the traffic gets past the lights at McKeown Plaza they fly. We don’t understand why the police aren’t ticketing more on McKeown. The intersection where Twiggs is situated is dangerous, with cars coming out of the drive through at Twiggs and customers parking on Cartier. In the winter that intersection is bottlenecked up with cars trying to get out, people parking on Cartier to go to Twiggs.

McKeown should be four lanes and have traffic lights at various intersections to slow the traffic down, plus accommodate the residents living here. McKeown is a drag strip. My husband and I have been concerned for a long time but an apartment complex makes us even more concerned.

Please share our comments/concerns with other members of your team.

Sincerely,

[redacted]

APPENDIX 3-2

Comments Received: Technical Agency & Key Stakeholder Groups

Connor MacIsaac

Subject: RE: [EXTERNAL] McKeown Avenue Reconstruction Schedule C Class EA Addendum

From: Valerie Murphy <Valerie.Murphy@nbmca.ca>
Sent: November 8, 2022 2:10 PM
To: Reid Porter <Reid.Porter@northbay.ca>
Subject: [EXTERNAL] McKeown Avenue Reconstruction Schedule C Class EA Addendum

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Good afternoon Reid,

North Bay-Mattawa Conservation Authority (NBMCA) has received the notice of the Addendum for the Class EA for McKeown Ave. We would like to take this opportunity to advise you that there is a small watercourse that flows through the study area. This watercourse is a feature regulated by NBMCA under Ontario Regulation 177/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourse (DIA).

In any future planning for work in this area, a DIA permit would be required which would set out appropriate sediment and erosion controls and in-water work measures.

Please do not hesitate to contact me should you have any questions or concerns.

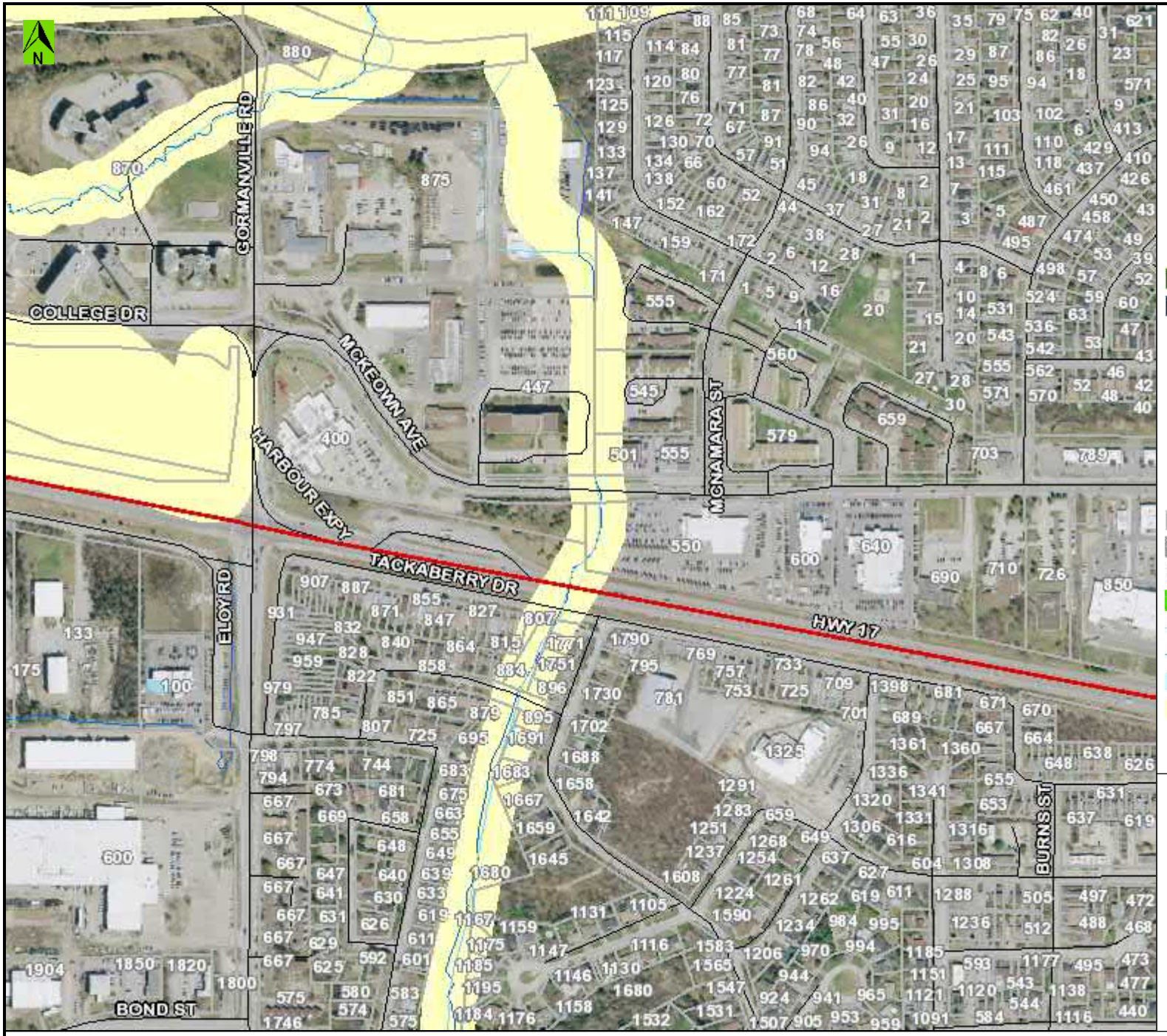
Thank you,

Valerie Murphy (she/her)
Regulations Officer
North Bay-Mattawa Conservation Authority
15 Janey Avenue
North Bay, ON P1C 1N1
Cell: 705-498-3038
Office:: 705-474-5420 ext 2004
Fax: 705-474-9793
Web: www.nbmca.ca

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1972-2022

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GENERAL USE MAP

LEGEND

- NBMCA
- DWSP
- On-Site Sewage System Program
  - Nipissing
  - East Parry Sound
  - West Parry Sound
- Road
  - Road
  - Highway
- Assessment Parcel
- Municipal Boundary
- Geographic Township
- Conservation Area
- Watercourse (OHN)
- Watercourse (Large Scale Hydrology)
- Waterbody (OHN)
- Approximate Regulated Area

NOTES

1: 9,028

0 90 180 360 m

NORTH BAY - MATTAWA CONSERVATION AUTHORITY
1972-2022 | 50 Years of Conservation

15 Janey Avenue
North Bay, ON P1C 1N1
Tel: (705) 474-5420
Fax: (705) 474-9793

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Connor MacIsaac

From: Connor MacIsaac
Sent: January 23, 2023 2:30 PM
To: Harvey, Joseph (MCM)
Cc: reid.porter@northbay.ca; Andrew McGregor; Jimmy Rathod; Katrina Thach
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

Categories: Filed by Newforma

Hi Joseph,

We will provide a copy of the Cultural Heritage Report to MCM for review and comment once available as requested. Our archaeological and cultural heritage subconsultant ASI will request a PIF number from the Ministry after they've got the project initiated. We'll follow-up with you once a PIF number is assigned.

Best,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: January 20, 2023 12:13 PM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

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Hi Connor,

Thanks for your reply.

Please provide us with a copy of the Cultural Heritage Report for review and comment prior to the completion of the Addendum. In addition, to support record keeping on our side, can you provide us with the Project Information Form number (PIF#) for the Stage 1 archaeological assessment.

Thanks,

Joseph Harvey | Heritage Planner
Citizenship, Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: January 20, 2023 11:47 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>
Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package - MCM Project Update (RVA 216166)

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Hi Joseph,

Thank you for your advice. To provide you an update on the project, based on the comments received from the Public Information Package, the City will be extending the study area easterly to include the intersection of McKeown Avenue at Champlain Street. The revised study area is highlighted in the attached. Improvements to this portion of McKeown Avenue were included in the 1999 ESR, and as such, the recommendations will be reflected in the Addendum to the ESR report. We'll also be notifying the remainder of the stakeholder list of this revision in the study area.

Based on MCM's comments, we have initiated both Stage 1 Archaeological Assessment as well as a Cultural Heritage Report as part of the Addendum.

Thanks,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: November 17, 2022 11:17 AM
To: Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>

Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Connor,

Thanks for providing the additional background information on the McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum. We reviewed the original ESR (2002) and have the following comments:

Archaeological Resources

- Since approvals for this project were granted, the legislative and regulatory framework as it relates to archaeological resources, and associated due diligence, has changed (e.g., Standards and Guidelines for Consultant Archaeologists (2011)). As such, we continue to recommend that the Criteria for Evaluating Archaeological Potential be completed to determine if an archaeological assessment is needed.
- If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the *Ontario Heritage Act* (OHA), who is responsible for submitting the report directly to MCM for review.

Built Heritage Resources and Cultural Heritage Landscapes

- Although the Ministry previously indicated that "*the study area does not contain designated heritage resources or properties*", additional built heritage resources and/or cultural heritage landscapes (BHR/CHL) may have been identified since the completion of the original ESR. The MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project will impact BHR/CHL.
- Where a known or potential BHR/CHL may be directly and adversely impacted, and whether it has not yet been evaluated for cultural heritage value or interest (CHVI), completion of a Cultural Heritage Evaluation Report (CHER) is required to fully understand its CHVI and level of significance. Cultural heritage value or interest is determined based on the application of the criteria in Ontario Regulations 9/06 and 10/06. If a BHR/CHL is found to be of CHVI, then a Heritage Impact Assessment will be completed in consultation with MCM as early as possible during detail design. We are available to provide further advice and comment on any technical cultural heritage studies to be completed in support of this undertaking.

Please do not hesitate to contact me if you have any further questions or need further information.

Regards,

Joseph Harvey | Heritage Planner
Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: November 4, 2022 10:55 AM
To: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Cc: reid.porter@northbay.ca; Andrew McGregor <AMcGregor@rvanderson.com>; Jimmy Rathod <JRathod@rvanderson.com>

Subject: RE: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Hi Joseph,

Thank you for the Ministry's comments. We have reviewed the information in the letter provided, and wanted to clarify that, as part of the original EA, the Ministry of Citizenship, Culture, and Recreation had provided clearance that no archaeological or cultural heritage resources were present within the study area, and that no further action was required.. I've attached relevant portions of the original ESR document for your information. Please let me know if the Ministry would like to receive the full copy of the original ESR, and I can provide it via a File Exchange.

Based on the letter provided, both checklists provided, "*Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*" and "*Criteria for Evaluating Archaeological Potential"* are required to be completed as part of the Addendum to the ESR, and that if either checklist determines the need for additional studies, those would need to be completed. Could you please confirm these requirements? We want to be sure that we meet all requirements as part of the Addendum.

Best,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1



From: Harvey, Joseph (MCM) <Joseph.Harvey@ontario.ca>
Sent: November 2, 2022 3:38 PM
To: reid.porter@northbay.ca
Cc: Connor MacIsaac <cmacIsaac@rvanderson.com>
Subject: FW: File 0017953: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Reid Porter,

Please find attached our initial advice on the above referenced undertaking.

Please note that the responsibility for administration of the Ontario Heritage Act and matters related to cultural heritage has been recently transferred from the Ministry of Tourism, Culture and Sport to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information

remain unchanged. Please continue to send any notices, reports and/or documentation to both Karla Barboza and myself.

Do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner
Inclusion and Heritage Division | Heritage Branch | Heritage Planning Unit
Ministry of Citizenship and Multiculturalism
613.242.3743
Joseph.Harvey@ontario.ca

From: Connor MacIsaac <cmacIsaac@rvanderson.com>
Sent: October-25-22 2:50 PM
Cc: Jimmy Rathod <JRathod@rvanderson.com>; reid.porter@northbay.ca
Subject: City of North Bay - McKeown Avenue Reconstruction Schedule "C" Class Environmental Assessment Addendum - Notice of Public Information Package

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Dear Sir / Madam,

On behalf of The City of North Bay, please find attached the Notice of Public Information Package prepared for the Addendum to the 1999 McKeown Avenue Schedule 'C' Class Environmental Assessment (EA) Environmental Study Report (ESR). Considering that it has been over 10 years since the original Environmental Study Report was filed, the City initiated this EA Addendum to reassess the widening of McKeown Avenue in consideration of the changes that have occurred since 1999, including traffic volumes and patterns, development, and regulations. You are receiving this notice as your agency or group was involved in the 1999 EA, and / or the City has identified you as having potential interest in the updated recommendations.

The City invites you to learn about the EA Addendum including the need and justification, alternatives considered, and revised recommendations, on the project website at: McKeown Avenue Reconstruction - Schedule "C" Class Environmental Assessment Addendum | City of North Bay.

Changes to the 1999 EA will be documented in an Addendum to the Environmental Study Report (ESR), which will be made available for a 30-day public review period. A Notice of Filing of EA Addendum will be issued at that stage.

To provide comments, questions, or concerns on the materials, request a hard copy of the online material, or to be removed from the contact list, please contact the below by November 11th, 2022.

Reid Porter
Infrastructure Engineer
City of North Bay
Phone: 705-474-4000 ext. 2304
Email: reid.porter@northbay.ca

Kind Regards,

Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218

a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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Connor MacIsaac

From:	Connor MacIsaac
Sent:	January 20, 2023 11:41 AM
To:	Lee, Erinn (MECP)
Cc:	Whiteley, Angela (MECP); reid.porter@northbay.ca; Battarino, Gavin (MECP); Andrew McGregor
Subject:	RE: MECP Comments - Notice of Public Information Package - McKeown Avenue Reconstruction MCEA Addendum (RVA 216166)
Attachments:	Revised Study Area Map.jpg
Categories:	Filed by Newforma

Hi Erinn,

Thank you for your advice. To provide you an update on the project, based on the comments received from the Public Information Package, the City will be extending the study area easterly to include the intersection of McKeown Avenue at Champlain Street. The revised study area is highlighted in the attached. Improvements to this portion of McKeown Avenue were included in the 1999 ESR, and as such, the recommendations will be reflected in the Addendum to the ESR report. We'll also be notifying the remainder of the stakeholder list of this revision in the study area.

Based on MECP's comments, we have initiated both a noise assessment and qualitative air assessment as part of the Addendum, as well as reached out to each of the Indigenous communities noted.

As requested, we will provide the draft Addendum to the ESR Report for MECP's review and comment once available.

Thanks,

arva
Connor MacIsaac, ENV SP, EPt
ENVIRONMENTAL PLANNER, EA & APPROVALS
t 905 685 5049 ext. 4218
a 43 Church Street, Suite 104, St. Catharines, ON L2R 7E1

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From: Lee, Erinn (MECP) <Erinn.Lee2@ontario.ca>
Sent: December 6, 2022 1:57 PM
To: reid.porter@northbay.ca; Connor MacIsaac <cmacIsaac@rvanderson.com>
Cc: Whiteley, Angela (MECP) <Angela.Whiteley@ontario.ca>; Battarino, Gavin (MECP) <Gavin.Battarino@ontario.ca>
Subject: MECP Comments - Notice of Public Information Package - McKeown Avenue Reconstruction MCEA Addendum

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Good afternoon Reid and Connor,

Please find attached MECP's comments in response to the Notice of Public Information Package for the McKeown Avenue Reconstruction Addendum. **The letter includes an updated list of Indigenous communities for consultation.**

Please note the following comments regarding air and noise studies:

- **Noise:** Given the previous noise report was prepared more than twenty years ago, the noise report should be updated to reflect the new horizon year 2041 vehicular traffic data, as well as the new road alignment cross-section.
- **Air Quality:** MECP expects that the report contain a qualitative assessment which includes:
    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

Thank you,

Erinn Lee (she/her)
Regional Environmental Planner | Ministry of the Environment, Conservation and Parks
Project Review Unit, Environmental Assessment Branch
135 St. Clair Ave W, Toronto, ON M4V 1P5
P : 1 (416) 357-1511 E: Erinn.Lee2@ontario.ca