
City of Sault Ste. Marie

Northern Avenue Corridor Improvements

ENVIRONMENTAL STUDY REPORT

May 2018
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Prepared by:



TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Background 1

1.2 Municipal Class Environmental Assessment Process..... 1

1.3 Study Area..... 2

1.4 Study Organization..... 2

1.5 Public Involvement..... 4

2.0 PHASE ONE – IDENTIFICATION AND DESCRIPTION OF THE PROBLEM OR OPPORTUNITY 5

2.1 Previous Reports 5

2.2 Problem/Opportunity Identification..... 5

2.3 Notice of Study Commencement..... 6

2.4 Problem/ Opportunity Statement..... 6

3.0 PHASE TWO – IDENTIFY AND EVALUATE ALTERNATIVE SOLUTIONS..... 6

3.1 Maintain Existing Conditions (“Do Nothing”) 6

3.2 Opportunity A: Lane Reassignment 7

3.2.1 *Alternative A2: Full Length Lane Reassignment (North Street to Pine Street)*..... 7

3.2.2 *Alternative A3: Lane Reassignment in Select Locations*..... 7

3.3 Opportunity B: Extension of Northern Avenue..... 8

B2 – *Extend easterly to connect to Black Road;*..... 9

B3 – *Extend south-easterly to connect to Lake Street.* 9

B4 – *Extend south-easterly to connect to Black Road*..... 9

3.3.1 *Alternative B2: Extend Easterly to Connect to Black Road*..... 9

3.3.2 *Alternative B3: Extend South-easterly to Connect to Lake Street*..... 9

3.3.3 *Alternative B4: Extend South-easterly to Connect to Black Road*..... 10

3.4 Opportunity C: Improvements to the access/egress of the P-Patch subdivision 11

3.4.1 *Alternative C2: New Road to Panoramic Drive* 11

3.4.2 *Alternative C3: New Road to Princeton Drive* 12

3.4.3 *Alternative C4: Install Traffic Lights at Pine Street and Pleasant Drive Intersection* 12

3.5 Inventory of Environmental Conditions..... 13

3.5.1 *Natural Environment*..... 13

3.5.2 *Heritage Resources* 14

3.5.3 *Social Environment*..... 15

3.6 Evaluation of Alternative Solutions..... 16

3.6.1 *Evaluation Criteria* 16

3.6.2 *Evaluation Summary* 18

3.7 Recommended Solution..... 24

3.8 Solicit Input on Recommended Solution 24

3.9 Traffic Review..... 24

4.0 PHASE THREE – ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION 25

4.1 Road Diet..... 25

4.2 New P-Patch Access Road 26

4.3 Solicit Input on Recommended Design 26

4.3.1	Consultation with Interested Parties.....	27
4.4	Preferred Design, Schedule and Cost.....	27
5.0	PHASE FOUR – ENVIRONMENTAL STUDY REPORT.....	27

APPENDICES

Appendix 1	Municipal Class Environmental Assessment Process
Appendix 2	Notice of Study Commencement and Project Distribution List
Appendix 3	City of Sault Ste. Marie Pine Street and Pleasant Drive Intersection Operations and Safety Review
Appendix 4	Stage 1 Archaeological Assessment – Northern Avenue Corridor
Appendix 5	Evaluation Matrix and Rationale
Appendix 6	June 22, 2016 Public Information Centre
Appendix 6a	Information Presented
Appendix 6b	Attendance List
Appendix 6c	Comments Received
Appendix 7	City of Sault Ste. Marie Traffic Report – Northern Avenue Road Diet and P-Patch Access Traffic Review
Appendix 8	September 26, 2017 Public Information Centre
Appendix 8a	Information Presented
Appendix 8b	Attendance List
Appendix 8c	Comments Received
Appendix 9	Summary of Questions and Concerns

1.0 INTRODUCTION

1.1 Background

The City of Sault Ste. Marie (City) completed a Transportation Master Plan (TMP) in 2015 to *“advance the implementation of the various transportation improvements while considering the current and future conditions of the community”*. Recommendations presented in the TMP include to undertake the municipal class environmental assessment (MCEA) process:

- to consider a road diet at Northern Avenue (North Street to Pine Street); and,
- to consider extending Northern Avenue to Black Road

Due to the current deteriorated surface condition of Northern Avenue, the City has determined that re-surfacing will be required in the near future. Completion of an MCEA addressing the above recommendations is appropriate so that any findings may be implemented in conjunction with the resurfacing.

The City has also identified an opportunity to address public concerns related to perceived traffic congestion at the intersection of Pine Street and Pleasant Drive. The City has received numerous comments and complaints regarding this location from area residents over the past few years. Although this intersection is not located directly on Northern Avenue, it is in such close proximity that any changes may impact Northern Avenue, therefore the City has decided that including this opportunity in the same MCEA process is prudent.

1.2 Municipal Class Environmental Assessment Process

Ontario’s Environmental Assessment Act (EA Act) was adopted in order to ensure that all reasonable alternative solutions, environmental impacts and community input are considered when public projects are undertaken. In order to streamline the process, the EA Act allows the grouping of similar and common projects into classes. Due to the similarity and frequency of municipal infrastructure projects, the Municipal Engineers Association developed and received approval for the Municipal Class Environmental Assessment. The MCEA is applicable to most municipal projects involving roads, water, wastewater and transit which are commonly recurring, similar in nature, limited in scale, and have a predictable range of impacts. Based on the scope of the opportunity identified, the MCEA is applicable to the Northern Avenue Corridor Improvements project.

The planning process outlined in the MCEA document is illustrated graphically in Appendix 1. In completing the MCEA for this project, the City has decided to follow the requirements of a Schedule C study, the most stringent schedule defined in the MCEA.

A typical Schedule C project requires that the following five Phases be completed:

- Phase 1: Identify the problem or opportunity for the project.
- Phase 2: Identify alternative solutions to the problem taking into consideration the existing environment and establish the preferred solution using input from review agencies and the public.

-
- Phase 3: Examine alternative methods of implementing the preferred solution which will minimize negative environmental effects and maximize positive effects.
 - Phase 4: Document the planning process carried out in the previous Phases and make the documentation available for comment by the public and review agencies.
 - Phase 5: Complete designs and proceed to construction of the project. This phase also includes the long-term evaluation of any special mitigating measures which were required to be implemented.

The Sault Ste. Marie TMP was completed based on the approaches conveyed in the Sustainable Planning Guidelines report (developed by Transport Canada and the Transportation Association of Canada) and was carried out in accordance with the requirements of a Master Plan under the MCEA process. As noted in the MCEA document, Master Plans typically address Phases 1 and 2 of the process for identified projects; however, due to the anticipated public interest in the Northern Avenue Corridor Improvements project, the City of Sault Ste. Marie has decided to review these steps.

1.3 Study Area

Northern Avenue is an east-west street, in the City's core area. Extending from Bainbridge Street in the west to approximately 320 metres east of Pine Street, Northern Avenue provides access to residential, commercial and institutional properties for vehicular traffic, cyclists and pedestrians. In the TMP, the street is classified as an "urban collector".

Between Bainbridge Street and North Street, Northern Avenue is a two-lane road through a residential area; from North Street to Pine Street it operates as a four-lane road abutting commercial, institutional and residential properties. East of Pine Street, Northern Avenue is a two lane road providing access to residential and institutional lands. Designated turn lanes are provided along the Northern Avenue corridor at the North Street, Great Northern Road, and Pine Street intersections.

The study area is illustrated in Figure 1 and extends east of Black Road and west of Carmen's Way. A portion of the P-Patch subdivision is also included to encompass the Pine Street/Pleasant Drive intersection.

Study Organization

To satisfy the planning process outlined for Schedule C projects in the MCEA, the following phased approach to the project is presented in this Environmental Study Report (ESR).

Phase 1: Identification and Description of the Problem

- a) Describe existing conditions.
- b) Identify the problem or opportunity.
- c) Develop the Problem/Opportunity statement.

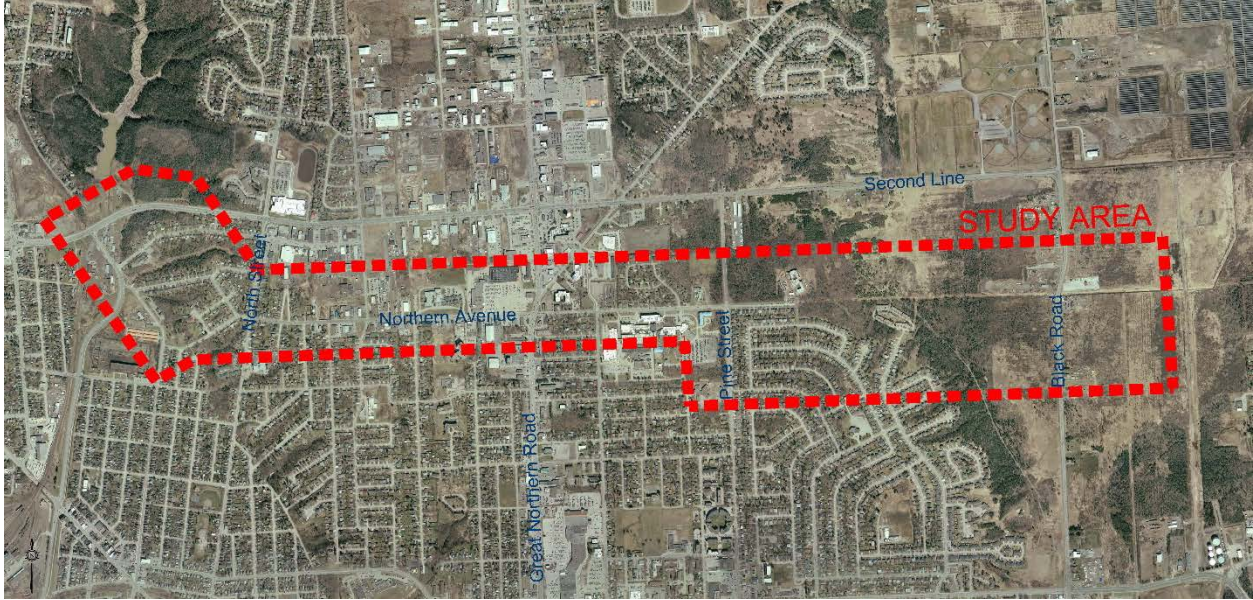


Figure 1. Northern Avenue Corridor Improvements Study Area

Phase 2: Identify and Evaluate Alternative Solutions

- a) Identify alternative solutions.
- b) Inventory the existing environmental conditions.
- c) Solicit input on alternative solutions.
- d) Evaluate the alternative solutions.
- e) Select and describe the preferred solution.

Phase 3: Alternative Design Concepts for the Preferred Solution

- a) Identify alternative designs.
- b) Review the horizontal and vertical road alignment.
- c) Review the road cross section.
- d) Review intersection configurations.
- e) Identify the recommended design.
- f) Solicit input on the recommended design.

Phase 4: Environmental Study Report

- a) Complete the Environmental Study Report.
- b) Place the ESR on public record.

Phase 5: Implementation

- a) Complete documents and tender construction.
- b) Construct the improvements.
- c) Monitor for environmental provisions and commitments.

At the end of Phase 4, following the placement of the ESR on public record, there is a 30-day review period during which members of the public and/or review agencies can review the report and provide comments to the City of Sault Ste. Marie.

The ESR will be available for review at the following locations as well as on the City's website:

City of Sault Ste. Marie
Engineering Department
5th Floor, Civic Centre
99 Foster Drive
Sault Ste. Marie, ON

City of Sault Ste. Marie
Clerk's Department
4th Floor, Civic Centre
99 Foster Drive
Sault Ste. Marie, ON

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON

If concerns raised during this period cannot be resolved through discussions with the City, a "Part II Order" request can be made to have the Minister of Environment and Climate Change (the "Minister") order an individual (full) EA for the project. Parties wishing to request a Part II Order for this project must submit a written request to the Minister in accordance with the requirements outlined in section A.2.8 of the MCEA document. Copies of the request are also to be sent to the Environmental Approvals Branch and the City of Sault Ste. Marie at the following addresses:

The Honourable Chris Ballard,
Minister of the Environment
and Climate Change
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto ON M7A 2T5

Director,
Environmental Approvals Branch
Ministry of the Environment and
Climate Change
1st Floor, 135 St. Clair Ave West
Toronto, ON M4V 1P5

Director,
Engineering Services
City of Sault Ste. Marie
5th Floor, Civic Centre
99 Foster Drive
Sault Ste. Marie, ON P6A 5N1

1.4 Public Involvement

Public and agency consultation ensures that those interested in the project process have the opportunity to provide input and comments. Throughout the study, the involvement of local residents, interest groups and government agencies was sought to obtain input into the definition of the problems/opportunity, identification and evaluation of alternative solutions and the development of the solution. A list of those people and organizations contacted is included in Appendix 2.

To determine if the project could have an adverse impact on Aboriginal and Treaty rights, Indigenous and Northern Affairs Canada (INAC) as well as Indigenous communities in the vicinity of the study area were contacted throughout the project to obtain input into the definition of the problems/opportunity, identification and evaluation of alternative solutions and the development of the solution. A list of Indigenous communities and organizations contacted is included in Appendix 2.

Through newspaper advertisements, letters, emails, notifications of upcoming public meetings and two informal Public Information Centres (PICs), the public and agency contacts were given the opportunity to review and discuss the progress of the study as well as provide any suggestions and comments. A project website was also maintained with copies of relevant documents available for review by interested parties.

Input received from interested parties is described in detail in the relevant sections of this report with supporting documentation in the appendices.

2.0 PHASE ONE – IDENTIFICATION AND DESCRIPTION OF THE PROBLEM OR OPPORTUNITY

2.1 Previous Reports

Sault Ste. Marie Cycling Master Plan: In August of 2007, the Sault Ste. Marie Cycling Master Plan was approved. The purpose of the plan was to provide general design considerations that could be applied to allow for roads and destinations within the community to be cycling friendly. The report also identified preferred cycling routes, specific design standards and a number of recommendations to develop safe cycling within the City.

Transportation Master Plan: In January of 2015, the City of Sault Ste. Marie’s Transportation Master Plan was completed by HDR Corporation. The TMP process was carried out to address the changing travel patterns in the City and to ensure road infrastructure continues to operate at a good level of service. The plan identified a “balanced approach” alternative strategy as the preferred planning solution. This strategy is expected to benefit all transportation users in the City by investing in capital road improvements as well as active transportation and transit network improvements. Among other things, the TMP includes the consideration of “road diets” that involve reducing the number of lanes and pavement widths of a road to improve roadway efficiency, mode share and safety. The Northern Avenue corridor was specifically identified in the Transportation Master Plan as a location that could possibly benefit from the implementation of the road diet technique. The TMP also identified the extension of Northern Avenue to Black Road as a potential road network improvement.

Operations and Safety Review: Following receipt of complaints from area residents regarding safety and congestion at the intersection of Pine Street and Pleasant Drive, the City retained the engineering firm CIMA+ to complete an Operations and Safety Review (found in Appendix 3). The report was finalized in March of 2015 and included findings from their review of intersection geometry, traffic and pedestrian volumes, traffic speeds, and collisions. It was noted that traffic volumes along Pine Street and Pleasant Drive were typical for their road types and that the intersection was operating with acceptable vehicle capacity ratios. The review concluded that replacing the current stop sign on Pleasant Drive with an all-way top or traffic signal light was not warranted. Despite the findings of the report, Council continues to receive pressure from some residents to make improvements.

2.2 Problem/Opportunity Identification

This study is being conducted to address the following problems/opportunities which have been identified through the completion of the above noted studies as well as through public input:

- A. Improve operational efficiency of Northern Avenue through implementation of a road diet.
- B. Extend Northern Avenue easterly from its current limit.
- C. Improve operations of the Pine Street/Pleasant Drive intersection.

The three opportunities are being combined into one MCEA due to their spatial proximity to one another as well as the potential for interdependence of the alternative solutions.

Northern Avenue dead ends east of Pine Street, making the function of the Northern Avenue corridor closely related to the operation of Pine Street as well as the access to the adjacent P-Patch subdivision. As a result, the City has identified the opportunity for possible access/egress improvements into the P-Patch subdivision in conjunction with possible improvements to Northern Avenue.

2.3 Notice of Study Commencement

A notice of commencement for the Northern Avenue Corridor Improvements was first published on March 19, 2016 in the Sault Ste. Marie Star newspaper and was posted online at the City of Sault Ste. Marie's website. Copies of the notice were also direct mailed to members of the public as well as review agencies.

A copy of the notice of commencement is included in Appendix 2. The distribution list is also included.

2.4 Problem/ Opportunity Statement

Vehicular travel patterns throughout Sault Ste. Marie have shifted over the years as a result of development in the north end of the City. Improving the efficiency of the Northern Avenue corridor is one of the recommendations of the recently completed Transportation Master Plan meant to help accommodate this shift.

Potential improvements noted in the Transportation Master Plan include:

- Opportunity A: Lane reassignment or elimination along the Northern Avenue corridor.
- Opportunity B: Extension of Northern Avenue to Black Road.

In conjunction with these possible improvements, the City has also identified:

- Opportunity C: Improvements to the access/egress of the P-Patch subdivision.

3.0 PHASE TWO – IDENTIFY AND EVALUATE ALTERNATIVE SOLUTIONS

The first task in Phase Two of the MCEA process is the identification of all reasonable alternatives to the stated problem or opportunity. In consultation with City staff and MCEA guidance documents, the following alternatives were developed.

3.1 Maintain Existing Conditions (“Do Nothing”)

This alternative is included as part of each opportunity described below. The “Do Nothing” alternative includes making no improvements or changes to address the identified problem/opportunity and it provides a benchmark against which to measure other possibilities. In an MCEA, the Do Nothing alternative would typically be the preferred solution when the costs/impacts of all other alternatives significantly outweigh their benefits.

Defined as Alternatives A1, B1 and C1 at the Public Information Centres held for the project, the Do Nothing alternative is a standard option typically required to be considered in the MCEA process. In this study, the Do Nothing alternative would result in the implementation of no

additional work to improve the efficiency of the Northern Avenue corridor or access into the P-Patch subdivision; the deteriorated surface would be re-paved and the status quo restored. Existing vehicle, pedestrian and cycling traffic flow paths would not be changed.

3.2 Opportunity A: Lane Reassignment

Section 9.2.3 of the TMP presents a discussion on road diets, including their many advantages and disadvantages. Northern Avenue between North Street and Pine Street is identified as a candidate location for further study which may benefit from a road diet. Two alternatives for implementing a road diet are presented in this MCEA process:

A2 – full length lane reassignment; and,

A3 – lane reassignment in select locations.

Alternatives A2 and A3 are largely non-structural options, meaning that extensive modification of the existing physical facilities is not required to implement these alternatives (i.e. the existing pavement width would be maintained). When compared to the Do Nothing alternative, these options only require changes to signage and line painting, along with some minor localized improvements.

3.2.1 Alternative A2: Full Length Lane Reassignment (North Street to Pine Street)

This alternative consists of reducing Northern Avenue from four lanes to three lanes with a continuous centre turn lane. Implementing Alternative A2 is intended to allow for the incorporation of designated bicycle lanes along the north and south sides of the corridor. The existing pedestrian sidewalks and boulevards will be maintained. Sidewalks may be added where possible.

3.2.2 Alternative A3: Lane Reassignment in Select Locations

This alternative involves the reduction of Northern Avenue from four lanes to three lanes with a continuous turn lane from North Street to Reid Street. The opportunity would allow that designated bicycle lanes may be included in the road diet locations. Pedestrian sidewalks and boulevards are expected to be maintained, or added to, if possible. Alternative A3 is shown in Figure 2.

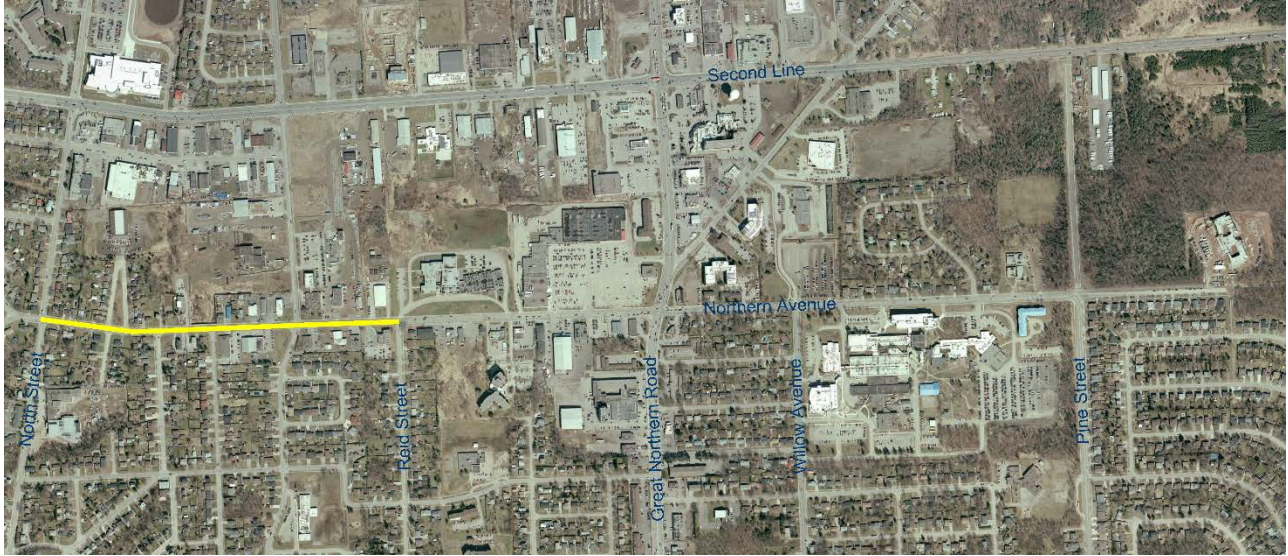


Figure 2. Alternative A3: Lane Reassignment in Select Locations.

The existing Northern Avenue corridor cross section as well as the cross section configuration proposed for a full or partial lane reassignment is illustrated in Figure 3.

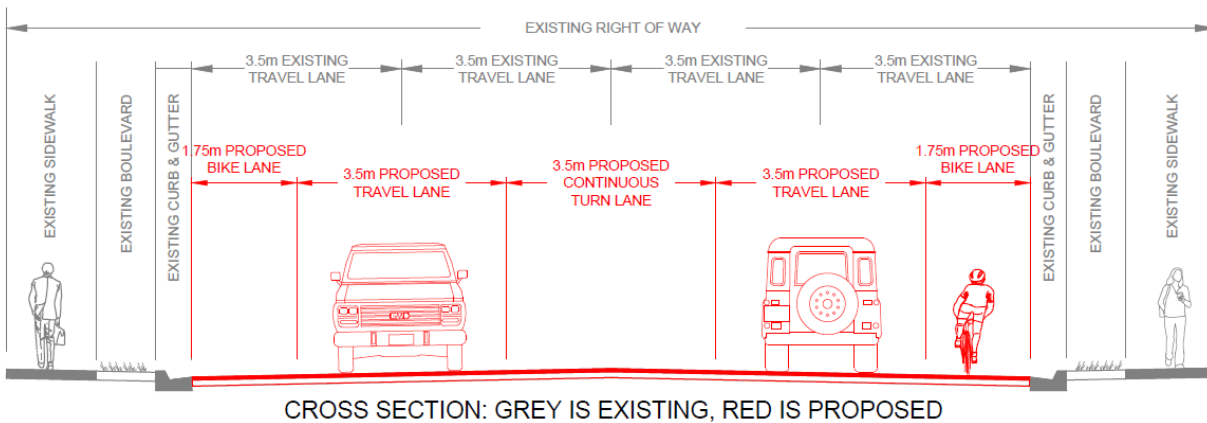


Figure 3 Alternative cross sections proposed for Opportunity A.

3.3 Opportunity B: Extension of Northern Avenue

Section 9.1.1 of the TMP, “Road Improvements”, states that the City identified the extension of Northern Avenue to Black Road as a potential road improvement. The TMP goes on to state that an extension of Northern Avenue to Black Road would “*improve network connectivity, support potential development, and reduce demand on Second Line*”. It should be noted that the TMP study was undertaken prior to the completion of the recent Second Line widening.

For the purposes of the Northern Avenue Corridor Improvements MCEA, the following alternatives for this opportunity (in addition to the Do Nothing alternative) are being considered:

- B2 – Extend easterly to connect to Black Road;
- B3 – Extend south-easterly to connect to Lake Street.
- B4 – Extend south-easterly to connect to Black Road.

These alternatives all include a requirement to construct new road through currently un-developed land.

3.3.1 Alternative B2: Extend Easterly to Connect to Black Road

This alternative consists of an extension of Northern Avenue approximately 1,200 meters easterly to connect with Black Road. This alternative provides a new route for east-west traffic while providing new pedestrian and cycling facilities along the extended corridor.

The road alignment for this alternative follows an existing utility (overhead power lines) corridor and traverses a relatively steep slope. The associated new intersection would likely require widening Black Road for turn lanes and possibly the installation of traffic signals.

Alternative B2 is shown on Figure 4.



Figure 4. Alternative B2 - Extend Easterly to Black Road.

3.3.2 Alternative B3: Extend South-easterly to Connect to Lake Street

Alternative B3 involves a south-easterly extension of the Northern Avenue corridor approximately 520 meters to intersect with upper Lake Street. This alternative may provide better access to properties in the upper Lake Street area while providing additional pedestrian and cycling facilities.

The alignment of alternative B3 would transect the existing wooded area behind residential properties and connect to Lake Street just south of the Pawating Place cooperative housing development.

Alternative B3 is shown on Figure 5.

3.3.3 Alternative B4: Extend South-easterly to Connect to Black Road

Alternative B4 expands on alternative B3 and includes the extension of Northern Avenue an additional 730 metres, beyond Lake Street to Black Road. With this option, better access to properties in the upper Lake Street area may be provided, however, increased traffic from Black Road may have other negative impacts. This alternative also extends the east-west Northern Avenue corridor for vehicular traffic; however, the existing Hub Trail in this location already provides facilities for pedestrians and cyclists.

Alternative B4 is shown on Figure 6.



Figure 5. Alternative B3 - Extend Southeasterly to Lake Street.



Figure 6. Alternative B4 - Extend Southeasterly to Black Road.

3.4 Opportunity C: Improvements to the access/egress of the P-Patch subdivision

In order to address resident concerns about perceived traffic congestion at the intersection of Pine Street and Pleasant Drive, improvements to access and egress of the P-Patch residential subdivision are included in this opportunity.

The P-Patch subdivision is generally bounded by Pine Street and McNabb Street on the west and south, and by slope lands and undeveloped woodlots to the east and north. This residential area is home to approximately 4,000 residents (including single family homes, semi-detached homes and medium density residential developments), a catholic church and an elementary school. It is currently accessed by four road connections – Pleasant Drive, Passmore Road, Pentagon Boulevard and Lake Street. Motor vehicle access to the P-Patch is currently available via McNabb Street (south boundary) and Pine Street (west boundary). There is no motor vehicle access to from the north or the east.

3.4.1 Alternative C2: New Road to Panoramic Drive

This alternative requires the construction of a new road at the existing east limit of Northern Avenue, south one block (100 metres) to Panoramic Drive. The proposed road would be constructed along an existing city-owned right-of-way, which currently accommodates greenspace and a pedestrian path along with buried sewer and water mains.

This additional road connection will provide enhanced access/egress to the P-Patch subdivision and will include facilities for pedestrians and cyclists. The provision of an alternative route such as this is anticipated to reduce vehicular traffic utilizing the Pine/Pleasant intersection and result in a corresponding improvement to the concerns voiced by residents.

Alternative C2 is shown on Figure 6.

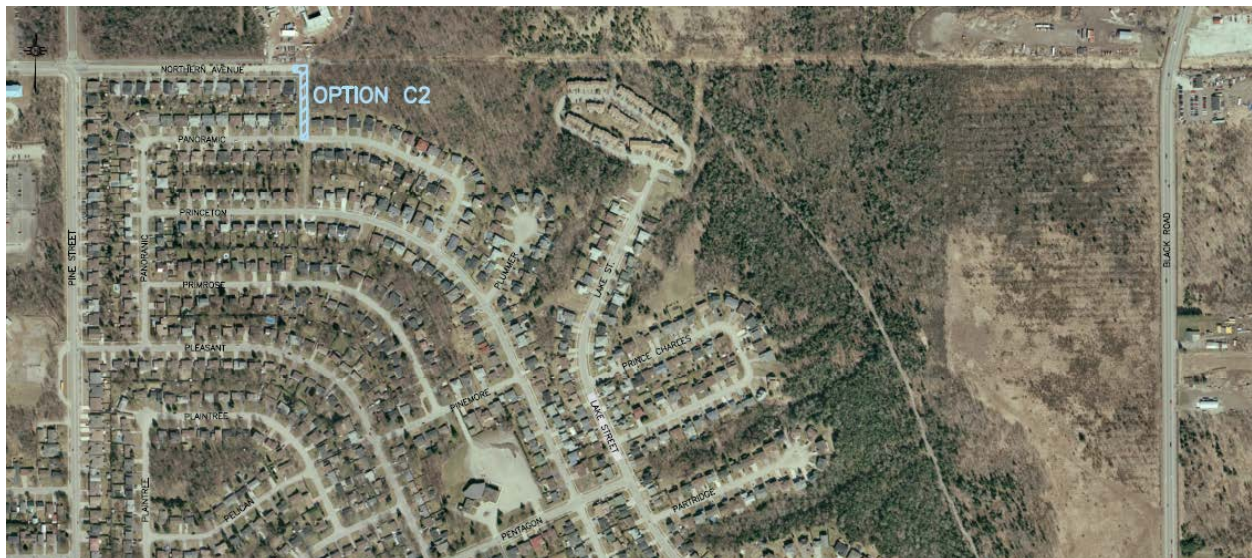


Figure 7. Alternative C2 - New Road to Panoramic Drive.

3.4.2 Alternative C3: New Road to Princeton Drive

Alternative C3 expands on alternative C2 by providing a new road two blocks (200 metres) south, between Northern Avenue and Princeton Drive. Similar to alternative C2, this proposed road will be constructed on an existing city-owned right-of-way.

Extending the new access road an additional 100 metres to Princeton Drive will provide a more direct route for more households in the immediate area.

Alternative C3 is shown in Figure 7.

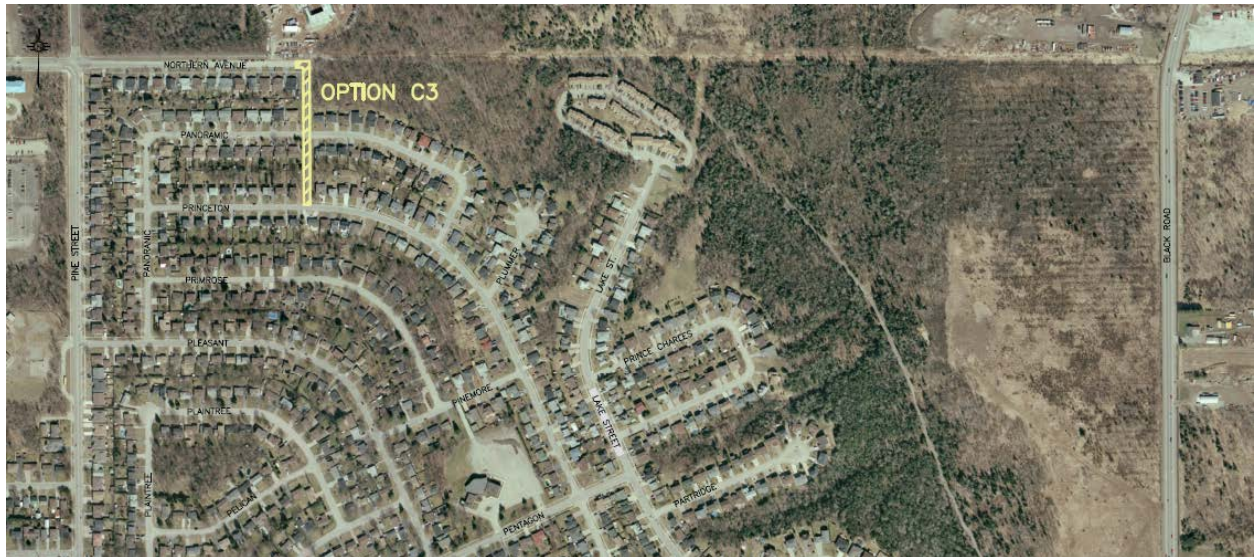


Figure 8. Alternative C3 - New Road to Princeton Drive.

3.4.3 Alternative C4: Install Traffic Lights at Pine Street and Pleasant Drive Intersection

This alternative involves the installation of traffic signal lights at the intersection of Pine Street and Pleasant Drive while maintaining the existing road network.

The current intersection configuration has traffic on Pine Street free flowing with a stop sign controlling vehicles on Pleasant Drive. The signalization of this intersection has been studied on various occasions in the past due to recurring calls for improvements from residents; however, the observed traffic volumes did not warrant implementation. As part of the Northern Avenue Corridor Improvements project, this has been revisited.

Alternative C4 is shown on Figure 8.



Figure 9. Alternative C4 - Install Traffic Lights at Pine Street and Pleasant Drive Intersection.

3.5 Inventory of Environmental Conditions

The second task in Phase 2 of the Class EA is the inventory of the natural, social and economic environment in the Study Area. For the purpose of this MCEA, the study area has been defined as the area bounded by John Street in the west, Black Road in the east and contains the residential and commercial properties located adjacent to the Northern Avenue right-of-way. The study area also includes the northern portion of the P-Patch subdivision, north of and including Pleasant Drive. The area of influence considered for the socio-economic environment has been defined as the developed urban region of the City of Sault Ste. Marie.

3.5.1 Natural Environment

The study area is entirely within the urban region of the City of Sault Ste. Marie and has been affected by human development activity in the past. The area is surrounded by a mix of developed and undeveloped lands including residential neighbourhoods, commercial developments, recreation/parklands and transportation corridors. The study area topography includes flat lowlands and dissected gullies to the east and flat to undulating lands to the west.

Regional Geology

The Ministry of Natural Resources and Forestry (MNR) Aggregate Resources Inventory of the Sault Ste. Marie Area as well as the Sault Ste. Marie Region Conservation Authority's (SSMRCA) Sault Ste. Marie Region Source Protection Area Assessment Report were reviewed for the purpose of characterizing the physiography and geology of the study area.

The geology in Sault Ste. Marie rests on bedrock of the Cambrian and Precambrian age. The study area is located generally within an area comprised of glaciolacustrine deposits including fragmented to varied silt, clay and fine sand. The geological formations in the Sault Ste. Marie area are mainly the result of the repeated advance and retreat of extensive continental ice sheets during the Wisconsin Stage of the Pleistocene Epoch.

The western portion of the Study Area is of undulating, rolling topography and composed of a mixture of sandy and silty ground morainal till. The surface drainage conditions in the area are considered to be dry.

Groundwater Resources

Groundwater flow within the City of Sault Ste. Marie generally runs from the northern Precambrian uplands to the St. Marys River in the south. A small portion along the east limits of the study area is considered to be a potential groundwater discharge area as its lower elevation allows for the water table to leave the aquifer and flow to the surface. The remainder of the Study Area is considered a potential groundwater recharge area that allows for a percentage of total precipitation to infiltrate to the water table.

Surface Water and Aquatic Habitat

Fort Creek is located just within the western limits of the study area. Originating in the northern portion of the City, the Fort Creek channel runs roughly north to south, crossing Second Line and Conmee Avenue. Further downstream, Fort Creek is conveyed by a concrete aqueduct from Carmen's Way to Queen Street where it then flows along an open channel to the St. Marys River.

Black Creek is located within the east limits of the study area. The creek forms approximately 60 meters east of Black Road and flows easterly where it ultimately connects to the Root River channel approximately 3.4 kilometres upstream of the St. Marys River.

As the Fort Creek and Root River are considered fish habitat, any proposal that may potentially impact the waterway or the area adjacent to the waterway (hazard area/flood plain) must have authorization from relevant agencies and must be carried out in accordance with applicable laws.

Vegetation and Terrestrial Environment

The majority of the land within and abutting the study area has been previously developed and/or disturbed. Tree species including red maple, yellow birch, white pine and red oak are sparsely located along the corridor with the majority of those being located at the east end of Northern Avenue within the undeveloped Sault College Woodlot.

The study area is situated within the City's core and includes portions of undeveloped land which may create favourable habitat for several wildlife species including (but not necessarily limited to) fox, racoons, squirrels, chipmunks and bird species such as the black-capped chickadee, white-throated sparrow, American crow and downy woodpecker.

3.5.2 Heritage Resources

Following a review of the "Master Plan of Archaeological Resources for the City of Sault Ste. Marie" (*Archaeological Services Inc. "ASI", 2011*), areas of suspected archaeological potential were identified along the Northern Avenue corridor. As a result, ASI was retained to conduct a Stage 1 Archaeological Assessment (background study and property inspection) for the Northern Avenue corridor. The Stage 1 Assessment (included in Appendix 4) concluded that although parts of the Northern Avenue corridor exhibit

archaeological potential (lands that have not undergone deep and extensive disturbances) a Stage 2 assessment would only be required if the City planned to disturb lands beyond the existing rights-of-way. It was also concluded that no archaeological potential existed along the utility corridor proposed for a new access/egress road to the P-Patch.

3.5.3 Social Environment

Land Use

A large portion of the Study Area consists of institutional and residential properties. Several commercial developments are located between Great Northern Road and North Street on either side of the Northern Avenue corridor. North and south of the central portion of the Study Area, adjacent to Great Northern Road corridor, consist mainly of industrial and commercial properties. The majority of the properties at the west limits of the Study Area are residential while the eastern limits of the Study Area are zoned as parks and recreation, industrial and rural area zones. The majority of the properties located further south of the Study Area are residential while the area to the north consist of a mixture of residential, rural area and parks and recreational zoned properties.

Utilities

The Study Area is serviced by both the municipal water distribution system and municipal sanitary/storm sewers.

Electricity is provided via a combination of overhead and underground conductors from the distribution grid owned and operated by the Sault Ste. Marie Public Utilities Commission (PUC).

All of the properties are within the boundaries of existing electrical and telecommunication services. The following authorities have infrastructure within the Study Area:

1. City of Sault Ste. Marie
2. Public Utilities Commission (PUC);
3. Bell Canada;
4. Shaw Cable; and
5. Union Gas.

Recreation

There are several recreational opportunities neighbouring the Study Area. The Strathclair Sports Complex is located north of the Study Area at the east end of Second Line. The sports complex offers both youth and adult baseball and soccer facilities.

The Hiawatha Highlands Conservation Area is found northeast of the Study Area. The conservation area offers 35 kilometres of nature trails for hiking, cross country skiing and biking as well as lakes and river systems for activities such as fishing and canoeing.

The John Roswell Hub Trail is located east of Pine Street, on the north side of the Northern Avenue corridor and provides a pedestrian/cycling route connecting the northern and eastern sections of the City.

The Soo Pee Wee Arena is located on the Northern Avenue corridor between Great Northern Road and Sackville Road. The arena was built in 1967 and offers the community such activities as youth and adult hockey and figure skating.

Sault College is located on the Northern Avenue corridor between Willow Avenue and Pine Street. In addition to providing post-secondary courses, Sault College also offers youth summer camps as well as fitness and dance classes to the community.

3.6 Evaluation of Alternative Solutions

In order to compare the alternative solutions, each was examined to estimate how they would impact the environment (as it is described above) and to determine what mitigating measures may be reasonable to address the impacts. Evaluation criteria were developed in order to aid the comparison and to form a basis for the identification of a preferred solution.

3.6.1 Evaluation Criteria

The following is a summary and description of the evaluation criteria. The criteria are divided into three categories: technical, natural and social. Each criterion was ranked for each alternative and given a subjective score of 1 (positive/most desirable), 2 (neutral) or 3 (negative/least desirable). The scores are based on the anticipated impacts of implementing the alternative.

It is noted that the evaluation criteria are applied with reference to the stated problem/opportunity and the previously defined study area.

1) Technical Criteria

1.1) Vehicular Traffic Flow

This study has been prompted by an opportunity to improve the Northern Avenue corridor which was identified through the transportation master planning process. Accordingly, the ability for a potential solution to provide a safe and efficient environment for vehicular traffic is crucial.

A ranking of 3 is assigned to alternatives which are anticipated to fail to provide safe and efficient vehicular traffic facilities.

A ranking of 1 for this criterion indicates that the alternative results in a relatively straightforward solution with intuitive vehicle movements with a minimal amount of potential conflict areas.

Alternatives which are anticipated to result in vehicular traffic flow which is likely to be less than ideal are given a ranking of 2.

1.2) Pedestrian and Cycling Traffic Flow

Similar to the criteria for vehicular traffic flow, this criterion provides a measure of the extent to which an alternative can provide safe and efficient facilities for pedestrians and cyclists.

Alternatives which fail to provide safe and efficient flow for pedestrian traffic are assigned a rating of 3.

A ranking of 1 in this criterion indicates that the alternative provides a safe and efficient method for pedestrians and cyclists to traverse through the Study Area.

An alternative which provides solutions which are for the most part safe and efficient however would result in some aspects being less than ideal are assigned a rank of 2 for this criterion.

1.3) Implementation of the Alternatives

This criterion provides the opportunity to assign ratings to alternatives which reflect the anticipated difficulties in physically implementing the proposed works. These factors may include topography factors, property constraints, interference with existing structures and similar challenges.

The most difficult or inconvenient alternatives to construct are rated 3.

The easiest and least inconvenient alternatives to construct are rated 1.

Alternatives ranked 2 are anticipated to have comparatively moderate difficulty or inconvenience associated with their implementation.

2) Environmental Criteria

2.1) Natural Environment

Rankings for this criterion reflect the anticipated impacts to the natural environment associated with implementation of the alternatives. Impacts may include changes to vegetation, habitat, water resources, etc.

Alternatives assigned a rank of 3 are anticipated to have significant negative impacts to the natural environment.

A ranking of 1 is applied to those alternatives which are anticipated to have little or no impact on the natural environment.

Those alternatives which are predicted to have moderate impacts are assigned a rank of 2.

3) Social Environment Criteria

3.1) Impacts on Land Users, Residents and Owners

Impacts to the local social environment are rated using this criterion. These include changes to the use of an area, impacts to nearby property owners, and other similar impacts.

Alternatives which would significantly negatively alter land uses and social interests are given the rank of 3.

Should little or no negative impacts be anticipated, a rank of 1 is assigned.

Those alternatives which may result in comparatively moderate negative social impacts are assigned a rank of 2.

4) Economic Criteria

4.1) Cost of Implementation

Cost of implementation refers to the actual dollar amounts to be expended to implement an alternative. Such costs include construction, land acquisition as well as engineering and associated administrative costs.

This criterion is ranked based on anticipated relative costs. Rankings are low cost (1), medium cost (2), and high cost (3).

3.6.2 Evaluation Summary

The alternatives for each of the three opportunities were assessed and scored against each other considering the criteria outlined above in order to determine which was preferred. A preferred alternative was determined for each opportunity.

A copy of the resulting evaluation matrix is presented in Appendix 5.

Opportunity A

Alternative A1: No Lane Reassignment (“Do Nothing”)

This option was found to be least preferred as it did not address the recommendation to improve the Northern Avenue corridor. Although this alternative would be considered the easiest to implement, it did not efficiently address vehicular flow along the corridor or provide any safety enhancements to pedestrian or cycling facilities. The effects of the “Do Nothing” approach on the natural environment were found to be negligible and impacts to land owners and users of the corridor would not be altered. Costs associated with Alternative A1, which for the purpose of this report are considered a baseline cost for comparison, were given a low-cost ranking as they include the continued costs related to the maintenance and operation of Northern Avenue as it is now.

Alternative A2: Full Length Lane Reassignment (North Street to Pine Street)

Alternative A2 was found to be the preferred alternative as it provides an opportunity to improve overall efficiency with respect to mode share and safety. Alternative A2 is felt to adequately address the recommendation in the TMP to improve the Northern Avenue corridor as the reduction to three lanes is expected to efficiently accommodate traffic volumes while providing an opportunity to enhance pedestrian and recreational cycling facilities within or adjacent to the road way.

Based on the average daily traffic (ADT) volumes observed along Northern Avenue, the overall traffic flow is not expected to be negatively impacted as a result of the reduction in traffic lanes. With the exception of the northbound and southbound approaches at Great Northern road, most movements, approaches and intersections are expected to operate at an acceptable level of service (LOS) and volume-to-capacity ratios. Apart from slight delays

related to transit stops during peak hours, traffic flow similar to the existing conditions is expected. It is also anticipated that efficient access to the properties adjacent to the corridor will be maintained through the implementation of this alternative.

Implementation of Alternative A2 is anticipated to result in moderate inconveniences to land owners and users of the corridor during construction. As Alternative A2 consists of redevelopment within the existing road corridor, minimal impacts on the natural environment are anticipated. Common mitigation procedures would be put in place to address typical impacts associated with construction.

Although lane widths are expected to vary along the corridor to allow for exclusive bicycle lanes on the north and south sides of the corridor, the proposed vehicle lane widths are expected to be the same or wider than the existing conditions. Existing intersection configurations are also expected to be maintained to ensure efficient operations. A reduction in vehicle travel lanes has been proven to help to maintain speed limit compliance, potentially improving the safety of the roadway.

Pedestrians would be required to cross fewer vehicle travel lanes which may also help to increase pedestrian safety along the corridor. It is also expected that the addition of bicycle lanes along the corridor will help to improve the efficiency of the roadway with respect to mode share, resulting in a positive social impact. Designated bicycle lanes allow for a greater buffer between not only bicycles and vehicles but also between bicycles and pedestrians along the sidewalk, making the corridor more inviting to all users. The addition of bicycle lanes also creates an east-west cycling route while helping to close gaps within the existing Hub Trail network. Costs are expected to include those associated with line painting for designated bicycle facilities and to reassign vehicle travel lanes.

It should be noted that the City's Transit Services recently completed a route optimization plan which identified the Sault College area as a candidate for a transit transfer point. Preliminary discussions have identified that the location for a transfer station should accommodate five buses as well as a 10-foot by 24-foot heated shelter and platform. Ideally the transfer station would also be located in the vicinity of the Hub Trail. The City should ensure that impacts related to the operation of the Northern Avenue corridor have been identified prior to finalizing the location of the proposed transit station.

Alternative A3: Lane Reassignment Select Locations

Alternative A3 is expected to be able to accommodate the traffic volumes observed along the Northern Avenue corridor, however, due to the length of road required to transition between three lanes and four lanes, only the section between North Street and Reid Street was found to be practical for a lane reassignment. The distance between existing intersections east of Reid Street is insufficient to safely accommodate the transition.

Similarly to Alternative A2, this alternative provides an opportunity to improve cycling facilities with the designation of bicycle lanes in select locations on the north and south sides of the Northern Avenue corridor. This alternative is less preferred than Alternative

A2 with respect to pedestrian and cycling traffic flow as fractured cycling facilities may cause confusion among corridor users, resulting in discouragement and lack of use.

Alternative A3 received a worse ranking than Alternative A2 with respect to its impact on land users, residents and owners. As vehicles traveling along the corridor may increase speeds to avoid bottlenecks at transition areas, thus safety concerns for those using the roadway may increase.

Similarly to Alternative A2, implementation of Alternative A3 consists of the redevelopment of the existing road and as a result, impacts to the natural environment are anticipated to be minimal. It is also anticipated that the relative cost of implementation of Alternative A3 would be similar to that of A2.

Opportunity Summary

Alternative A1 is not carried forward as it does not address the recommendation to improve the Northern Avenue corridor. This alternative does not efficiently address vehicular flow along the corridor or provide any safety enhancements to pedestrian or cycling facilities.

Alternative A2 is recommended for further consideration as it is expected to provide an opportunity to improve the overall efficiency of the Northern Avenue corridor with respect to mode share and safety. Implementation of this alternative is anticipated to have minimal impacts on the natural environment and an increase in pedestrian and cyclist safety.

Alternative A3 is not considered further as its implementation may lead to inconsistent lane configurations resulting in negative impacts on the efficiency and flow of traffic along the roadway. Discontinuing bicycle lanes may also cause confusion among corridor users, resulting in discouragement and lack of use.

Opportunity B

Alternative B1: No Extension of Northern Avenue (“Do Nothing”)

Alternative B1 was determined to be the preferred alternative for opportunity B. The do nothing alternative ranked most favourably on the majority of the criteria evaluated; essentially meaning that the cost of constructing an extension of Northern Avenue will not provide a significant benefit over the status quo, and in-fact may have overall negative impacts.

Since no changes are required for this option, impacts related to the implementation are negligible. Traffic flow along Northern Avenue is not altered and there are no negative impacts on the environment, land users or nearby residents.

Although this alternative is considered the easiest to implement, it does not provide the opportunity to upgrade underground or aerial infrastructure or pedestrian and cycling facilities. However, these facilities may be constructed even if the road isn't, if warranted.

Alternative B2: Extend Easterly to Black Road

Alternative B2 may help to reduce traffic on Second Line as this extension will provide an additional east-west route for vehicular traffic. However, a reduction in traffic travelling along Second Line is not necessarily beneficial, while the increased traffic on Northern Avenue is arguably detrimental. Second Line has recently been expanded to accommodate increased traffic volumes and is currently operating without capacity concerns.

As the proposed route for an easterly extension to Black Road is along an existing cleared utility corridor, impacts to the environment are expected to be minimal. This alternative provides significant opportunities to install new sewer and water infrastructure; however, due to the steep terrain and limited property availability, the cost and difficulty of implementation makes this alternative less favourable.

Alternative B3: Extend Southeasterly to Lake Street

With respect to road efficiency, the implementation of Alternative A3 may result in some positive impacts as it provides the opportunity to connect upper Lake Street directly to Northern Avenue. This would also provide enhanced pedestrian and cycling facilities as well as potential for new water/sewer infrastructure along approximately 520 meters of new road.

Construction of this alternative will require mitigating measures to avoid detrimental impacts to the natural environment. Clearing of trees and destruction of habitat will result from implementation of this alternative. The steep topography in the area may be accommodated more easily with this Alternative as opposed to Alternative B2.

While an extension of Northern Avenue may provide better access to properties in the upper Lake Street area, negative impacts with respect to vehicular traffic flow and land use may be experienced. Connecting Lake Street to Northern Avenue is anticipated to result in increased traffic along both Northern Avenue as well as along Lake Street, countering the opportunity of a possible lane reassignment on Northern Avenue while negatively impacting adjacent properties. The alternative will also require the relocation of a portion of the Hub Trail.

Although expected to be less than Alternatives B2 and B4, moderate costs are still anticipated with the implementation of this alternative – mainly due to the steep slopes and property requirements.

Alternative B4: Extend Southeasterly to Black Road

Impacts, both positive and negative, resulting from the implementation of this alternative are expected to be similar to those of Alternatives B2 and B3.

Alternative B4 offers an additional east-west route for vehicular traffic between Black Road and Great Northern Road and provides the opportunity for the construction of additional pedestrian and cycling facilities along with approximately 1,250 meters of new road. This

alternative may also allow for the elimination of the Upper Lake Pump Station while enhancing the City's water distribution network.

It is anticipated that an extension of Northern Avenue to Black Road would likely increase the traffic volume along Northern Avenue, similar to alternative A2. A possible increase in traffic along Northern Avenue, the alteration of green space to allow for the construction of a new road and the relocation of a portion of the Hub Trail is expected to negatively impact adjacent properties as well as those using the Hub Trail.

Similarly to Alternative B2 and B3, the cost and difficulty associated with the implementation of this alternative resulted in a less favourable ranking.

Opportunity Summary

Alternative B1 is carried forward for further consideration as impacts related to the implementation of this alternative are negligible. Traffic flow along Northern Avenue is not expected to be altered and no negative impacts on the environment, land users or nearby residents are anticipated.

Alternative B2 is not considered further as this alternative may allow for an increase in traffic along the Northern Avenue corridor, countering the opportunity of a possible lane reassignment. Higher costs are also anticipated with this alternative as the road would be constructed over steep terrain with limited property availability.

Alternative B3 is not carried forward as connecting Lake Street to Northern Avenue may result in increased traffic along both Northern Avenue as well as along Lake Street, countering the opportunity of a possible lane reassignment on Northern Avenue. The loss of trees and wooded area associated with the implementation of this alternative as well as higher anticipated construction costs make this alternative unfavourable.

Similarly to Alternative B3, Alternative B4 is not carried forward as a connection between Northern Avenue and Black Road may result in an increase in traffic along Northern Avenue, countering the opportunity of a possible lane reassignment along Northern Avenue. Environmental impacts related to the construction of this alternative as well as the higher costs associated with the construction of a new road/utilities through challenging topography makes this a less favourable alternative.

Opportunity C

Alternative C1: No New Access into P-Patch ("Do Nothing")

Implementation of Alternative C1 does not provide any access/egress improvements to the P-Patch subdivision and maintains the status quo at the Pine Street/Pleasant Drive intersection.

With this alternative, the Pine Street/Pleasant Drive intersection would continue to function in its current capacity, which has drawn vocal criticism from area residents and users of all types.

This alternative received favourable rankings with respect to its lack of difficulty to implement as well as associated costs; however, the operation of the Pine Street/Pleasant Drive intersection has received complaints from users over the past few years which outweigh the positives of this alternative.

Alternative C2: New Road to Panoramic Drive

Alternative C2 will provide a new access/egress point into the P-Patch subdivision while improving the existing pedestrian and cycling facilities. It is expected that a new road may help to alleviate traffic congestion at the Pine Street and Pleasant Drive intersection as traffic in the vicinity of these streets would likely be diverted to the new road.

Minimal impacts to the natural environment are anticipated with this alternative and moderate costs associated with the construction of the new road along the existing City owned right-of-way are expected.

The construction of a new road may negatively impact neighbouring properties as the new road is expected to increase traffic in the northwest portion of the P-Patch.

Alternative C3: New Road to Princeton Drive

Similarly to Alternative C2, C3 will provide a new access/egress point into the P-Patch subdivision. It will include improvements to the existing pedestrian and cycling facilities while helping to improve traffic movement throughout the northern portion of the P-Patch.

It is expected that the construction of a new road along the City's existing right-of-way will help to divert north and west bound traffic in the vicinity of Princeton Drive away from the Pine Street/Pleasant Drive intersection, potentially aiding in the reduction of perceived traffic congestion while minimizing wait times at the intersection.

Moderate costs are expected with this alternative as construction of the new road would take place along the existing City owned right-of-way, eliminating the need to purchase or clear any undeveloped land.

Although implementation of the alternative is expected to produce minimal impacts to the natural environment, the construction of a new road may negatively impact neighbouring properties as the new road is expected to increase traffic in the northwest portion of the P-Patch.

Alternative C4: Install Traffic Lights at Pine Street and Pleasant Drive

Alternative C4, Install Traffic Lights at Pine Street and Pleasant Drive, may help to shorten wait times for vehicles exiting the P-Patch subdivision at certain times of the day (and under certain conditions) – and increase delays at other times.

Existing pedestrian and cycling flow paths would not be expected to change; however, traffic flow along Pine Street will be impacted resulting in increased travel times.

Costs expected with this Alternative include the installation of the signals themselves, as well as modifications to curb radii and sidewalks.

Opportunity Summary

Alternative C1 results in the Pine Street/Pleasant Drive intersection continuing to function in its current capacity, not providing any additional access/egress points into the P-Patch subdivision. As the function of the intersection has drawn vocal criticism from area residents, this alternative is not carried forward.

Although Alternative C2 and C3 result in similar impacts, Alternative C3 is carried forward. As Alternative C3 is expected to divert a greater amount of traffic away from the Pine Street/Pleasant Drive intersection, this alternative is found to be more favourable.

Alternative C4 is not carried forward as its implementation is not expected to improve the overall function of the intersection. As traffic flow along Pine Street is expected to increase and shorter wait times for those vehicles exiting the P-Patch subdivision are not expected to be consistent (i.e. during non-peak hours) this alternative is considered less favourable.

3.7 Recommended Solution

Following the evaluation procedure, the following combination of alternatives was identified as the recommended solution:

- Alternative A2 – Full length lane reassignment
- Alternative B1 – No extension of Northern Avenue
- Alternative C3 – New road to Princeton Drive

3.8 Solicit Input on Recommended Solution

A Public Information Centre was held on June 22, 2016 in the Russ Ramsay Room of the Sault Ste. Marie Civic Centre. Representatives from both Kresin Engineering Corporation (KEC) and the City were available to discuss the project.

The focus of this first PIC was to present the opportunity statement and the identified possible improvements to be considered as well as seek public input on the recommended solution. Twenty-seven residents attended the PIC in order to discuss the project. Copies of the presentation boards, attendance records and comments received at the PIC are attached in Appendix 6.

Input received during this PIC, as well as comments forwarded to KEC afterwards did not identify any additional alternatives to be considered. Many comments were supportive of the recommended solution; however, opposition to Alternative C3, primarily from adjacent residents, was noted. Also, concerns about the operation of the Great Northern Road/Northern Avenue intersection were received, specifically regarding the lack of an eastbound right turn facility.

No comments were received from any Indigenous community/organization.

3.9 Traffic Review

CIMA+ completed a Traffic Report in January of 2017 (included in Appendix 7). The report further evaluated the recommended solution identified for the Northern Avenue corridor from a traffic engineering perspective. The report provides a quantitative and qualitative review of the benefits and dis-benefits of lane reassignment along Northern Avenue as well as a capacity analysis of the

intersection of Northern Avenue and Pine Street following the construction of a new access/egress road to the P-Patch.

Based on their evaluation, CIMA+ concluded that the recommended road diet may help to increase road safety for all users and provide an improved cycling environment. Although transit vehicles may lead to the occasional delay in traffic along the corridor, no significant operational impacts are expected as a result of a lane reassignment along Northern Avenue.

Following a review of traffic operations at the Northern Avenue and Pine Street intersection, it was determined that a new access/egress road into the P-Patch would have a neutral impact on traffic operations at this intersection. Although a new road is expected to redirect traffic to the Northern Avenue and Pine Street intersection, the intersection operates well below capacity under the existing as well as future predicted conditions.

4.0 PHASE THREE – ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION

At the completion of Phase Two of the MCEA, the preferred solution selected consists of implementing a road diet along approximately 2,200 meters of road between North Street and Pine Street as well as the construction of approximately 200 meters of new road from the existing east termination of Northern Avenue, south to intersect with Princeton Drive. The reasonable alternatives available to achieve this solution are few due to the specific nature of the proposed improvements.

The following outlines some design considerations for the implementation of this solution.

4.1 Road Diet

The proposed road diet is largely a non-structural modification consisting essentially of re-painting lane lines and adding lines/symbols for bicycle lanes. Some modifications to existing curbs and sidewalks will be required in localized areas, which will be done in consultation with design guidelines and established best practices. Input from the City traffic department, cycling advocates and design professionals will be obtained. Intersection configurations for automobiles following the road diet will closely match the existing conditions as there are currently dedicated turning lanes in many locations.

The suggested lane widths presented in the CIMA+ traffic report are recommended for implementation with this solution.

The existing property constraints at the southwest quadrant of the Great Northern Road/Northern Avenue intersection (Catalina Motel property) has resulted in a lack of space for a dedicated right turn lane. As a result, traffic back-ups are currently experienced in this location when as few as two eastbound vehicles will block access to the channelized right turn lane. This situation will not be improved with the proposed road diet. Property acquisition at this location is recommended to allow the construction of dedicated right turn facilities.

Although not specifically related to the road diet, the intersection of Willow Road and Northern Avenue was identified as requiring upgrades to accommodate bicycle traffic. Currently at this

location there are traffic signal heads facing the three legs of the intersection; however, bicycle traffic from the Hub Trail cannot see the status of the signals. Additional signal heads are recommended for this intersection.

In conjunction with the proposed road diet, the existing sidewalks along Northern Avenue will remain, with possible slight modifications where necessary. It is noted that there is currently no sidewalk on the south side of Northern Avenue, west of Reid Street; it is recommended that new sidewalk be installed at this location.

4.2 New P-Patch Access Road

The construction limits of a two-lane road within the P-Patch subdivision are to be within the existing City owned right-of-way, therefore deviation of the horizontal alignment will not be possible. The vertical alignment is expected to follow the existing topography while accommodating adjacent properties and existing intersections at Northern Avenue, Panoramic Drive and Princeton Drive.

The recommended cross-section for the new access road is a two lane urban cross-section with curbs and one sidewalk. The urban cross-section is recommended since it provides a more compact road which will minimize impacts to adjacent properties; a cross-section with ditches would require a greater width of disturbance.

The proposed new intersection at the east end of Northern Avenue will be a challenge as vehicular traffic is predicted to have a tendency to “free-flow” since it is only a two leg intersection. However, with the Hub Trail forming a third leg, bicycle/vehicle conflicts are possible. A stop sign control is recommended for the south leg of this intersection.

It is also recommended that the new access road have stop sign controls at both Princeton Drive and Panoramic Drive. This is expected to help with speed limit compliance and will make the route less appealing to cut through traffic seeking a “short-cut” through the P-Patch.

4.3 Solicit Input on Recommended Design

A second PIC was conducted on September 26, 2017 to present the recommended design to the Public. The opportunity was provided and the public was encouraged to discuss and offer comments on the presented information.

Thirty-one residents were in attendance at the second PIC and included good representation of residents in the immediate area who were concerned with the potential for negative effects resulting from the implementation of the recommended design. Specific issues raised predominantly involved a potential for an increase in traffic within the P-Patch as well as the possibility of increased traffic congestion on Northern Avenue following the implementation of lane reassignment. The public generally supported the addition of designated bicycle lanes along Northern Avenue.

No comments were received from any Indigenous community/organization.

Copies of the presentation boards, attendance records and comments received at the PIC are attached in Appendix 8.

4.3.1 Consultation with Interested Parties

Following the second PIC, further consultation with interested parties was carried out on a one-on-one basis. These consultations included discussion of the following main concerns:

1. The construction of the proposed new P-Patch access road will not result in overall benefit.
2. More robust facilities for bicycles are required, including left turn boxes at signalized intersections.
3. Signalized pedestrian crossovers are needed at various locations along Northern Avenue.
4. The proposed road diet will result in unacceptable delays in accessing private properties and vehicle movements in general.

The concerns raised through consultation with interested parties can, for the most part, be successfully addressed through the detailed design and construction phases, as well as monitoring following implementation. The use of established best practices, standards and guidelines in the design and construction of bicycle and pedestrian facilities will address the majority of these concerns. Monitoring performance following implementation can also identify operational modifications which may further improve performance.

A summary of comments and responses are included in Appendix 9.

4.4 Preferred Design, Schedule and Cost

The preferred design consists of lane reassignments on Northern Avenue as detailed above. The lane reassignments are essentially a non-structural change involving line painting. It is our understanding that the current road surface is in a deteriorated state and requires re-paving; implementation of the road diet in conjunction with re-paving is recommended and the cost for line painting and minor modifications is \$250,000 in addition to the paving cost.

The construction of new sidewalk west of Reid Street can be completed at the same time, or phased as budget allows. The generation of accurate estimates to construct a sidewalk at this location requires a more detailed review. Property acquisition and/or relocation of utility poles are likely to be needed.

The construction of the new road into the P-Patch can be completed independently from the lane reassignment project, as budget allows. The estimated cost to construct this road is approximately \$340,000 including contingencies and engineering.

5.0 PHASE FOUR – ENVIRONMENTAL STUDY REPORT

In accordance with the completion of this study as a Schedule C Project under the Municipal Class Environmental Assessment process, a Notice of Completion of this Environmental Study Report is to be issued and published by the City of Sault Ste. Marie.

The ESR is to be made available for review by interested parties for a period of 30 days following the Notice of Completion. During this review period, concerns from the public are to be resolved

by the City if possible. Failing resolution of issues, the concerned parties can request, during the review period, that the Minister of the Environment and Climate Change issue an order to comply with Part II of the EA Act.

It is preferable to resolve issues with the City rather than requesting a Part II order, therefore negotiations or mediation with the City is encouraged.

A request for a Part II order must be made in writing within 30 days of the Notice of Completion to the Minister of the Environment and Climate Change, with a copy to the City of Sault Ste. Marie at the addresses below:

The Honourable Chris Ballard
Minister of the Environment
and Climate Change
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto ON M7A 2T5

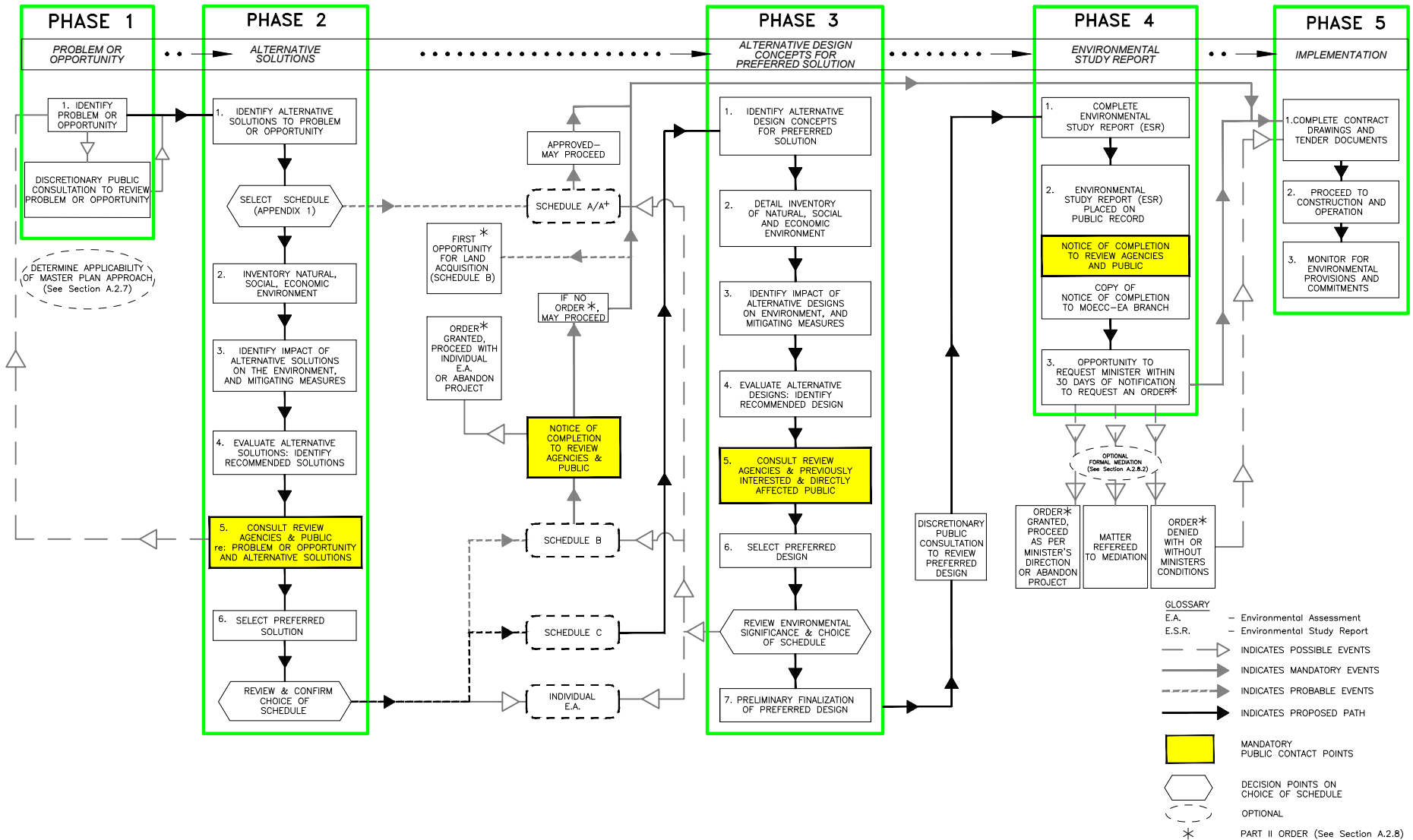
Director, Environmental
Approvals Branch
Ministry of the Environment
and Climate Change
1st Floor, 135 St. Clair Ave West
Toronto, ON M4V 1P5

Director of Engineering
Services
City of Sault Ste. Marie
5th Floor, Civic Centre
99 Foster Drive
Sault Ste. Marie, ON P6A 5N1

APPENDIX 1
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PROCESS

PLANNING & DESIGN PROCESS FOR MUNICIPAL ROAD PROJECTS

NOTE:
THIS FLOWCHART IS TO BE READ IN CONJUNCTION WITH THE "EXPLANATION OF PLANNING & DESIGN PROCESS" IN THE MEA CLASS EA DOCUMENT.



REPRODUCED FROM MUNICIPAL ENGINEER'S ASSOCIATION, MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

DESIGN	
DRAWN	
CHECKED	
PROJECT	1564.04
FILENAME	1564 class ea process
SCALE	NTS

APPENDIX 2
NOTICE OF STUDY COMMENCEMENT & PROJECT DISTRIBUTION LIST

NOTICE OF STUDY COMMENCEMENT NORTHERN AVENUE CORRIDOR IMPROVEMENTS

The City of Sault Ste. Marie (City) is initiating a study to investigate alternatives to improve the efficiency of the Northern Avenue Corridor. It has been identified as part of the City's 2015 Transportation Master Plan that Northern Avenue is a candidate for potential lane reassignment and/or elimination between North Street and Pine Street and that an extension of Northern Avenue to Black Road may help to improve road network connectivity as well as reduce the traffic demands on Second Line. In conjunction with these potential improvements, the City has also identified the opportunity to integrate improvements to the access/egress of the P-Patch subdivision.

The study is being undertaken as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment ("Class EA"). The study will include public and external agency consultations. The study will evaluate alternative designs based on their potential impacts on the natural, social and economic environments. Preceding any decisions recommending or accepting a preferred alternative, interested parties will have the opportunity to review the study findings and provide input and comments into the evaluation.

Public consultation is vital to the success of this study. The City would like to ensure that anyone interested in this study has the opportunity to get involved and provide input. The City plans to hold Public Information Centres (PICs) during the course of the Class EA in order to solicit input. Notification of the PICs will be provided at the appropriate time by means of a notice similar to this one.

Please contact one of the following project team members if you would like to be included on the project mailing list, have any questions or wish to obtain more information on the project:

City of Sault Ste. Marie
Attention: Don Elliott, P. Eng.
Director of Engineering Services
99 Foster Drive, Civic Centre
Sault Ste. Marie, ON
Tel: (705) 759-5329
Email: d.elliott@cityssm.on.ca

Kresin Engineering Corporation
Attention: Michael Kresin, P. Eng.
Consulting Engineer
536 Fourth Line East
Sault Ste. Marie, ON
Tel: (705) 949-4900
Email: northernave@kresinengineering.ca

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

This notice first published on March 19, 2016.



NORTHERN AVENUE CORRIDOR IMPROVEMENTS ENVIRONMENTAL ASSESSMENT
KEC Project Ref. No. 1564
MASTER Consultation List

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
1a	Algoma District School Board	David Ervin	Supervisor of Facility Renewal and Capital Planning	190 Northern Avenue	Sault Ste. Marie	ON
1b	Algoma District School Board	David Steele	Manager	190 Northern Avenue	Sault Ste. Marie	ON
1c	Algoma District School Board	Amy See	Facilities Use/Office Supervisor	190 Northern Avenue	Sault Ste. Marie	ON
2	Brookfield Renewable Power Inc. Sault Hydro Operations	Mr. Jim Deluzio	General Manager	243 Industrial Park Crescent	Sault Ste. Marie	ON
3	City of Sault Ste. Marie	Mr. Christian Provenzano	Mayor	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
4	City of Sault Ste. Marie	Ms. Judy Hupponen	Ward Councillor - Ward 3	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
5	City of Sault Ste. Marie	Mr. Matthew Shoemaker	Ward Councillor - Ward 3	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
6	City of Sault Ste. Marie	Mr. Rick Niro	Ward Councillor - Ward 4	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
7	City of Sault Ste. Marie	Mr. Lou Turco	Ward Councillor - Ward 4	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
8	City of Sault Ste. Marie	Mr. Tom Vair	Deputy CAO, Community Development and Enterprise Services	Box 580, 99 Foster Drive, Level 2	Sault Ste. Marie	ON
9	City of Sault Ste. Marie	Ms. Virginia Mcleod	Manager, Recreation and Culture	Box 580, 99 Foster Drive, Level 2	Sault Ste. Marie	ON
10	City of Sault Ste. Marie, Planning Department	Mr. Don Mcconnell	Planning Director	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
10a	City of Sault Ste. Marie, Planning Department	Mr. Steve Turco	Planner	Box 580, 99 Foster Drive	Sault Ste. Marie	ON
11	City of Sault Ste. Marie, Public Works and Transportation	Mr. Larry Girardi	Commissioner	128 Sackville Road	Sault Ste. Marie	ON
12	Department of Fisheries and Oceans	Ms. Sara Eddy	Fish Habitat Biologist	867 Lakeshore Road	Burlington	ON
13	Algoma Power Inc.	Mr. Dan Richards	Supervisor District Engineer	2 Sackville Road, Suite A	Sault Ste. Marie	ON
14	Great Lakes Power Transmission	Mr. Bernie Mobach	Consultant	2 Sackville Road, Suite B	Sault Ste. Marie	ON
15a	Huron Superior District Catholic School Board	Ms. Rose Burton Spohn	Director of Education	90 Ontario Avenue	Sault Ste. Marie	ON
15b	Huron Superior District Catholic School Board	Mr. Larry Pezzutto	Principal, St. Paul School	78 Dablon Street	Sault Ste. Marie	ON
15c	Huron Superior District Catholic School Board	Mr. Sam Colizza	Manager of Plant Services	90 Ontario Avenue	Sault Ste. Marie	ON
16	Indigenous and Northern Affairs Canada	Ms. Lina Letiecq	Regional Environmental Manager	25 St. Clair Avenue East, 8th Floor	Toronto	ON
17	Ministry of Indigenous Relations and Reconciliation	Ms. Ashley Johnson	Senior Advisor, Consultation Unit	160 Bloor St. E., 9th Floor	Toronto	ON

Ministry/Agency	Contact Name	Contact Title	Street Address	City	Province
18 Ministry of Citizenship, Immigration and International Trade	Mr. Tony D'Agostino	Regional Advisor	Suite 200, 70 Foster Drive	Sault Ste. Marie	ON
19 Ministry of Tourism, Culture and Sport	Ms. Laura Hatcher	Heritage Planner	401 Bay Street, Suite 1700	Toronto ON	ON
20 Ministry of Municipal Affairs, Municipal Services Office - North	Mr. Dave Welwood	Planner	159 Cedar Street, Suite 401	Sudbury	ON
21 Ministry of Natural Resources and Forestry	Ms. Marjorie Hall	District Planner	70 Foster Drive	Sault Ste. Marie	ON
22 Ministry of Northern Development and Mines	Ms. Priya Tandon	Director	5th Floor, Room 5630, 99 Wellesley Street West	Toronto	ON
23 Ministry of Economic Development and Growth	Ms. Rachel Simeon	Director, Strategic Programs Development and Deliver Office Division	Hearst Block, 6th Floor, 900 Bay Street	Toronto	ON
24 Ministry of the Attorney General	Mr. Antonin Pribetic	Counsel	8th Floor, 720 Bay Street	Toronto	ON
25 Ministry of the Environment and Climate Change	Mr. Ron Dorscht	Supervisor	70 Foster Drive, Suite 110	Sault Ste. Marie	ON
26 Ministry of Transportation	Mr. Andrew Healy	Senior Environmental Planner	447 McKeown Avenue, 1st Floor Mailroom	North Bay	ON
27 Downtown Association	Mr. Josh Ingram	Manager	496 Queen Street East	Sault Ste. Marie	ON
28 HDR Corporation	Ms. Elizabeth Szymanski, C.E.T.	Consultant	255 Adelaide Street West	Toronto	ON
29 PUC Services Inc.	Mr. Dominic Parrella	President and CEO/Secretary	500 Second Line, P.O. Box 9000	Sault Ste. Marie	ON
30 PUC Services Inc.	Mr. Rob Harten	Manager of Engineering	500 Second Line, P.O. Box 9000	Sault Ste. Marie	ON
31 PUC Services Inc.	Mr. Darren Seabrook	Electrical Distribution Engineer	500 Second Line, P.O. Box 9000	Sault Ste. Marie	ON
32 PUC Services Inc.	Mr. Andrew Hallett	Water Distribution Engineer	500 Second Line, P.O. Box 9000	Sault Ste. Marie	ON
33 Sault Cycling Club	Mr. Eric Eddy	President	c/o 235 McNabb Street	Sault Ste. Marie	ON
34 Sault Ste. Marie Fire Services	Mr. Peter Johnson	Fire Chief	72 Tancred Street	Sault Ste. Marie	ON
35 Sault Ste. Marie Public Library	Ms. Roxanne Toth-Rissanen	CEO/Director of Public Libraries (Acting)	50 East Street	Sault Ste. Marie	ON
36 Sault Ste. Marie Police Services	Mr. Robert Keetch	Chief of Police	580 Second Line East	Sault Ste. Marie	ON
37 Sault Ste. Marie Region Conservation Authority	Ms. Rhonda Bateman	General Manager	1100 Fifth Line East	Sault Ste. Marie	ON
38 Sault Ste. Marie Association of Ratepayers	David Poluck	Volunteer Organizer, Communications	302 Boundary Road	Sault Ste. Marie	ON
39 Sault Trailblazers Snowmobile Club	Mr. John Breckenridge	President	98 Old Garden River Road	Sault Ste. Marie	ON
40 Sault Trails Advocacy Committee	Ms. Donna Hilsinger	Chairperson, Sault Ste. Marie Economic Development Corporation	99 Foster Drive - Level 3	Sault Ste. Marie	ON
41 Transport Canada - Ontario Region	To Whom It May Concern	Environmental Assessment Program	4900 Yonge Street	Toronto	ON
42 Batchewana First Nation	Chief Dean Sayers	Chief	236 Frontenac Street	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
43	Garden River First Nation	Chief Paul Syrette	Chief	7 Shingwauk Street, RR 4	Garden River	ON
44	Historic Sault Ste. Marie District Métis Community Council	Ms. Kim Powley	President	26 Queen Street East	Sault Ste. Marie	ON
	cc: Métis Nation of Ontario	Ms. Kim Powley		500 Old St. Patrick Street, Unit 3	Ottawa	ON
45	Métis Nation of Ontario	Jesse Fieldwebster	Consultant Coordinator	355 Cranston Crescent, PO Box 4	Midland	ON
46	Public Contact	Robert Rattle			Sault Ste. Marie	ON
47	Public Contact	Al Wright		9 Pinemore Blvd	Sault Ste. Marie	ON
48	Public Contact	Terry Politz		6 Langdon Cres	Sault Ste. Marie	ON
49	Public Contact	Autorama Sales Inc		482 BLACK RD	SAULT STE MARIE	ON
50	Public Contact	Miller Michael James		9 TADCASTER PL	SAULT STE MARIE	ON
51	Public Contact	Baldassarro Patrizia		2020 MILLENIUM CRT	SAULT STE MARIE	ON
52	Public Contact	Dumas Pierre, Dumas Kathryn Susanne		969 HWY 552 E	GOULAIS RIVER	ON
53	Public Contact	Sault Ste Marie City		PO BOX 580 STN MAIN	SAULT STE MARIE	ON
54	Public Contact	Litalien Michelle Janet		611 NORTHERN AVE E	SAULT STE MARIE	ON
55	Public Contact	Bressan Isaiah Luigi, Stubbs Brandon James		5 PALOMINO DR	SAULT STE MARIE	ON
56	Public Contact	Palmer Lindsay		593 NORTHERN AVE E	SAULT STE MARIE	ON
57	Public Contact	Disano Nino John, Disano Steven Vihtori		177 MALABAR DR	SAULT STE MARIE	ON
58	Public Contact	Masci Angela		601 NORTHERN AVE E	SAULT STE MARIE	ON
59	Public Contact	Burtch Brian Mathew		597 NORTHERN AVE E	SAULT STE MARIE	ON
60	Public Contact	Plastino Nicholas, Plastino Eugenio		643 NORTHERN AVE E	SAULT STE MARIE	ON
61	Public Contact	Dugas Pamela Jane		358 PINE SHORE DR	SAULT STE MARIE	ON
62	Public Contact	Barsanti David Nathaniel		621 NORTHERN AVE E	SAULT STE MARIE	ON
63	Public Contact	Chorney Patricia Arlene		617 NORTHERN AVE E	SAULT STE MARIE	ON
64	Public Contact	Pierman Kenneth Patrick		641 NORTHERN AVE E	SAULT STE MARIE	ON
65	Public Contact	Torquato Zachary Aurelio G		631 NORTHERN AVE E	SAULT STE MARIE	ON
66	Public Contact	Barros-Mitchell Grace		145 PANORAMIC DR	SAULT STE MARIE	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
67	Public Contact	Elliott Richard, Elliott Terri		655 NORTHERN AVE E	SAULT STE MARIE	ON
68	Public Contact	Trudeau Dwayne, Trudeau Trudy-Lynn		651 NORTHERN AVE E	SAULT STE MARIE	ON
69	Public Contact	Serravalle George Frank, Serravalle Arlene A		488 NORTHERN AVE E	SAULT STE MARIE	ON
70	Public Contact	Latvanen Gary William, Latvanen Elaine		474 NORTHERN AVE E	SAULT STE MARIE	ON
71	Public Contact	Nelson Edgar, Nelson Agnes Ruth		462 NORTHERN AVE E	SAULT STE MARIE	ON
72	Public Contact	2472311 Ontario Inc Re: 00317 Northern Ave E		1323 WAUBANOKA WAY	SAULT STE MARIE	ON
73	Public Contact	Nicholson Lorne Delmer, Nicholson Gloria Verna		367 NORTHERN AVE E	SAULT STE MARIE	ON
74	Public Contact	Poluck David Edward, Poluck Kathy Jean		357 NORTHERN AVE E	SAULT STE MARIE	ON
75	Public Contact	Muncaster Irene Eleanor, Parent Marilyn Anne		397 NORTHERN AVE E	SAULT STE MARIE	ON
76	Public Contact	Bortolussi Adam Christopher		C/O 470 ALBERT ST E	SAULT STE MARIE	ON
77	Public Contact	Posteraro Antonio, Posteraro Anthony Mathew		36 KITCHENER RD	SAULT STE MARIE	ON
78	Public Contact	Posteraro Gennaro, Posteraro Anthony		170 STRAND AVE	SAULT STE MARIE	ON
79	Public Contact	Columbus Club Of Sault Ste Marie Housing Corporation - Att: J S Nadeau		277 NORTHERN AVE E	SAULT STE MARIE	ON
80	Public Contact	1584836 Ontario Inc		231 NORTHERN AVE E	SAULT STE MARIE	ON
81	Public Contact	Soo Arena Association		285 NORTHERN AVE E	SAULT STE MARIE	ON
82	Public Contact	1309971 Ontario Inc		207 NORTHERN AVE E	SAULT STE MARIE	ON
83	Public Contact	Pawating Co-Operative Homes Inc		58 PAWATING PL	SAULT STE MARIE	ON
84	Public Contact	Evans Merle Douglas, Evans Linda Marie - Re: 00068 Northern Ave E		25 POINT RD	AWERES TWP	ON
85	Public Contact	Bodley Terry Robert, Bodley Lori Jean		58 NORTHERN AVE E	SAULT STE MARIE	ON
86	Public Contact	Bressan & Stubbs Properties Inc		5 PALOMINO DR	SAULT STE MARIE	ON
87	Public Contact	Viotto Rosario Santo, Viotto Andrea Louise		85 NORTHERN AVE E	SAULT STE MARIE	ON
88	Public Contact	Johnson Robert Michael, Johnson Patricia Anne		247 PRENTICE AVE	SAULT STE MARIE	ON
89	Public Contact	1890632 Ontario Inc		1212 OLD GARDEN RI RD	SAULT STE MARIE	ON
90	Public Contact	Perron Sherri-Lee		658 NORTH ST	SAULT STE MARIE	ON
91	Public Contact	Euale David Andrew		22 NORTHERN AVE E	SAULT STE MARIE	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
92	Public Contact	Doherty Michael Kenneth, Doherty Laurie Ann Felecita		10 NORTHERN AVE E	SAULT STE MARIE	ON
93	Public Contact	Cmma Holdings Inc		167 SACKVILLE RD	SAULT STE MARIE	ON
94	Public Contact	Mccaig Vivian Mae		18 NORTHERN AVE E	SAULT STE MARIE	ON
95	Public Contact	Brookfield Power, Great Lakes Power, Transmission & Distribution		2 SACKVILLE RD	SAULT STE MARIE	ON
96	Public Contact	Ross Michael Connard, Ross Sarah Jean Marie		5 NORTHERN AVE E	SAULT STE MARIE	ON
97	Public Contact	Ontario Realty Corporation, C/O Orc Property Tax Dept		77 WELLESLEY ST W, 11TH FLOOR FERGUSON BLOCK	TORONTO	ON
98	Public Contact	Oaklin Trucking And Leasing Limited		483 BLACK RD	SAULT STE MARIE	ON
99	Public Contact	Attention Sam Graham: Roy Graham Trucking Ltd	Office Manager	91 CELENE CRT	SAULT STE MARIE	ON
100	Public Contact	Brooks Derrick		603 NORTHERN AVE E	SAULT STE MARIE	ON
101	Public Contact	Stevenson Sharon Arlene		599 NORTHERN AVE E	SAULT STE MARIE	ON
102	Public Contact	Turco Travis Michael, Turco Alyson Carol		71 SOFTWOOD DR	SAULT STE MARIE	ON
103	Public Contact	Rutledge Leanne Mary		627 NORTHERN AVE E	SAULT STE MARIE	ON
104	Public Contact	Febbraro Luciano, Febbraro Manuela		175 BITONTI CRES	SAULT STE MARIE	ON
105	Public Contact	Smith Jocelyn Marie		615 NORTHERN AVE E	SAULT STE MARIE	ON
106	Public Contact	Koutny Denise Zdenka		613 NORTHERN AVE E	SAULT STE MARIE	ON
107	Public Contact	Capancioni Robert Peter		84 GOLF RANGE CRES	SAULT STE MARIE	ON
108	Public Contact	Ianni-Palarchio Nadia Lidia		633 NORTHERN AVE E	SAULT STE MARIE	ON
109	Public Contact	Moran Mernie John, Moran Patricia Anne		135 PANORAMIC DR	SAULT STE MARIE	ON
110	Public Contact	Mcfarling Donald, Mcfarling Elaine		657 NORTHERN AVE E	SAULT STE MARIE	ON
111	Public Contact	Kearns Kathleen		653 NORTHERN AVE E	SAULT STE MARIE	ON
112	Public Contact	Parlow Michael Vincent, Parlow Sarah Michelle		58 TUCKET ST	SAULT STE MARIE	ON
113	Public Contact	Burtch Brian Mathew		607 NORTHERN AVE	SAULT STE MARIE	ON
114	Public Contact	Fernandez Cecilia		136 PANORAMIC DR	SAULT STE MARIE	ON
115	Public Contact	Scali Louis Kyle		116 AVERY RD	SAULT STE MARIE	ON
116	Public Contact	Cruise Jeffrey Alexander, Cruise Miranda Lee		113 PANORAMIC DR	SAULT STE MARIE	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
117	Public Contact	Hall Jordan Thomas Donald		54 PRINCETON DR	SAULT STE MARIE	ON
118	Public Contact	Fryia Ted Michael, Fryia Katherine Ann		66 PRINCETON DR	SAULT STE MARIE	ON
119	Public Contact	Kaupp William J		1016 PINE ST	SAULT STE MARIE	ON
120	Public Contact	Algoma District School Board Re: 00550 Northern Ave E		644 ALBERT ST E	SAULT STE MARIE	ON
121	Public Contact	Lisinchuk Dawson Michael		456 NORTHERN AVE E	SAULT STE MARIE	ON
122	Public Contact	Howson Kathryn Anne		480 NORTHERN AVE E	SAULT STE MARIE	ON
123	Public Contact	Horochoowski Karol S, Horochoowski Elizabeth A		468 NORTHERN AVE E	SAULT STE MARIE	ON
134	Public Contact	Dubreuil Richard Eddy		450 NORTHERN AVE E	SAULT STE MARIE	ON
125	Public Contact	Lalonde Paul Gerard, Lalonde Jean		494 NORTHERN AVE E	SAULT STE MARIE	ON
126	Public Contact	Hnatchuk Lorraine Trustee, Hnatchuk John Thomas Estate		500 NORTHERN AVE E	SAULT STE MARIE	ON
127	Public Contact	Colombi John, Colombi Loredana		146 PANORAMIC DR	SAULT STE MARIE	ON
128	Public Contact	Sault College Of Applied Arts And Technology Re: 00891 Second Line E		PO BOX 60 STN MAIN	SAULT STE MARIE	ON
129	Public Contact	Discount Car And Truck Rentals		225 NORTHERN AVE E UNIT B	SAULT STE MARIE	ON
130	Public Contact	Kars Elmer George		259 GREAT NORTHERN RD	SAULT STE MARIE	ON
131	Public Contact	Skyarby'S Inc		1279 WELLINGTON ST E	SAULT STE MARIE	ON
132	Public Contact	Dilabio Robert		375 NORTHERN AVE E	SAULT STE MARIE	ON
133	Public Contact	Kehoe M Jean, Kehoe John S Estate		401 NORTHERN AVE E	SAULT STE MARIE	ON
134	Public Contact	Nicholson Chris, Nicholson Ann		381 NORTHERN AVE E	SAULT STE MARIE	ON
135	Public Contact	Merrifield Kathleen E		413 NORTHERN AVE E	SAULT STE MARIE	ON
136	Public Contact	Yukich Wayne		446 NORTHERN AVE E	SAULT STE MARIE	ON
137	Public Contact	Lpf Realty Retail Inc Re: 00248 Northern Ave E		SUITE 700, 2275 UPPWE MIDDLE RD E	OAKVILLE ON	ON
138	Public Contact	1022357 Ontario Inc Re: 00279 Northern Ave E		261 OLD GARDEN RIVER RD	SAULT STE MARIE	ON
139	Public Contact	Steeltown Motor Sales Inc		275 NORTHERN AVE E	SAULT STE MARIE	ON
140	Public Contact	Sleepy'S Incorporated		251 NORTHERN AVE E	SAULT STE MARIE	ON
141	Public Contact	Vance Allison Beth		203 NORTHERN AVE E	SAULT STE MARIE	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
142	Public Contact	510127 Ontario Limited Re: 00293 Northern Ave E		219 TRUNK RD	SAULT STE MARIE	ON
143	Public Contact	Children'S Aid Society Of Algoma		405 QUEEN ST E	SAULT STE MARIE	ON
144	Public Contact	1743566 Ontario Inc		23 LODEMA DR	GOULAIS RIVER ON POS 1E0	ON
145	Public Contact	Penny'S Pets Inc		179 NORTHERN AVE E	SAULT STE MARIE	ON
146	Public Contact	Gryphon Holdings Ltd		72 NORTHERN AVE E	SAULT STE MARIE	ON
147	Public Contact	Stephens Anita		62 NORTHERN AVE E	SAULT STE MARIE	ON
148	Public Contact	Roess Peter David		1444 PEOPLES RD	SAULT STE MARIE	ON
149	Public Contact	Fleming Stephen Ross, Fleming Brandy Lee		52 NORTHERN AVE E	SAULT STE MARIE	ON
150	Public Contact	No Longer At This Address		79 DACEY RD	SAULT STE MARIE	ON
151	Public Contact	Garrow Neil, Garrow Graham		89 NORTHERN AVE E	SAULT STE MARIE	ON
152	Public Contact	Sault Scuba Centre Ltd		102 NORTHERN AVE E	SAULT STE MARIE	ON
153	Public Contact	Gilbert & Nick (Sault), Holdings Inc		148 NORTHERN AVE E	SAULT STE MARIE	ON
154	Public Contact	U.A.J.A.P.P.F.I, Local Union 800 Re: 00165 Northern Ave E		1640 BANCROFT DR	SUDBURY ON	ON
155	Public Contact	Bumbaco Deborah Joyce		14 NORTHERN AVE E	SAULT STE MARIE	ON
156	Public Contact	Couturier Wilbert Joseph		3 NORTHERN AVE	SAULT STE MARIE	ON
157	Public Contact	Rivera-Montufar Jose Ignacio, Rivera-Montufar Elizabeth L		4 NORTHERN AVE W	SAULT STE MARIE	ON
158	Public Contact	Armstrong Karen Lee, Armstrong Clarence James		23 NORTHERN AVE E	SAULT STE MARIE	ON
159	Public Contact	Coccimiglio Adolfo		15 NORTHERN AVE E	SAULT STE MARIE	ON
160	Public Contact	Trudeau David John, Redmond Allison Joyce		28 NORTHERN AVE E	SAULT STE MARIE	ON
161	Public Contact	China Steel Industries Inc Re: 00003 Sackville Rd		164 INDUSTRIAL PARK CRES	SAULT STE MARIE	ON
162	Public Contact	1188004 Ontario Inc Re: 00115 Northern Ave E		1235 PEOPLES RD	SAULT STE MARIE	ON
163	Public Contact	Community Living Algoma		99 NORTHERN AVE E	SAULT STE MARIE	ON
164	Public Contact	Conway Marilyn Alice		45 NORTHERN AVE E	SAULT STE MARIE	ON
165	Public Contact	Pajovi Inc, Bruni Frank, C/O Mark Smith, O/A Area Express Del Service		239 NORTHERN AVE E	SAULT STE MARIE	ON
166	Public Contact	Sault Ste Marie City Re: 00065 Old Garden Rvr Rd		99 FOSTER DR	SAULT STE MARIE	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
167	Public Contact	Anglican Church Of Canada, Diocese Of Algoma Re: 00360 Northern Ave E		PO BOX 1168 STN MAIN	SAULT STE MARIE	ON
168	Public Contact	Cara Community Corporation		31 OLD GARDEN RIVER RD	SAULT STE MARIE	ON
169	Trevor Rising	The Sault College Of Applied Arts And Technology	Director, Physical Resources	443 NORTHERN AVE, PO BOX 60	SAULT STE MARIE	ON
170a	Public Contact	Attention Daniel Woods, P. Eng: Extendicare (Canada) Inc Re: 00650 Northern Ave	Director of Engineering	3000 STEELES AVE E	MARKHAM ON	ON
170b	Public Contact	Attention Carly Brown: EXTENDICARE (CANADA) INC Re: 00650 NORTHERN AVE				
170c	Public Contact	Attention Susan Enouy: EXTENDICARE (CANADA) INC Re: 00650 NORTHERN AVE				
171	Public Contact	No Resident - Finn Hill		185 Black Road	Sault Ste. Marie	ON
172	Public Contact	Current Resident		482 Black Road	Sault Ste. Marie	ON
173	Public Contact	Current Resident		483 Black Road	Sault Ste. Marie	ON
174	Public Contact	No Resident - No Such Address		498 Black Road	Sault Ste. Marie	ON
175	Public Contact	No Resident - No Known Address		536 Black Road	Sault Ste. Marie	ON
176	Public Contact	Current Resident		258 Great Northern Road	Sault Ste. Marie	ON
177	Public Contact	Current Resident		259 Great Northern Road	Sault Ste. Marie	ON
178	Public Contact	Current Resident		303 Great Northern Road	Sault Ste. Marie	ON
179	Public Contact	No Resident - No Such Address		78 Kent Avenue	Sault Ste. Marie	ON
180	Public Contact	Current Resident		79 Kitchener Road	Sault Ste. Marie	ON
181	Public Contact	No Resident - Pawating Property		1119 Lake Street	Sault Ste. Marie	ON
182	Public Contact	No Resident - Pump Station		1120 Lake Street	Sault Ste. Marie	ON
183	Public Contact	Current Resident		658 North Street	Sault Ste. Marie	ON
184	Public Contact	Current Resident		5 Northern Avenue East	Sault Ste. Marie	ON
185	Public Contact	Current Resident		10 Northern Avenue East	Sault Ste. Marie	ON
186	Public Contact	Current Resident		14 Northern Avenue East	Sault Ste. Marie	ON
187	Public Contact	Current Resident		15 Northern Avenue East	Sault Ste. Marie	ON
188	Public Contact	Current Resident		18 Northern Avenue East	Sault Ste. Marie	ON
189	Public Contact	Current Resident		22 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
190	Public Contact	Current Resident		23 Northern Avenue East	Sault Ste. Marie	ON
191	Public Contact	Current Resident		28 Northern Avenue East	Sault Ste. Marie	ON
192	Public Contact	Current Resident		45 Northern Avenue East	Sault Ste. Marie	ON
193	Public Contact	Current Resident		52 Northern Avenue East	Sault Ste. Marie	ON
194	Public Contact	Current Resident		58 Northern Avenue East	Sault Ste. Marie	ON
195	Public Contact	Current Resident		62 Northern Avenue East	Sault Ste. Marie	ON
196	Public Contact	Vacant Lot		65 Northern Avenue East	Sault Ste. Marie	ON
197	Public Contact	Current Resident		68 Northern Avenue East	Sault Ste. Marie	ON
198	Public Contact	Current Resident		72 Northern Avenue East	Sault Ste. Marie	ON
199	Public Contact	No Resident - Appartment Bld		73 Northern Avenue East	Sault Ste. Marie	ON
200	Public Contact	Current Resident		85 Northern Avenue East	Sault Ste. Marie	ON
201	Public Contact	Current Resident		89 Northern Avenue East	Sault Ste. Marie	ON
202	Public Contact	Current Resident		98 Northern Avenue East	Sault Ste. Marie	ON
203	Public Contact	Current Resident		99 Northern Avenue East	Sault Ste. Marie	ON
204	Public Contact	Current Resident		102 Northern Avenue East	Sault Ste. Marie	ON
205	Public Contact	Current Resident		110 Northern Avenue East	Sault Ste. Marie	ON
206	Public Contact	Current Resident		115 Northern Avenue East	Sault Ste. Marie	ON
207	Public Contact	Current Resident		115 Northern Avenue East	Sault Ste. Marie	ON
208	Public Contact	Current Resident		134 Northern Avenue East	Sault Ste. Marie	ON
209	Public Contact	Mr. Steve Roberts		140 Northern Avenue East	Sault Ste. Marie	ON
210	Public Contact	Current Resident		145 Northern Avenue East	Sault Ste. Marie	ON
211	Public Contact	Current Resident		147 Northern Avenue East	Sault Ste. Marie	ON
212	Public Contact	Current Resident		148 Northern Avenue East	Sault Ste. Marie	ON
213	Public Contact	Current Resident		165 Northern Avenue East	Sault Ste. Marie	ON
214	Public Contact	No Resident - Penny's Pets		179 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
215	Public Contact	Current Resident		190 Northern Avenue East	Sault Ste. Marie	ON
216	Public Contact	Current Resident		191 Northern Avenue East	Sault Ste. Marie	ON
217	Public Contact	Current Resident		203 Northern Avenue East	Sault Ste. Marie	ON
218a	Public Contact	Ms. Amanda Trembley, Office Administrator		207 Northern Avenue East	Sault Ste. Marie	ON
218b	Public Contact	Mr. Jerry Stefanizzi		207 Northern Avenue East	Sault Ste. Marie	ON
219	Public Contact	Current Resident		219 Northern Avenue East	Sault Ste. Marie	ON
220	Public Contact	Current Resident		225 Northern Avenue East	Sault Ste. Marie	ON
221	Public Contact	Current Resident		225 Northern Avenue East	Sault Ste. Marie	ON
222	Public Contact	Current Resident		231 Northern Avenue East	Sault Ste. Marie	ON
223	Public Contact	No Resident - School		232 Northern Avenue East	Sault Ste. Marie	ON
224	Public Contact	Current Resident		239 Northern Avenue East	Sault Ste. Marie	ON
225	Public Contact	Current Resident		239 Northern Avenue East	Sault Ste. Marie	ON
226	Public Contact	Current Resident		248 Northern Avenue East	Sault Ste. Marie	ON
227	Public Contact	Current Resident		251 Northern Avenue East	Sault Ste. Marie	ON
228	Public Contact	No Resident - Metro Plaze (Value Village?)		252 Northern Avenue East	Sault Ste. Marie	ON
229	Public Contact	No Resident - Metro Plaza		256 Northern Avenue East	Sault Ste. Marie	ON
230	Public Contact	Current Resident		264 Northern Avenue East	Sault Ste. Marie	ON
231	Public Contact	Current Resident		268 Northern Avenue East	Sault Ste. Marie	ON
232	Public Contact	No Resident - Metro Plaze		270 Northern Avenue East	Sault Ste. Marie	ON
233	Public Contact	Current Resident		272 Northern Avenue East	Sault Ste. Marie	ON
234	Public Contact	Current Resident		275 Northern Avenue East	Sault Ste. Marie	ON
235	Public Contact	No Resident - Main Appartment Bldg		277 Northern Avenue East	Sault Ste. Marie	ON
236	Public Contact	No Resident - Main Appartment Bldg		277 Northern Avenue East	Sault Ste. Marie	ON
237	Public Contact	No Resident - 3 Businessess in Bldg		279 Northern Avenue East	Sault Ste. Marie	ON
238	Public Contact	Current Resident		282 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
239	Public Contact	Current Resident		284 Northern Avenue East	Sault Ste. Marie	ON
240	Public Contact	Current Resident		285 Northern Avenue East	Sault Ste. Marie	ON
241	Public Contact	No Resident - Metro Plaza		288 Northern Avenue East	Sault Ste. Marie	ON
242	Public Contact	No Resident - Metro Plaza		292 Northern Avenue East	Sault Ste. Marie	ON
243	Public Contact	Current Resident		293 Northern Avenue East	Sault Ste. Marie	ON
244	Public Contact	Current Resident		294 Northern Avenue East	Sault Ste. Marie	ON
245	Public Contact	Current Resident		306 Northern Avenue East	Sault Ste. Marie	ON
246	Public Contact	Current Resident		317 Northern Avenue East	Sault Ste. Marie	ON
247	Public Contact	Current Resident		317 Northern Avenue East	Sault Ste. Marie	ON
248	Public Contact	Current Resident		317 Northern Avenue East	Sault Ste. Marie	ON
249	Public Contact	Current Resident		352 Northern Avenue East	Sault Ste. Marie	ON
250	Public Contact	Current Resident		357 Northern Avenue East	Sault Ste. Marie	ON
251	Public Contact	No Resident - Church Parking Lot		360 Northern Avenue East	Sault Ste. Marie	ON
252	Public Contact	Current Resident		361 Northern Avenue East	Sault Ste. Marie	ON
253	Public Contact	Current Resident		367 Northern Avenue East	Sault Ste. Marie	ON
254	Public Contact	Current Resident		370 Northern Avenue East	Sault Ste. Marie	ON
255	Public Contact	Current Resident		372 Northern Avenue East	Sault Ste. Marie	ON
256	Public Contact	Current Resident		374 Northern Avenue East	Sault Ste. Marie	ON
257	Public Contact	Current Resident		375 Northern Avenue East	Sault Ste. Marie	ON
258	Public Contact	Current Resident		376 Northern Avenue East	Sault Ste. Marie	ON
259	Public Contact	Current Resident		380 Northern Avenue East	Sault Ste. Marie	ON
260	Public Contact	Current Resident		381 Northern Avenue East	Sault Ste. Marie	ON
261	Public Contact	Current Resident		382 Northern Avenue East	Sault Ste. Marie	ON
262	Public Contact	Current Resident		384 Northern Avenue East	Sault Ste. Marie	ON
263	Public Contact	Current Resident		386 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
264	Public Contact	Current Resident		388 Northern Avenue East	Sault Ste. Marie	ON
265	Public Contact	No Resident - Vacant Home		389 Northern Avenue East	Sault Ste. Marie	ON
266	Public Contact	Current Resident		390 Northern Avenue East	Sault Ste. Marie	ON
267	Public Contact	Current Resident		392 Northern Avenue East	Sault Ste. Marie	ON
268	Public Contact	Current Resident		397 Northern Avenue East	Sault Ste. Marie	ON
269	Public Contact	No Resident - Park		400 Northern Avenue East	Sault Ste. Marie	ON
270	Public Contact	Current Resident		401 Northern Avenue East	Sault Ste. Marie	ON
271	Public Contact	Current Resident		407 Northern Avenue East	Sault Ste. Marie	ON
272	Public Contact	Current Resident		413 Northern Avenue East	Sault Ste. Marie	ON
273	Public Contact	No Resident - Sault College Parking Lot		428 Northern Avenue East	Sault Ste. Marie	ON
274	Public Contact	Current Resident		440 Northern Avenue East	Sault Ste. Marie	ON
275	Public Contact	Current Resident		442 Northern Avenue East	Sault Ste. Marie	ON
276	Public Contact	Current Resident		443 Northern Avenue East	Sault Ste. Marie	ON
277	Public Contact	Current Resident		446 Northern Avenue East	Sault Ste. Marie	ON
278	Public Contact	Current Resident		450 Northern Avenue East	Sault Ste. Marie	ON
279	Public Contact	Current Resident		456 Northern Avenue East	Sault Ste. Marie	ON
280	Public Contact	Current Resident		462 Northern Avenue East	Sault Ste. Marie	ON
281	Public Contact	Current Resident		468 Northern Avenue East	Sault Ste. Marie	ON
282	Public Contact	Current Resident		474 Northern Avenue East	Sault Ste. Marie	ON
283	Public Contact	Current Resident		480 Northern Avenue East	Sault Ste. Marie	ON
284	Public Contact	Current Resident		488 Northern Avenue East	Sault Ste. Marie	ON
285	Public Contact	Current Resident		494 Northern Avenue East	Sault Ste. Marie	ON
286	Public Contact	Current Resident		500 Northern Avenue East	Sault Ste. Marie	ON
287	Public Contact	Current Resident		524 Northern Avenue East	Sault Ste. Marie	ON
288	Public Contact	Current Resident		550 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
289	Public Contact	No Resident - Sault College Wood Lot		562 Northern Avenue East	Sault Ste. Marie	ON
290	Public Contact	Current Resident		593 Northern Avenue East	Sault Ste. Marie	ON
291	Public Contact	Current Resident		595 Northern Avenue East	Sault Ste. Marie	ON
292	Public Contact	Current Resident		597 Northern Avenue East	Sault Ste. Marie	ON
293	Public Contact	Current Resident		599 Northern Avenue East	Sault Ste. Marie	ON
294	Public Contact	Current Resident		601 Northern Avenue East	Sault Ste. Marie	ON
295	Public Contact	Current Resident		603 Northern Avenue East	Sault Ste. Marie	ON
296	Public Contact	Current Resident		605 Northern Avenue East	Sault Ste. Marie	ON
297	Public Contact	Current Resident		607 Northern Avenue East	Sault Ste. Marie	ON
298	Public Contact	Current Resident		611 Northern Avenue East	Sault Ste. Marie	ON
299	Public Contact	Current Resident		613 Northern Avenue East	Sault Ste. Marie	ON
300	Public Contact	Current Resident		615 Northern Avenue East	Sault Ste. Marie	ON
301	Public Contact	Current Resident		617 Northern Avenue East	Sault Ste. Marie	ON
302	Public Contact	Current Resident		621 Northern Avenue East	Sault Ste. Marie	ON
303	Public Contact	Current Resident		623 Northern Avenue East	Sault Ste. Marie	ON
304	Public Contact	Current Resident		625 Northern Avenue East	Sault Ste. Marie	ON
305	Public Contact	Current Resident		627 Northern Avenue East	Sault Ste. Marie	ON
306	Public Contact	Current Resident		631 Northern Avenue East	Sault Ste. Marie	ON
307	Public Contact	Current Resident		633 Northern Avenue East	Sault Ste. Marie	ON
308	Public Contact	Current Resident		635 Northern Avenue East	Sault Ste. Marie	ON
309	Public Contact	Current Resident		637 Northern Avenue East	Sault Ste. Marie	ON
310	Public Contact	Current Resident		641 Northern Avenue East	Sault Ste. Marie	ON
311	Public Contact	Current Resident		643 Northern Avenue East	Sault Ste. Marie	ON
312	Public Contact	Current Resident		645 Northern Avenue East	Sault Ste. Marie	ON
313	Public Contact	Current Resident		647 Northern Avenue East	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
314	Public Contact	Current Resident		650 Northern Avenue East	Sault Ste. Marie	ON
315	Public Contact	Current Resident		651 Northern Avenue East	Sault Ste. Marie	ON
316	Public Contact	Current Resident		653 Northern Avenue East	Sault Ste. Marie	ON
317	Public Contact	Current Resident		655 Northern Avenue East	Sault Ste. Marie	ON
318	Public Contact	Current Resident		657 Northern Avenue East	Sault Ste. Marie	ON
319	Public Contact	Current Resident		3 Northern Avenue West	Sault Ste. Marie	ON
320	Public Contact	Current Resident		4 Northern Avenue West	Sault Ste. Marie	ON
321	Public Contact	Current Resident		31 Old Garden River Road	Sault Ste. Marie	ON
322	Public Contact	Current Resident		65 Old Garden River Road	Sault Ste. Marie	ON
323	Public Contact	Current Resident		134 Panoramic Drive	Sault Ste. Marie	ON
324	Public Contact	Current Resident		135 Panoramic Drive	Sault Ste. Marie	ON
325	Public Contact	Current Resident		136 Panoramic Drive	Sault Ste. Marie	ON
326	Public Contact	Current Resident		145 Panoramic Drive	Sault Ste. Marie	ON
327	Public Contact	Current Resident		146 Panoramic Drive	Sault Ste. Marie	ON
328	Public Contact	Current Resident		2 Pawating Place	Sault Ste. Marie	ON
329	Public Contact	Current Resident		3 Pawating Place	Sault Ste. Marie	ON
330	Public Contact	Current Resident		4 Pawating Place	Sault Ste. Marie	ON
331	Public Contact	Current Resident		5 Pawating Place	Sault Ste. Marie	ON
332	Public Contact	Current Resident		6 Pawating Place	Sault Ste. Marie	ON
333	Public Contact	Current Resident		7 Pawating Place	Sault Ste. Marie	ON
334	Public Contact	Current Resident		8 Pawating Place	Sault Ste. Marie	ON
335	Public Contact	Current Resident		9 Pawating Place	Sault Ste. Marie	ON
336	Public Contact	Current Resident		10 Pawating Place	Sault Ste. Marie	ON
337	Public Contact	Current Resident		11 Pawating Place	Sault Ste. Marie	ON
338	Public Contact	Current Resident		12 Pawating Place	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
339	Public Contact	Current Resident		13 Pawating Place	Sault Ste. Marie	ON
340	Public Contact	Current Resident		14 Pawating Place	Sault Ste. Marie	ON
341	Public Contact	Current Resident		15 Pawating Place	Sault Ste. Marie	ON
342	Public Contact	Current Resident		16 Pawating Place	Sault Ste. Marie	ON
343	Public Contact	Current Resident		17 Pawating Place	Sault Ste. Marie	ON
344	Public Contact	Current Resident		18 Pawating Place	Sault Ste. Marie	ON
345	Public Contact	Current Resident		19 Pawating Place	Sault Ste. Marie	ON
346	Public Contact	Current Resident		20 Pawating Place	Sault Ste. Marie	ON
347	Public Contact	Current Resident		21 Pawating Place	Sault Ste. Marie	ON
348	Public Contact	Current Resident		22 Pawating Place	Sault Ste. Marie	ON
349	Public Contact	Current Resident		23 Pawating Place	Sault Ste. Marie	ON
350	Public Contact	Current Resident		24 Pawating Place	Sault Ste. Marie	ON
351	Public Contact	Current Resident		25 Pawating Place	Sault Ste. Marie	ON
352	Public Contact	Current Resident		26 Pawating Place	Sault Ste. Marie	ON
353	Public Contact	Current Resident		28 Pawating Place	Sault Ste. Marie	ON
354	Public Contact	No Resident (Moved./Unknown)		30 Pawating Place	Sault Ste. Marie	ON
355	Public Contact	Current Resident		32 Pawating Place	Sault Ste. Marie	ON
356	Public Contact	Current Resident		34 Pawating Place	Sault Ste. Marie	ON
357	Public Contact	Current Resident		36 Pawating Place	Sault Ste. Marie	ON
358	Public Contact	Current Resident		38 Pawating Place	Sault Ste. Marie	ON
359	Public Contact	Current Resident		40 Pawating Place	Sault Ste. Marie	ON
360	Public Contact	Current Resident		42 Pawating Place	Sault Ste. Marie	ON
361	Public Contact	Current Resident		44 Pawating Place	Sault Ste. Marie	ON
362	Public Contact	Current Resident		46 Pawating Place	Sault Ste. Marie	ON
363	Public Contact	No - Resident (Moved/Unknown)		48 Pawating Place	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
364	Public Contact	Current Resident		50 Pawating Place	Sault Ste. Marie	ON
365	Public Contact	Current Resident		52 Pawating Place	Sault Ste. Marie	ON
366	Public Contact	Current Resident		54 Pawating Place	Sault Ste. Marie	ON
367	Public Contact	Current Resident		56 Pawating Place	Sault Ste. Marie	ON
368	Public Contact	Current Resident		58 Pawating Place	Sault Ste. Marie	ON
369	Public Contact	Current Resident		62 Pawating Place	Sault Ste. Marie	ON
370	Public Contact	Current Resident		66 Pawating Place	Sault Ste. Marie	ON
371	Public Contact	Current Resident		70 Pawating Place	Sault Ste. Marie	ON
372	Public Contact	Current Resident		74 Pawating Place	Sault Ste. Marie	ON
373	Public Contact	Current Resident		76 Pawating Place	Sault Ste. Marie	ON
374	Public Contact	Current Resident		78 Pawating Place	Sault Ste. Marie	ON
375	Public Contact	Current Resident		80 Pawating Place	Sault Ste. Marie	ON
376	Public Contact	Current Resident		82 Pawating Place	Sault Ste. Marie	ON
377	Public Contact	Current Resident		84 Pawating Place	Sault Ste. Marie	ON
378	Public Contact	Current Resident		86 Pawating Place	Sault Ste. Marie	ON
379	Public Contact	Current Resident		88 Pawating Place	Sault Ste. Marie	ON
380	Public Contact	Current Resident		90 Pawating Place	Sault Ste. Marie	ON
381	Public Contact	Current Resident		92 Pawating Place	Sault Ste. Marie	ON
382	Public Contact	No Resident (Moved/Unknown)		94 Pawating Place	Sault Ste. Marie	ON
383	Public Contact	Current Resident		96 Pawating Place	Sault Ste. Marie	ON
384	Public Contact	Current Resident		98 Pawating Place	Sault Ste. Marie	ON
385	Public Contact	Current Resident		1016 Pine Street	Sault Ste. Marie	ON
386	Public Contact	Current Resident		54 Princeton Drive	Sault Ste. Marie	ON
387	Public Contact	Current Resident		56 Princeton Drive	Sault Ste. Marie	ON
388	Public Contact	Current Resident		66 Princeton Drive	Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
389	Public Contact	Current Resident		2 Sackville Road	Sault Ste. Marie	ON
390	Public Contact	Current Resident		2 Sackville Road	Sault Ste. Marie	ON
391	Public Contact	No Resident - China Steel Inc. Garage?		3 Sackville Road	Sault Ste. Marie	ON
392	Public Contact	No Resident - Sault College Wood Lot		891 Second Line East	Sault Ste. Marie	ON
393	Public Contact	Current Resident		9 Tadcaster Place	Sault Ste. Marie	ON
394	Public Contact	Bill Merrifield		97 Bainbridge Street	Sault Ste. Marie	ON
395	Public Contact	John Krmpotic		96 Bainbridge Street	Sault Ste. Marie	ON
396	Public Contact	John Amendola		100 Bainbridge Street	Sault Ste. Marie	ON
397	Public Contact	Jim Fitzpatrick		104 Bainbridge Street	Sault Ste. Marie	ON
398	Public Contact	Current Resident		129 Panoramic Drive	Sault Ste. Marie	ON
399	Public Contact	Current Resident		130 Panoramic Drive	Sault Ste. Marie	ON
400	Public Contact	Ralph and Erika Vecchio		149 Panoramic Drive	Sault Ste. Marie	ON
401	Public Contact	Current Resident		48 Princeton Drive	Sault Ste. Marie	ON
402	Public Contact	Current Resident		50 Princeton Drive	Sault Ste. Marie	ON
403	Public Contact	Current Resident		51 Princeton Drive	Sault Ste. Marie	ON
404	Public Contact	Current Resident		54 Princeton Drive	Sault Ste. Marie	ON
405	Public Contact	Current Resident		55 Princeton Drive	Sault Ste. Marie	ON
406	Public Contact	Current Resident		57 Princeton Drive	Sault Ste. Marie	ON
407	Public Contact	Mark Cady/Karen Zaffini		61 Princeton Drive	Sault Ste. Marie	ON
408	Public Contact	Mr. Marc Thibodeau		69 Princeton Drive	Sault Ste. Marie	ON
409	Public Contact	Chris Kelly		177 Panoramic Drive	Sault Ste. Marie	ON
410	Public Contact	Chuck Miller		46 Moluch Street	Sault Ste. Marie	ON
411	Public Contact	Andre Riopel		200 Case Road	Sault Ste. Marie	ON
412	Public Contact	Denton Middaugh		177 Princeton Drive	Sault Ste. Marie	ON
413	Public Contact	Mark Crofts			Sault Ste. Marie	ON

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
414	Sault Naturalists	Ron Prickett			Sault Ste. Marie	ON
415	Public Contact	Laura Marsh		205 Panoramic Drive	Sault Ste. Marie	ON
416	Public Contact	Ian Klingenberg		165 Panoramic Drive	Sault Ste. Marie	ON
417	Public Contact	Janice Knapp		54 Jean Avenue	Sault Ste. Marie	ON
418	Public Contact	Peter and Anne McLarty		755 Fifth Line	Sault Ste. Marie	ON
419	Public Contact	Pete Bulas		1--30 Albert Street East	Sault Ste. Marie	ON
420	Public Contact	Dan Gowans		75 Pageant Drive	Sault Ste. Marie	ON
421	Public Contact	Jim McShane		173 Panoramic Drive	Sault Ste. Marie	ON
422	Public Contact	Rich and Sue Greenwood		184 Promenade Drive	Sault Ste. Marie	ON
423	Public Contact	Jim Steele		44 Woodhurst	Sault Ste. Marie	ON
424	Public Contact	Betty Vankerkhof		72 Prince Charles Cres	Sault Ste. Marie	ON
425	Public Contact	Robert Routledge		74 Tilley Road	Sault Ste. Marie	ON
426	Public Contact	Carole Blaquiere		244 Young Road	Goulais River	ON
427	Public Contact	Ken Miller		1913 Queen Street East	Sault Ste. Marie	ON
428	Public Contact	Karen Mikoliew		46 Moluch Street	Sault Ste. Marie	ON
429	Public Contact	Mike Keenan		189 Panoramic Drive	Sault Ste. Marie	ON
430	Public Contact	Alexander Flammia		711 Bay Street, Unit #203	Sault Ste. Marie	ON
431	Public Contact	Joe Sniezek		60 Prince Charles Crescent	Sault Ste. Marie	ON
432	Shaw Communications	Justin Williamson				
433	Bell Canada	Alain Morin				
434	Public Contact	Ann-Marie Fenlon		178 Princeton Drive	Sault Ste. Marie	ON
435	Public Contact	Mr. Peter Henry				
436	Public Contact	Mr. Lorenzo DiCerbo				
437	Public Contact	Mr. Terry Roberts		1207 Old Garden River Road	Sault Ste. Marie	ON
438	Public Contact	Ms. Darlene Govette				

Ministry/Agency		Contact Name	Contact Title	Street Address	City	Province
439	Public Contact	Mr. David Helwig				
440	Public Contact	Mr. Sean Meades		11 Euclid Road	Sault Ste. Marie	ON
441	Public Contact	Mr. Ray Fox		11 Euclid Road	Sault Ste. Marie	ON
442	Public Contact	Mr. Lucas Febbraro				
443	Public Contact	Mr. Paul McDonald				
444	Public Contact	Mr. Robert Carricato		12 Plummer Court	Sault Ste. Marie	ON
445	Public Contact	Ms. Pat Sutherland		Princeton Drive	Sault Ste. Marie	ON

APPENDIX 3
CITY OF SAULT STE. MARIE PINE STREET AND PLEASANT DRIVE
INTERSECTION OPERATIONS AND SAFETY REVIEW

City of Sault Ste. Marie

**Pine Street &
Pleasant Drive
Intersection**
Operations and Safety
Review

FINAL

March 2015

B000519

CIMA
Partners in excellence

City of Sault Ste. Marie

**Pine Street &
Pleasant Drive
Intersection**
Operations and Safety Review

FINAL

March 2015

B000519



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Technical Analyst

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Project Manager

VERIFIED BY:

Stephen Keen, P.Eng., M.Sc.

Project Director

Executive Summary

CIMA was retained by the City of Sault Ste. Marie to conduct an Operations and Safety Review of the intersection of Pine Street and Pleasant Drive. The City has been received complaints related to traffic operations and safety at this intersection, including:

- + Difficulty (delay) making the westbound left-turn from Pleasant Drive onto Pine Street from the stop control; and
- + Non-compliance of westbound right-turn vehicles with the school crossing guards' Stop sign while students are crossing Pine Street on the north side.

The scope of this study included the review and analysis of items such as intersection geometry, traffic and pedestrian volumes, traffic speeds, collision history, intersection capacity and level of service, and all-way stop warrant and traffic signal justification reviews.

The main findings from our review are:

- + Traffic volumes on both Pine Street and Pleasant Drive are within typical ranges for their respective road classifications; pedestrian volumes are significantly concentrated within 15-minute periods in both AM and PM school peaks and are very low during other times of the day;
- + 85th percentile speed on Pine Street is at least 15 km/h in excess of the posted speed, including the regular 50 km/h and 40 km/h associated with the school zone;
- + The intersection operates with acceptable volume to capacity ratios and levels of service for all approaches;
- + All-way stop control and traffic signals are not justified at the intersection; and
- + No evidence was found that operational issues may cause conflicts between westbound right-turning vehicles and pedestrians on the north crosswalk.

In short there were no obvious problems found at this intersection. Based on our findings, the following recommendations are provided:

- + The existing traffic control (minor-road stop control) should be maintained;
- + Consideration should be given to observe traffic operations on-site to further investigate potential conflicts and delays between pedestrians and westbound (i.e. from Pleasant Drive) right-turning vehicles. If non-compliance is found to be significant, occasional police patrols could mitigate the issue;

Although the speeding on Pine Street is typical for such a road; if the City wishes to address this issue they may consider the following:

- + In the short-term, the City may consider installing electronic speed feedback signs on Pine Street approaching Pleasant Drive to reduce operating speeds along this road; and
- + If speeds remain a concern the City may consider installing traffic calming measures on Pine Street, including raised median islands and/or intersection curb extensions.

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Table of Contents

Executive Summary	i
1. Background	1
2. Study Area	1
3. Existing Conditions	2
3.1 Intersection Geometry and Traffic Control.....	2
3.2 Traffic Volumes	3
3.3 Pedestrian Volumes	5
3.4 Traffic Speeds.....	6
3.5 Collision Analysis.....	7
3.6 Traffic Operations.....	9
3.6.1 Westbound Right-Turn Operations.....	10
4. All-Way Stop Warrant and Traffic Signal Justification Review	11
4.1 All-Way Stop Warrant	11
4.2 Traffic Signal Justification	11
4.2.1 Pedestrian Crossover	11
5. Summary of Findings and Recommendations	11
5.1 Summary of Findings	11
5.2 Potential Improvements	12
5.2.1 Roundabout.....	12
5.2.2 Traffic Calming	15
5.2.2.1 Curb Extensions	15
5.2.2.2 Intersection Curb Extensions	16
5.2.2.3 Raised Median Islands.....	16
5.2.3 Electronic Speed Feedback Signs	17
5.3 Summary of Recommendations	18

Appendices

Appendix A: Synchro Reports

Appendix B: All-Way Stop Warrant and Traffic Signal Justification Reports



1. Background

CIMA was retained by the City of Sault Ste. Marie to conduct an Operations and Safety Review of the intersection of Pine Street and Pleasant Drive. The City has been receiving a series of complaints related to traffic operations and safety at this intersection, including:

- + Difficulty making the westbound left-turn from Pleasant Drive onto Pine Street from the stop control; and
- + Non-compliance of westbound right-turn vehicles with the school crossing guards' Stop sign while students are crossing Pine Street on the north side.

This report includes the findings from our review of intersection geometry, traffic and pedestrian volumes, traffic speeds, collisions and operations. The report also provides recommendations to address any issues encountered.

2. Study Area

The study area for this assignment is illustrated in **Figure 1** and includes the intersection of Pine Street & Pleasant Drive and its 3 approaches (northbound, southbound and westbound).

Pine Street is an arterial road with a posted speed limit of 50 km/h. It extends in the north-south direction, connecting to the Trans-Canada Highway at the north end, and to Wellington Street and Queen Street at the south end. The land use is predominantly residential and an access to St. Paul Catholic School is present across from Pleasant Drive.

School zone signs are present on Pine Street indicating a reduction of the speed limit to 40 km/h when flashing beacons are active. The flashing school zone schedule was provided by the City and includes the periods between 8:30 and 9:00 am, 11:50 am and 12:20 pm, and 3:20 and 3:50 pm.

The predominance of residential land use and the low speed limits are not typical of arterial roads, where commercial or institutional developments, for example, are more common. This may lead to conflicting interpretations of the function of the road by different road users (drivers and pedestrians, especially).

Pleasant Drive is a minor collector residential road with a posted speed limit of 50 km/h.

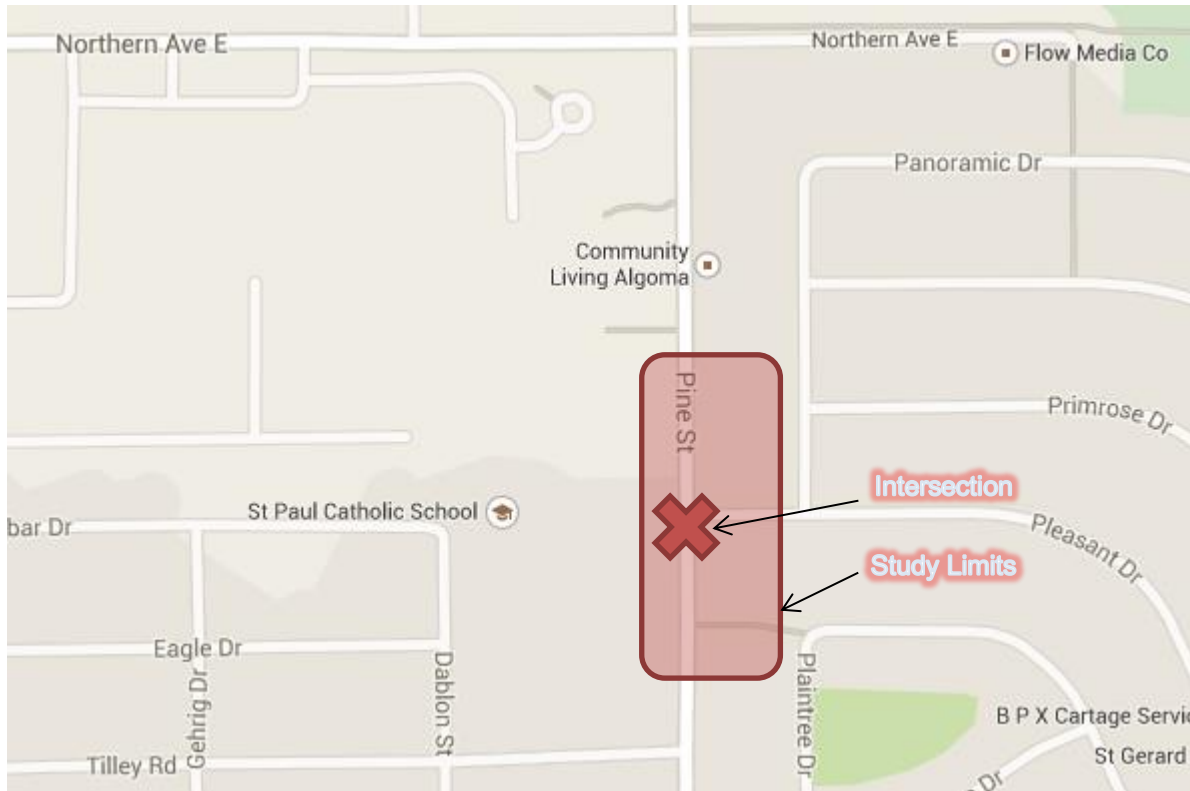


Figure 1: Study Area

3. Existing Conditions

3.1 Intersection Geometry and Traffic Control

The intersection of Pine Street & Pleasant Drive is a 3-leg configuration with minor road stop control on Pleasant Drive, although the access to St. Paul Catholic School effectively functions as a fourth leg. The access is a 'loop' with the entrance located opposite to Pleasant Drive and with the exit located approximately 75 metres southerly, and is used predominantly by school buses.

The two streets intersect each other at a 90-degree angle. Dedicated left-turn lanes are present on the southbound and westbound approaches. There are no apparent visibility restrictions to drivers leaving Pleasant Drive onto Pine Street. **Figure 2** illustrates the intersection geometry, and **Table 1** indicates approximate lane widths.

Sidewalks are present on both sides of Pine Street and on the north side of Pleasant Drive, and crosswalks are located on the north and east legs of the intersection. Two school crossing guards are assigned to the intersection during school entry and dismissal times: one at the crosswalk on the north leg; a second one was added to assist with safety concerns. The second crossing guard may also assist students to cross Pleasant Drive if required.



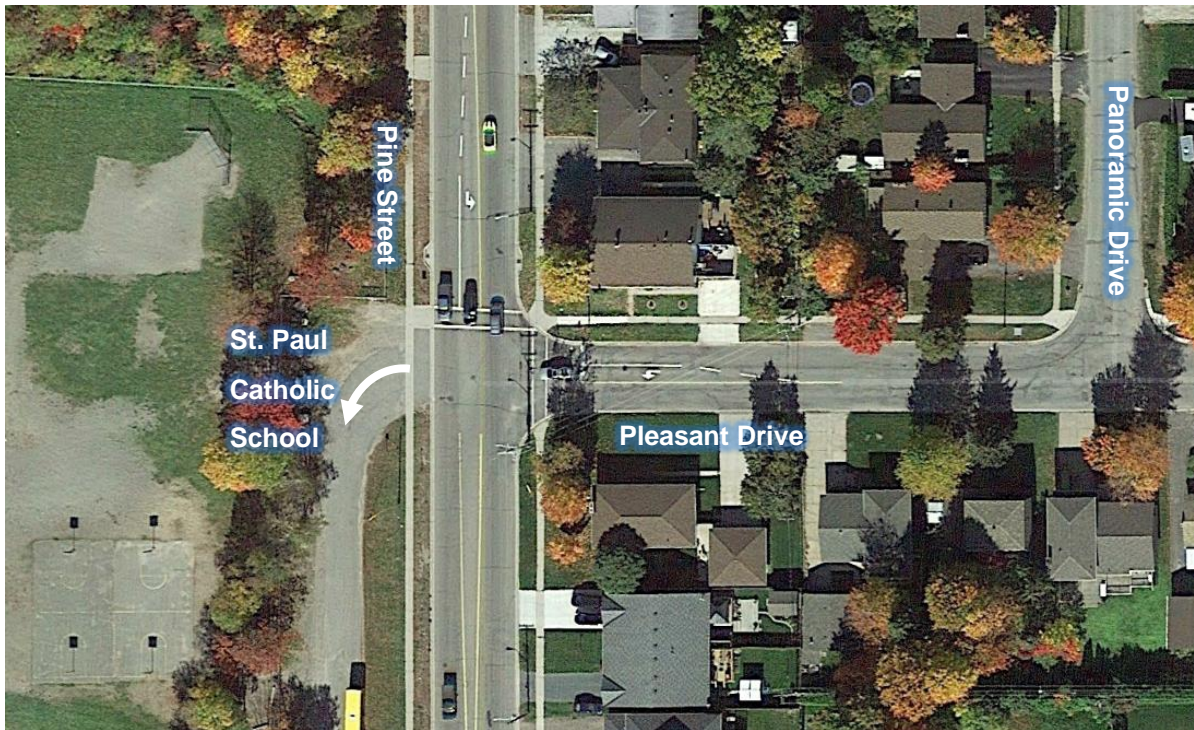


Figure 2: Intersection Geometry

Table 1: Lane Widths

Direction	Movement	Lane Width (m)	Total Cross Section (m)
NB	T/R	5.00	12.00
	L	3.00	
SB	T/R	3.75	9.50
	L	2.50	
WB	R	2.80	
	L		

3.2 Traffic Volumes

Figure 3 illustrates the 24-hour volumes on the approaches to the intersection of Pine Street & Pleasant Drive. Based on the count conducted on Tuesday, October 7, 2014, Pine Street carries a volume of approximately 13,700 vehicles per day on the north leg (7,395 southbound; 6,369 northbound), and approximately 11,600 vehicles per day on the south leg (5,666 northbound; 6,017 southbound). These volumes are in the range outlined in the Geometric Design Guide for Canadian Roads (TAC – Transportation Association of Canada, 1999) for arterial roads. Pleasant Drive carries a volume of approximately 4,000 vehicles per day (2,173 westbound; 1,901 eastbound), a volume typical of residential collector roads according the TAC Guide.

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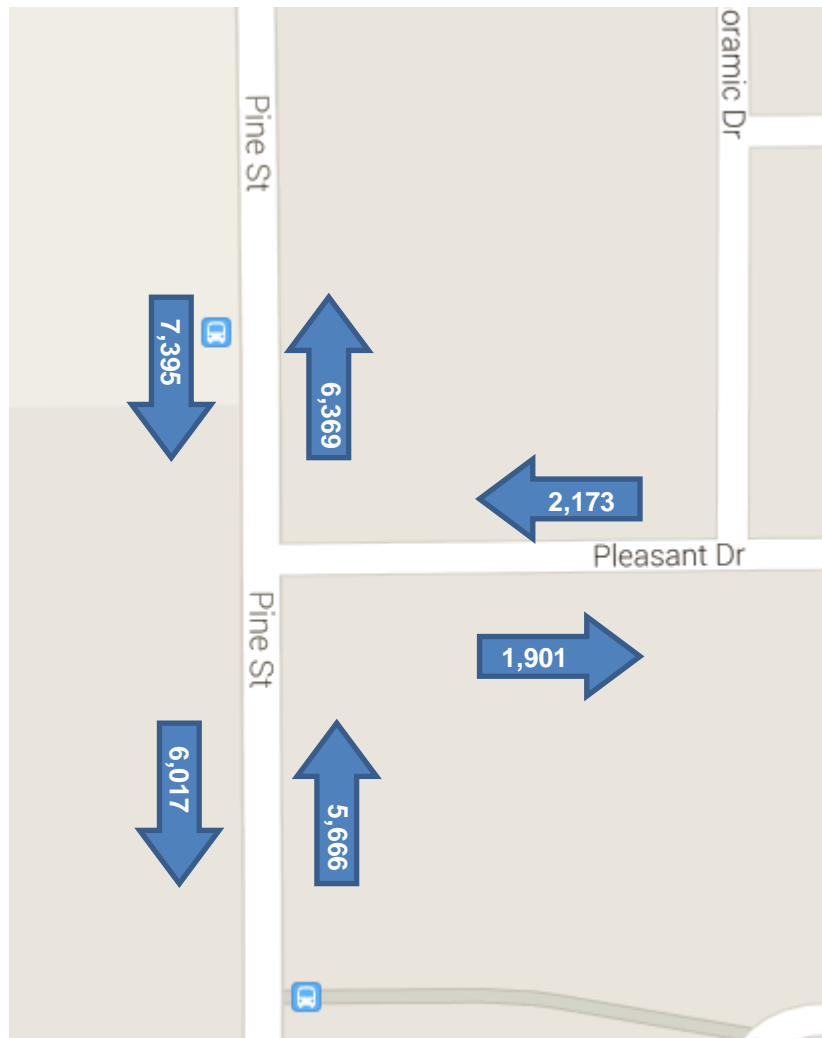


Figure 3: 24-hour Volumes

Figure 4 shows the turning movement volumes at the intersection, based on a count conducted on Tuesday, October 28, 2014. As expected, the most significant volumes are the through movements in the northbound and southbound direction (382 and 755 vehicles per hour¹, respectively).

¹ Including through and left turn movements.



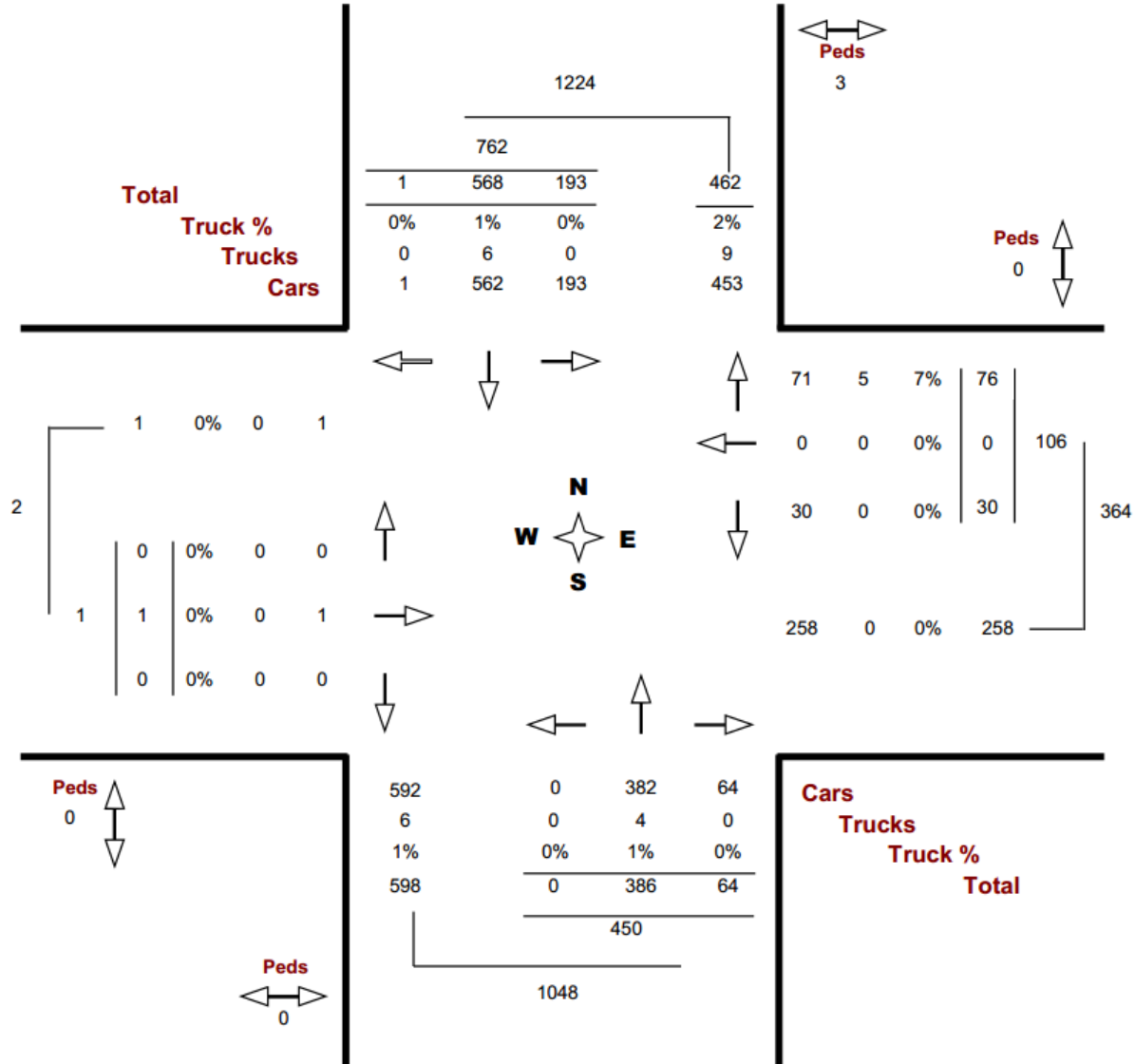


Figure 4: Peak Hour Turning Movement Diagram (4:30 - 5:30 pm)²

3.3 Pedestrian Volumes

Figure 5 illustrates the 8-hour volumes at the intersection. The north leg presents the highest pedestrian volume, since the crosswalk on the north leg is the continuation of the Pleasant Drive sidewalk, used by pedestrians to access the school from the residential neighbourhood. Eighty-eight pedestrians crossed Pine Street on the north crosswalk, likely from/to the school. The east approach had 10 pedestrians crossing Pleasant Drive during the 8 hours counted.

² The morning period was only counted between 8:00 and 9:00 am, therefore it is not possible to accurately determine the AM Peak Hour.

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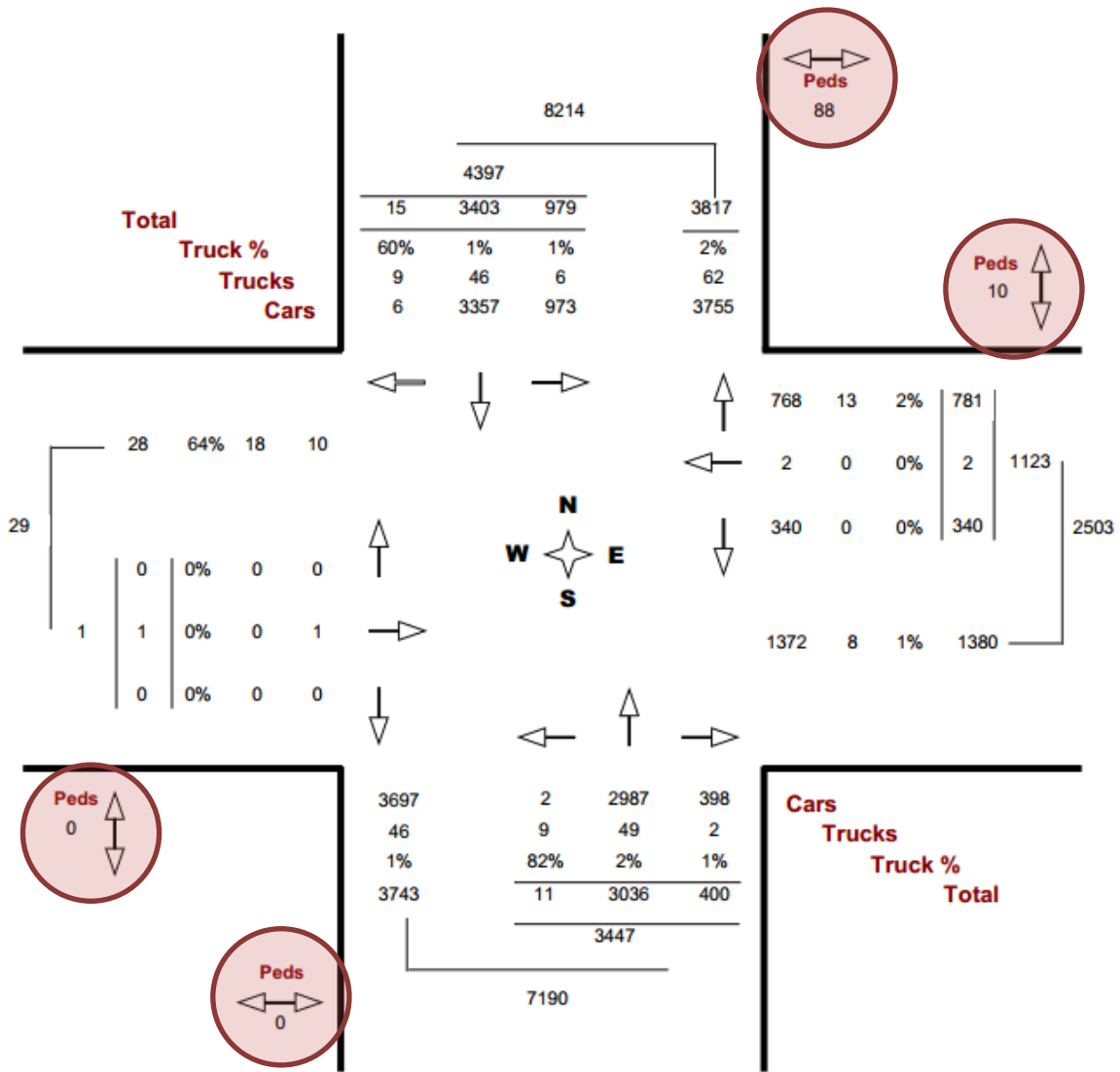


Figure 5: 8-Hour Turning Movement Diagram (8-9 am + 12-7 pm)

3.4 Traffic Speeds

A speed study was conducted by the City on the three approaches to the subject intersection, between October 6th and 8th, 2014. **Table 2** summarizes the results for Pine Street on approach to Pleasant Drive, including 85th percentile speeds and compliance rates for the overall study sample and for the periods when the school zone flashing beacons are active.³

³ 8:30 to 9:00 am, 11:50 am to 12:20 pm, 3:20 to 3:50 pm.



Table 2: Speeds on Pine Street on Approach to Pleasant Drive

Direction		Speed Limit 50 km/h (Non-flashing periods)	Speed Limit 40 km/h (Flashing School Zone)		
			8:30 – 9:00	11:50 – 12:20	15:20 – 15:50
NB	85 th Percentile Speed	64 km/h	58 km/h	63 km/h	59 km/h
	Compliance	14%	18%	7%	21%
SB	85 th Percentile Speed	70 km/h	59 km/h	59 km/h	60 km/h
	Compliance	18%	15%	11%	10%

* Posted speed: 50 km/h; when flashing school zone: 40 km/h

For all cases, the compliance rates are low, ranging between 11% and 21%, while 85th percentile speeds are at least 14 km/h in excess of the speed limit. This is not unexpected given the road characteristics. As discussed in **Section 2**, different users may have conflicting interpretations of the function of the road, and drivers are likely to interpret Pine Street to be a higher speed road.

The speeds on Pleasant Drive on approach to Pine Street are not a concern, with a compliance rate of 89% and an 85th percentile speed of 49 km/h.

3.5 Collision Analysis

Collision records for the study area were provided by the City for a period of 3 years (2011 to 2014). During this period, 9 collisions were reported at the intersection of Pine Street & Pleasant Drive.

Out of the 9 collisions, 3 can be classified as Angle collisions, all involving a northbound and a westbound vehicle (highlighted with the red rectangle in **Figure 6**). Each of these 3 collisions occurred under different conditions: one occurred with clear weather and during the day; one occurred on ‘packed snow’ during dark conditions; and the third occurred under rain and during daylight. None of these three collisions involved injuries.

Another 2 injury Turning Movement collisions (highlighted with the green rectangle in **Figure 6**). were reported at the intersection, one involving a northbound vehicle going ahead and a southbound vehicle turning left, and the other involving a southbound vehicle going ahead and a northbound vehicle turning left. Both occurred during daylight periods and under clear weather condition, however pavement condition was dry for one collision and wet for the other.

The remaining 4 collisions include a Rear End; a reversing vehicle hitting a stopped vehicle; a Sideswipe; and a Turning Movement collision with two southbound vehicles, one of which making an improper turn.

The collision review shows that 5 out of 9 collisions involved a northbound or a southbound vehicle going straight through the intersection against a vehicle entering or exiting Pleasant Drive. Given the low speed compliance observed on Pine Street (refer to Section 3.4), and the potential for different interpretations of the function of the road by different road users, it is possible that the higher speeds of northbound and southbound traffic (expected to be predominantly through traffic) may be violating the expectations of drivers accessing Pine Street from Pleasant Drive (expected to be predominantly local traffic).

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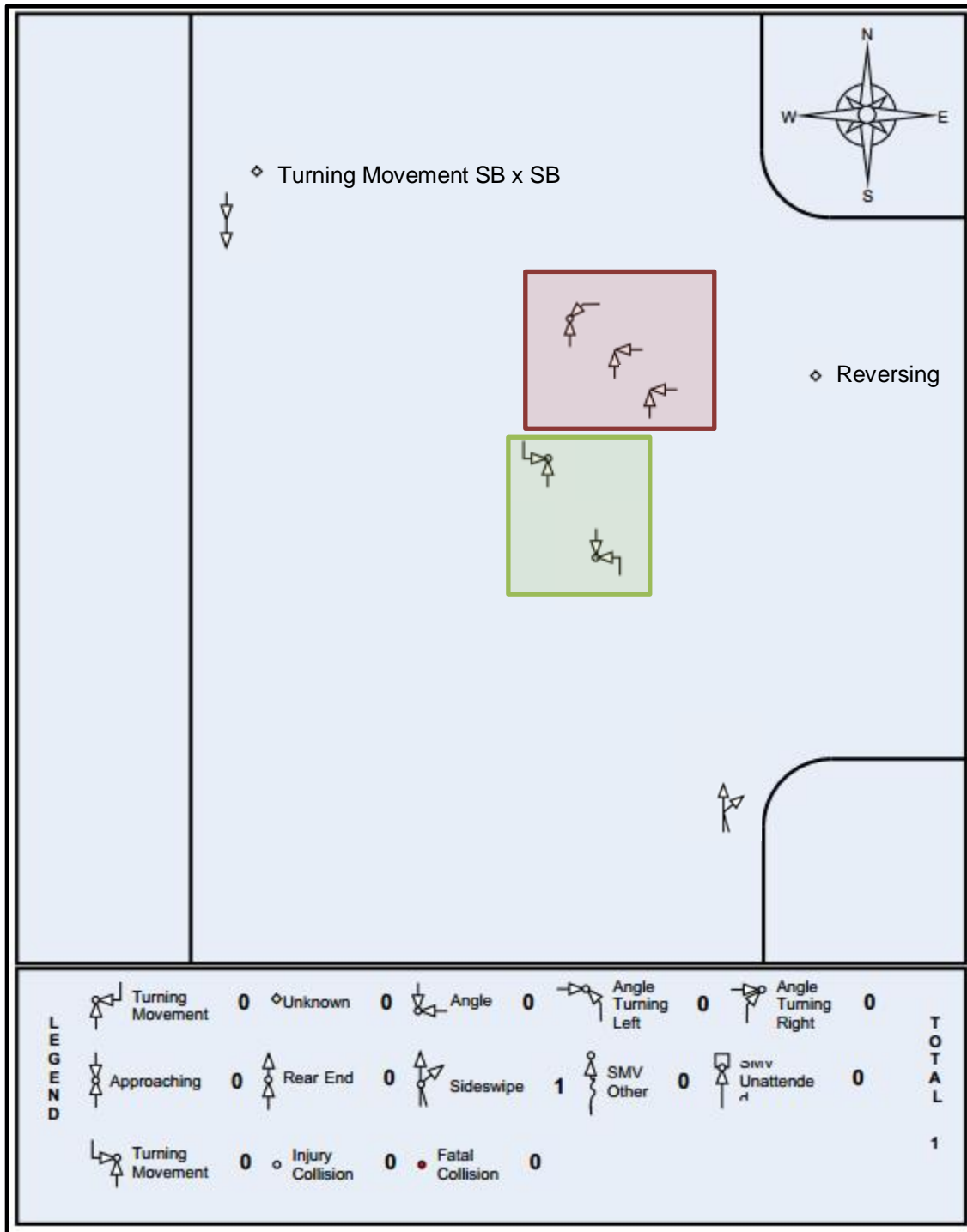


Figure 6: Pine Street & Pleasant Drive Collision Diagram

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3.6 Traffic Operations

An operational analysis was conducted using procedures described in the Highway Capacity Manual 2010 (HCM). For intersections, the analysis focuses on performance measures such as intersection capacity and Level of Service (LOS).

Intersection capacity performance is measured as a volume to capacity ratio (v/c). A v/c ratio of 1.0 indicates that an intersection or lane group is operating at capacity. Typically, v/c ratios of up to 0.85 are considered acceptable.

Level of Service is a qualitative measure of operational performance based on control delay. The LOS criteria for unsignalized intersections are shown in **Table 3**. LOS A is represented by a control delay of less than 10 seconds per vehicle (referred to as free flow operating conditions). LOS F is represented by a control delay greater than 50 seconds per vehicle for unsignalized intersections. Typically, a LOS D or better is considered acceptable.

Table 3: Highway Capacity Manual LOS Criteria for Unsignalized Intersections⁴

Level of Service (LOS)	Control Delay (s)
A	<= 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	>50

Synchro/SimTraffic 8 software was used to determine whether poor operational performance during shorter periods would justify changing the control type at the intersection of Pine Street & Pleasant Drive. The analysis was conducted for the AM Peak and PM School Peak Periods, and the results are summarized in **Table 4**.

⁴ If v/c > 1.0, LOS = F.



Table 4: Intersection Operation – Existing Conditions (Minor Road Stop Control)

Direction	Movement	v/c	Delay (s)	LOS	95 th Queue (m)
NB	T/R	Free Flow			
SB	L	0.08 [0.15]	9.2 [9.1]	A [A]	15 [19]
	T/R	Free Flow			
WB	L	0.24 [0.21]	20.8 [29.2]	C [D]	25 [19]
	R	0.58 [0.20]	23.4 [13.4]	C [B]	33 [26]
Overall		-	6.3 [2.9]	A [A]	-

AM Peak [PM School Peak]

The Synchro/SimTraffic results indicate that current operations (i.e. with minor road stop control) are acceptable for both peak periods reviewed. The through movements on Pine Street operate with free flow conditions, while Pleasant Drive operates well under capacity and with LOS D or better. The movement with the longest average delay is the westbound left-turn: approximately 29 seconds per vehicle. This movement was one of the original complaints that initiated this study. The analysis results show that there are no operational concerns related to the westbound left turn or any other movements.

3.6.1 Westbound Right-Turn Operations

One of the complaints that originated this study referred to westbound right-turn vehicles not complying with the school crossing guards' Stop sign while students are crossing Pine Street on the north side. Although the results of the analysis in the previous section show no operational concerns, it is possible that delays for this movement are increased with the presence of the crossing guard, making drivers impatient and resulting in non-compliance.

A Synchro model was adapted to simulate the presence of the crossing guard at the intersection in order to evaluate potential operational impacts that the guard might have on the westbound right-turn movement. The results of the Synchro model indicated acceptable average delays to the westbound right-turn: 16 seconds (LOS C) for the AM Peak and 28.5 seconds (LOS D) for the PM School Peak. These results can be considered conservative, as they assume that pedestrian crosses Pine Street one at a time. Realistically, however, school children are also expected to cross in groups, which would reduce the number of crossings and provide more gaps to right-turning vehicles. There is little evidence that traffic and pedestrian volumes alone may be contributing to non-compliance with the crossing guard Stop sign.

It is important to note that due to the limitations of the Synchro software, the analysis described in this section is an approximation and definitive conclusions should not be drawn solely based on it. Field studies, including gap availability and/or delay for the westbound right-turn would need to be conducted to confirm these findings.

4. All-Way Stop Warrant and Traffic Signal Justification Review

4.1 All-Way Stop Warrant

In late 2014 the City conducted an All-Way Stop warrant review for the intersection of Pine Street and Pleasant Drive, following the guidance provided by OTM Book 5 – Regulatory Signs. Their analysis indicated that All-Way Stop control is not warranted at this intersection.

CIMA reviewed the warrant calculations conducted by the City (**Appendix B**) and we confirm that the calculations were undertaken correctly and in a manner that follows the guidance in OTM Book 5.

4.2 Traffic Signal Justification

In late 2014 the City conducted a traffic signal justification review for the intersection of Pine Street and Pleasant Drive, following the requirements from OTM Book 12 – Traffic Signals. The City used the November 2007 edition of OTM Book 12. Although a newer version (March 2012) is available, none of the warrant criteria have changed from the 2007 version. Their analysis indicated that signal control is not warranted at this intersection.

CIMA reviewed the warrant calculations conducted by the City (**Appendix B**) and we confirm that the calculations were undertaken correctly and in a manner that follows the guidance in OTM Book 12.

4.2.1 Pedestrian Crossover

Another alternative for the intersection is the installation of a Pedestrian Crossover (PXO). PXOs provide pedestrians with protected crossing opportunities by requiring motorists to yield to pedestrians within the crosswalk. The new Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments is in the process of obtaining final approval and is expected to be published later in 2015. OTM Book 15 will provide warrant criteria for the installation of PXOs. The City may consider conducting a PXO warrant analysis following the methodology in OTM Book 15 once it has been published.

5. Summary of Findings and Recommendations

This section provides a summary of findings from the existing conditions review, and discusses potential improvements that could be implemented at the intersection of Pine Street and Pleasant Drive. A summary of our recommendations can be found in Section 5.3.

5.1 Summary of Findings

Based on our review, the following findings were drawn:

- + The predominance of residential land use and the low speed limits are not typical of arterial roads, which may lead to conflicting interpretations of the function of the road by different road users;
- + There are no apparent visibility restrictions to drivers leaving Pleasant Drive onto Pine Street;

- + Traffic volumes on Pine Street are within typical ranges for arterial roads;
- + Traffic volumes on Pleasant Drive are within typical ranges for residential collector roads;
- + Pedestrian volumes are significantly concentrated within 15-minute periods in both AM and PM school peaks and are very low during other times of the day;
- + Pine Street presents 85th percentile speeds at least 15 km/h in excess of the posted speed, including the regular 50 km/h and 40 km/h associated with the school zone;
- + Five out of nine collisions reported at the intersection involved a northbound or a southbound vehicle going straight through the intersection against a vehicle entering or exiting Pleasant Drive. Given the low speed compliance observed on Pine Street, and the potential for different interpretations of the function of the road by different road users, it is possible that the higher speeds of northbound and southbound traffic (expected to be predominantly through traffic) may be violating the expectations of drivers accessing Pine Street from Pleasant Drive (expected to be predominantly local traffic);
- + The intersection operates with acceptable v/c ratios and Levels of Service for all approaches;
- + All-way stop control and traffic signal are not justified at the intersection; and
- + No evidence was found that operational issues may cause conflicts between westbound right-turning vehicles and pedestrians on the north crosswalk.

5.2 Potential Improvements

5.2.1 Roundabout

As part of the review of options the possibility of installing a roundabout at the intersection of Pine Street & Pleasant Drive was considered. CIMA prepared a functional sketch for a roundabout that would cater to trucks (WB19 and possibly WB20 with some refinement); such a solution would require a significant amount of land on the west side of Pine Street for construction. While Pine Street appears to cater to very few trucks, it is designated as an arterial and we assume any intersection would have to be designed to accommodate trucks. Such a roundabout would reduce speeds along Pine Street through the intersection to around 40 km/h and would also reduce the delay for traffic exiting Pleasant Drive. It would also provide a safer pedestrian environment as a result of the lower speeds as well as pedestrians only having to cross 1 lane at a time instead of the current 3 lanes. **Figure 7** illustrates how a roundabout that caters to large truck traffic would be accommodated at the intersection.



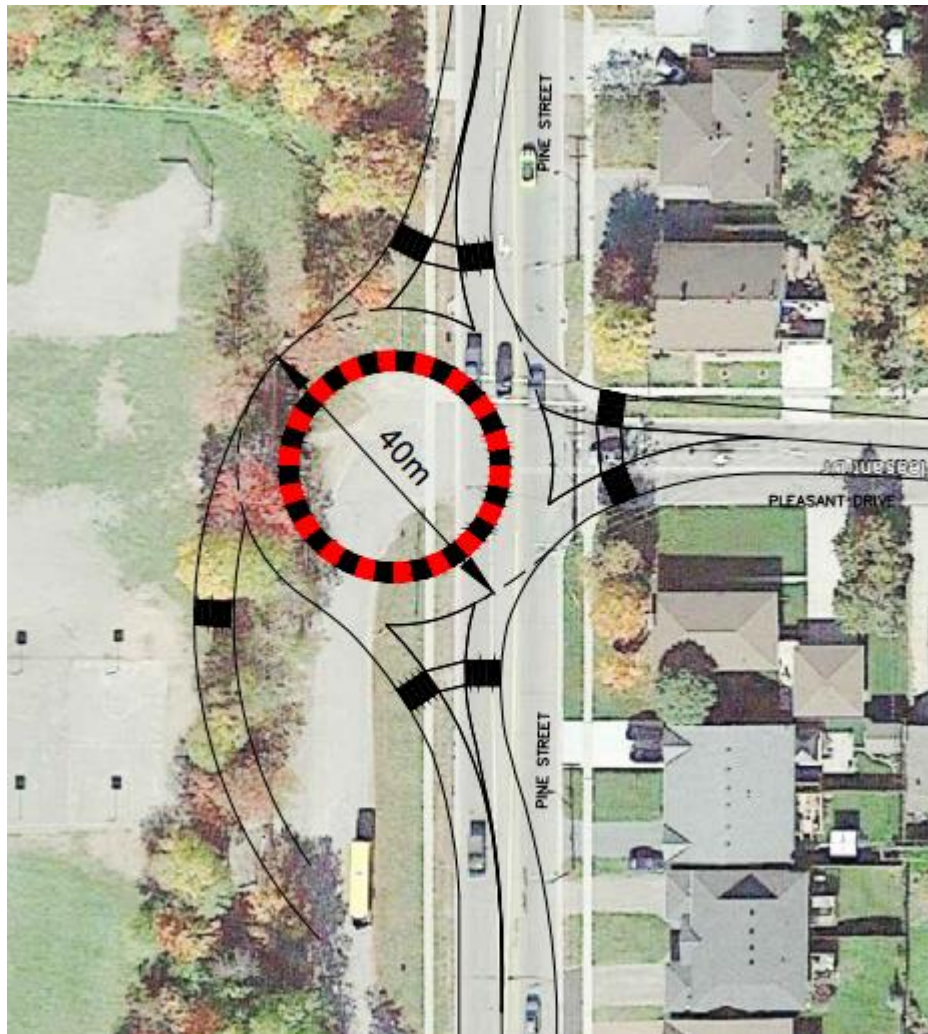


Figure 7: Modern Roundabout

It is expected that there would be significant encroachment onto the school property, reconfiguration of the driveway and the removal of several trees would be required. Pedestrian walking distances to reach the crosswalks would increase, since crosswalks at roundabouts are located on the approaches to the roundabout, farther from the adjacent street than a regular intersection.

There are two smaller roundabout options that could be considered at this location that would have less impact on the adjacent property. These include a roundabout similar to the one in Figure 7 only that it would not accommodate large trucks (only buses and mid-size trucks). An example in Oakville, Ontario is shown in **Figure 8** below – this has a diameter of 35 metres rather than the 40 metres shown above.

B000519



Figure 8: Small-radius Modern Roundabout

A range of roundabout sizes can be considered anywhere between the 40 metre diameter shown in Figure 7 to as little as a mini-roundabout with a 20 metre diameter. An example of a 20 metre mini-roundabout in Burlington, Ontario is shown in **Figure 9** below. This does cater to larger vehicles as the central island is mountable; however, the speed reduction is less and drivers have more scope to ignore the yield sign. Mini-roundabouts tend to work well in an area where speeds are already low to begin with, typically in a residential area and not on an arterial road such as Pine Street.



Figure 9: Mini Roundabout

A roundabout option could be worked out for the Pine Street & Pleasant Drive intersection once a design vehicle is confirmed (e.g. size of truck to be accommodated); however, in terms of a roundabout addressing the stated public concerns and revealed issues around the intersection, it would be an excessive response (particularly in terms of cost and land impact) in relation to the size of the identified problems.



5.2.2 Traffic Calming

One of the purposes of traffic calming is to reduce vehicular speed on local and collector residential streets. According to the Canadian Guide to Neighbourhood Traffic Calming (TAC, 1998), *many traffic calming measures are implemented to increase motorists' awareness of the street's function and thereby reduce vehicular speeds.* Traffic calming measures could be implemented on Pine Street, on approach to Pleasant Drive, in order to accomplish this speed reduction.

Traffic calming measures are classified in three different groups: horizontal deflection, vertical deflection, and obstructions. Vertical deflections and obstruction are more appropriate for local roads, with lower volumes and where mobility is not a primary concern. Pine Street, being an a minor arterial with predominantly residential land use, has both mobility and accessibility as primary concerns, therefore horizontal deflection measures are preferable.

There are several different types of horizontal deflection traffic calming measures, and each of them may be better suited for different situations. CIMA reviewed a series of traffic calming measures, and we found that the application of one of the following traffic calming measures (or a combination of them) on Pine Street may be beneficial.

5.2.2.1 Curb Extensions

Curb extensions (**Figure 10** and **Figure 11**) are horizontal intrusions of the curb into the roadway, resulting in a narrower section of roadway. Their benefits include speed reduction and improvement of the appearance of a street, when landscaped. Some of the disbenefits include potential for conflict between bicyclists and motor vehicles, incompatibility with bicycle lanes, and increased snow removal cost and snow plow damage to grass, trees and curb extensions. It is important to note that the installation of curb extension on Pine Street may not be feasible due to the presence of several residential driveways on both sides of the road.



Figure 10: Curb Extension

B000519



Figure 11: Curb Extension

5.2.2.2 Intersection Curb Extensions

This traffic calming measure is similar to a curb extension, however located at intersections (**Figure 12**). One additional benefit compared to curb extensions is potential reduction of vehicle-pedestrian conflicts due to the reduction of the pedestrian crossing distance at the intersection and improved visibility.



Figure 12: Neckdown

5.2.2.3 Raised Median Islands

Raised median islands (**Figure 13** and **Figure 14**) are elevated medians built on the centreline of a two-way roadway to reduce travel lane widths. They are expected to reduce vehicle speeds and vehicle-pedestrian conflicts (although, due to the presence of the southbound left turn lane at the intersection of Pine Street & Pleasant Drive, a raised median island would need to be installed further upstream to induce drivers to reduce speeds before reaching the intersection). Some

disbenefits of raised median islands include increased snow removal costs and potential to restrict access to driveways from one direction.



Figure 13: Raised Median Island



Figure 14: Raised Median Island

5.2.3 Electronic Speed Feedback Signs

Finally, electronic speed feedback signs (**Figure 15**) could be used to warn drivers that are exceeding speed limit. These types of signs are typically more effective when they have been recently installed, and their efficacy declines with time, as drivers become used to their presence. The City could utilize these signs as a short-term, temporary measure until a more permanent measure is installed.

B000519



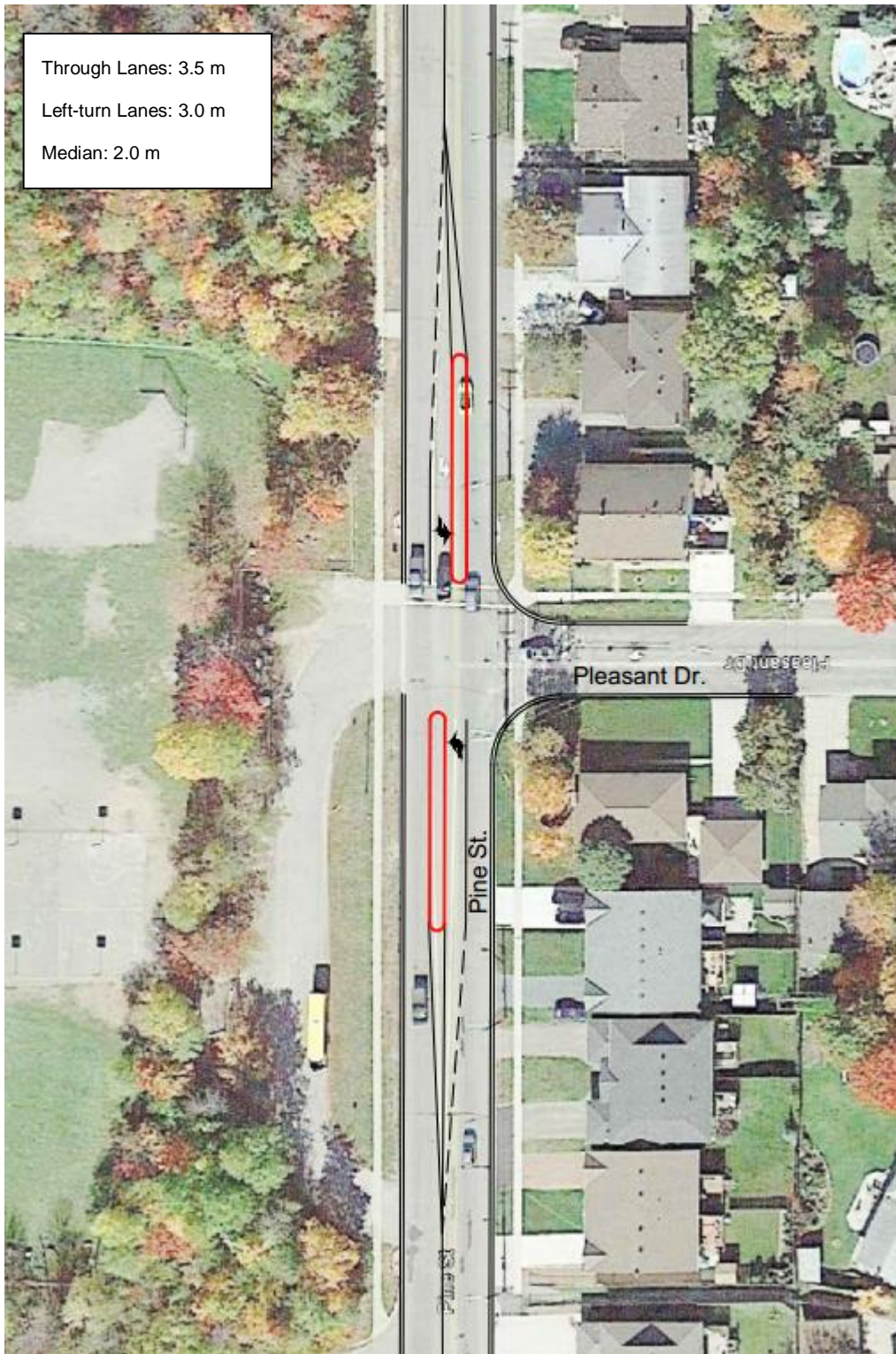
Figure 15: Electronic Speed Feedback Sign

5.3 Summary of Recommendations

Considering the findings from our review of the intersection of Pine Street and Pleasant Drive, we provide the following recommendations:

- + Although found to be acceptable under existing conditions, delays to westbound left-turn vehicles (i.e. from Pleasant Drive onto Pine Street from the stop control) could be further reduced with the installation of a roundabout. However, this would be an expensive and intrusive solution to a minor problem. We recommend maintaining the existing minor-road stop control;
- + No empirical evidence suggests that non-compliance of westbound right-turn vehicles with the school crossing guards' Stop sign while students are crossing Pine Street on the north side is a significant issue. The City should consider conducting field studies to observe conflicts and delays between pedestrians and right-turning vehicles. If non-compliance is found to be significant, occasional police patrols could mitigate the issue;
- + To reduce operating speeds on Pine Street, the City may consider installing electronic speed feedback signs on Pine Street approaching Pleasant Drive from both sides (north and south of the intersection). Speeds should be monitored over time to assess the effectiveness of the electronic signs.
- + If speeds are not reduced with the presence of the electronic speed feedback signs, the City may consider installing traffic calming measures on Pine Street. Two different options can be further evaluated:
 1. Raised median islands upstream of Pleasant Drive; or
 2. Intersection curb extensions at the corners of the intersection and a raised median island on the south leg. This option could also address, at some level, the concern about the non-compliance with the crossing guard stop sign.

Figure 16 and Figure 17 provide concept drawings illustrating the proposed configurations.



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Figure 16: Traffic Calming Option 1 - Raised Median Islands

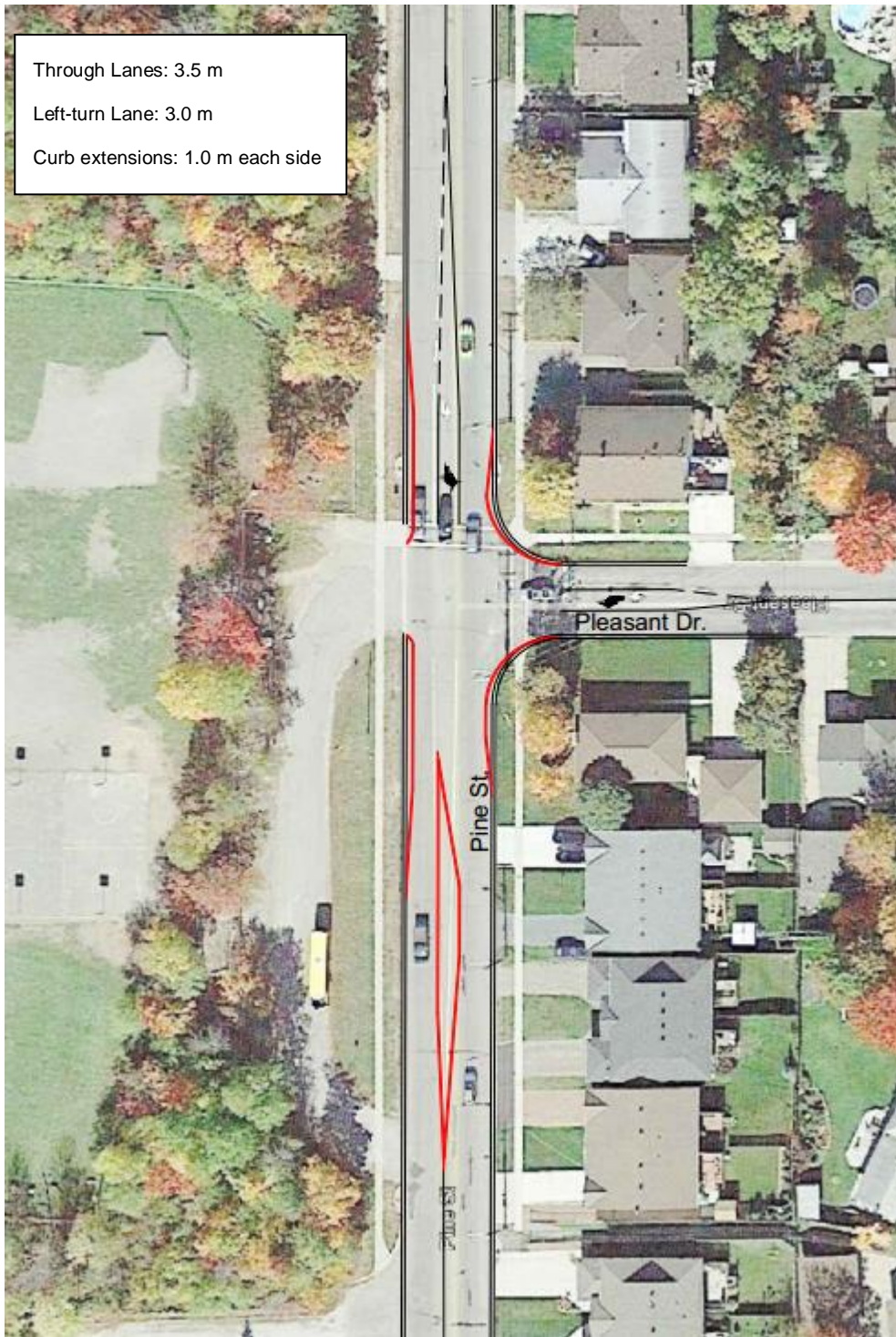


Figure 17: Traffic Calming Option 2 – Intersection Curb Extensions + Raised Median Island

B000519

Appendix A: Synchro Reports

HCM 2010 TWSC
3: Pine Street & Pleasant Drive

09/02/2015

Intersection

Int Delay, s/veh 6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	65	1	175	2	498	17	71	255	7
Conflicting Peds, #/hr	22	0	0	0	0	22	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	160	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	66	92	80	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	71	1	265	2	622	18	77	277	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1248	1124	304	1115	1119	655	307	0	0	663	0	0
Stage 1	457	457	-	658	658	-	-	-	-	-	-	-
Stage 2	791	667	-	457	461	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	150	205	736	185	207	466	1254	-	-	926	-	-
Stage 1	583	568	-	453	461	-	-	-	-	-	-	-
Stage 2	383	457	-	583	565	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	58	181	722	170	182	457	1253	-	-	925	-	-
Mov Cap-2 Maneuver	75	275	-	298	301	-	-	-	-	-	-	-
Stage 1	571	511	-	444	452	-	-	-	-	-	-	-
Stage 2	160	448	-	534	508	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	22.9	0	2
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1253	-	-	-	298	456	925	-	-
HCM Lane V/C Ratio	0.002	-	-	-	0.237	0.584	0.083	-	-
HCM Control Delay (s)	7.9	-	-	0	20.8	23.4	9.2	-	-
HCM Lane LOS	A	-	-	A	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.9	3.6	0.3	-	-

HCM 2010 TWSC
3: Pine Street & Pleasant Drive

13/02/2015

Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	4	88	4	709	24	88	272	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	160	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	4	88	4	709	24	88	272	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1225	1191	274	1179	1181	721	276	0	0	733	0	0
Stage 1	450	450	-	729	729	-	-	-	-	-	-	-
Stage 2	775	741	-	450	452	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	156	187	765	167	190	427	1287	-	-	872	-	-
Stage 1	589	572	-	414	428	-	-	-	-	-	-	-
Stage 2	391	423	-	589	570	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	113	168	765	154	170	427	1287	-	-	872	-	-
Mov Cap-2 Maneuver	182	256	-	280	288	-	-	-	-	-	-	-
Stage 1	587	514	-	413	427	-	-	-	-	-	-	-
Stage 2	307	422	-	530	512	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	16	0	2.3
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1287	-	-	-	-	418	872	-	-
HCM Lane V/C Ratio	0.003	-	-	-	-	0.22	0.101	-	-
HCM Control Delay (s)	7.8	-	-	0	0	16	9.6	-	-
HCM Lane LOS	A	-	-	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	0.8	0.3	-	-

HCM 2010 TWSC
3: Pine Street & Pleasant Drive

09/02/2015

Intersection												
Int Delay, s/veh	2.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	34	0	91	7	354	64	125	517	3
Conflicting Peds, #/hr	47	0	0	0	0	47	0	0	4	4	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	160	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	40	0	108	8	421	76	149	615	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1539	1523	668	1485	1487	511	666	0	0	545	0	0
Stage 1	962	962	-	523	523	-	-	-	-	-	-	-
Stage 2	577	561	-	962	964	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	94	118	458	103	124	563	923	-	-	1024	-	-
Stage 1	308	334	-	537	530	-	-	-	-	-	-	-
Stage 2	502	510	-	308	334	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	63	92	438	87	97	539	920	-	-	1021	-	-
Mov Cap-2 Maneuver	151	179	-	189	198	-	-	-	-	-	-	-
Stage 1	293	274	-	511	504	-	-	-	-	-	-	-
Stage 2	396	485	-	262	274	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	17.7	0.1	1.8
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	920	-	-	-	189	539	1021	-	-
HCM Lane V/C Ratio	0.009	-	-	-	0.214	0.201	0.146	-	-
HCM Control Delay (s)	8.9	-	-	0	29.2	13.4	9.1	-	-
HCM Lane LOS	A	-	-	A	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.8	0.7	0.5	-	-

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	108	8	1059	76	144	560	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	160	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	108	8	1059	76	144	560	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2017	2001	562	1963	1965	1097	564	0	0	1135	0	0
Stage 1	850	850	-	1113	1113	-	-	-	-	-	-	-
Stage 2	1167	1151	-	850	852	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	43	60	526	47	63	259	1008	-	-	616	-	-
Stage 1	355	377	-	253	284	-	-	-	-	-	-	-
Stage 2	236	272	-	355	376	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	20	46	526	38	48	259	1008	-	-	616	-	-
Mov Cap-2 Maneuver	-	-10	97	-	135	150	-	-	-	-	-	-
Stage 1	352	289	-	251	282	-	-	-	-	-	-	-
Stage 2	136	270	-	272	288	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	28.5	0.1	2.6
HCM LOS	A	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1008	-	-	-	-	259	616	-	-
HCM Lane V/C Ratio	0.008	-	-	-	-	0.417	0.234	-	-
HCM Control Delay (s)	8.6	-	-	0	0	28.5	12.6	-	-
HCM Lane LOS	A	-	-	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	1.9	0.9	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Appendix B: All-Way Stop Warrant and Traffic Signal Justification Reports



CITY OPERATIONS - PUBLIC WORKS

All-way Stop Warrants Conforming to OTM Book 5, Mar. 2000

For the Intersection of Pine Street @ Pleasant Drive, Based on the Study Done Oct 28, 2014

Warrant	Justification	Required Value	Conditions satisfied?	
			Section	Warrant
Arterial/Major Road Conditions must be satisfied for: All hours	1. Vehicle Volume on all approaches, for each of the heaviest hours	> 500	Yes	No
	2. Combined Vehicle and Pedestrian Volume crossing the major road, for each of the same hours	> 200	No	
	3. Percentage of Vehicle Volume split on the major road, for each of the same hours	< 70	No	
Local Road (4-leg intersection) Conditions must be satisfied for: All hours	1. Vehicle Volume on all approaches, for each of the heaviest hours	> 350	Yes	No
	2. Percentage of Vehicle Volume split on the major road, for each of the same hours	< 65	No	
Collision Experience	1. Total reported collisions of types susceptible to correction by an all-way stop control per 12-month period averaged over 36 months	>= 4	---	No

Justification Details

Warrant 1 - Arterial/Major Road

1 - Vehicle Volume on all approaches

	09:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	Total	Average
Vehicle Volume all approaches	1,091	1,030	1,100	983	1,195	1,297	1,197	1,075	8,968	1,121
Vehicle Volume all approaches > 500	yes	yes	yes	yes	yes	yes	yes	yes		

Conditions are satisfied

2 - Combined Vehicle and Pedestrian Volume crossing the major road

	09:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	Total	Average
Vehicle Volume	241	126	142	120	125	108	127	135	1,124	140
Pedestrian Volume	22	3	3	0	47	6	2	5	88	11
Veh./Ped. crossing major road	263	129	145	120	172	114	129	140	1,212	152
Veh./Ped. crossing major road > 200	yes	no	no	no	no	no	no	no		

Conditions are not satisfied

3 - Percentage of Vehicle Volume split on the major road

	09:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	Total	Average
Vehicle Volume major approach	850	904	958	863	1,070	1,189	1,070	940	7,844	980
% of Volume split on major app.	78	88	87	88	90	92	89	87		87
% of Volume split on major app. < 70	no	no	no	no	no	no	no	no		

Conditions are not satisfied

An ALL-WAY STOP condition WOULD NOT BE recommended under the Arterial/Major Road warrant

Warrant 2 - Local/Minor Road

1 - Vehicle Volume on all approaches

	09:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	Total	Average
Vehicle Volume all approaches	1,091	1,030	1,100	983	1,195	1,297	1,197	1,075	8,968	1,121
Vehicle Volume all approaches > 350	yes	yes	yes	yes	yes	yes	yes	yes		

Conditions are satisfied

2 - Percentage of Vehicle Volume split on the major road

	09:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	Total	Average
Vehicle Volume major approach	850	904	958	863	1,070	1,189	1,070	940	7,844	980
% of Volume split on major app.	78	88	87	88	90	92	89	87		87
% of Volume split on major app. < 65	no	no	no	no	no	no	no	no		

Conditions are not satisfied

An ALL-WAY STOP condition WOULD NOT BE recommended under the Local/Minor Road warrant

Warrant 3 - Collision Experience

Number of reportable collisions (last 36 months) susceptible to correction by an all-way stop control 2

Annual collision average 0.67

Annual collision average ≥ 4 No

An ALL-WAY STOP condition WOULD NOT BE recommended under the Collision warrant



CITY OPERATIONS - PUBLIC WORKS

Traffic Signal Warrant Conforming to OTM Book 12, Nov. 2007

For the Intersection of Pine Street @ Pleasant Drive, Based on the Study Done Oct 28, 2014

Intersection Type * T - West
 Approach Lanes on Major One
 Approach Lanes on Minor One Channelized Right Turn: North Approach East Approach
 Flow Condition Restricted South Approach West Approach

Justification	Description	Minimum Requirement	Compliance	
			Sectional %	Entire %
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches for each of the heaviest 8 hours	720	100	53
	B. Vehicle Volume, along the minor road for each of the same 8 hours	255	53	
2. Delay to Cross Traffic	A. Vehicle Volume, along the major road for each of the heaviest 8 hours	720	100	69
	B. Combined Vehicle and Pedestrian Volume crossing the major road, for each of the same 8 hours	75	69	
3. Volume/Delay Combination	Justifications 1 and 2 both fulfilled to the extent of 80% or more	---	---	0
4. Minimum Four-Hour Vehicle Volume	All plotted points representing hourly volume for minor approach vs. major approach for four highest hours fall above the applicable curve	---	---	100
5. Collision Experience	A. Total reported collisions of types susceptible to correction by a traffic signal per 12-month period averaged over 36 months	5	13	13
	B. Adequate trial of less restrictive remedies, where satisfactory observance and enforcement have failed to reduce the number of collisions	---	100	
6. Pedestrian Volume and Delay	A. Plotted point representing 8-hour pedestrian volume vs. 8-hour vehicular volume falls in justified zone	---	n/a	n/a
	B. Plotted point representing 8-hour volume of pedestrians experiencing delays of 10 s or more vs. 8-hour pedestrian volume falls in justified zone	---	n/a	

Conclusion: Traffic Signal is not justified

Justification Details

Justification 1 - Minimum Vehicular Volume

A - All Approaches

	Min. Req.	Min. Req.	15:00	19:00	13:00	17:00	14:00	18:00	16:00	09:00	Total
Volume	720	576	983	1,075	1,030	1,297	1,100	1,197	1,195	1,091	8,968
Compliance %	100	80	100	100	100	100	100	100	100	100	800

Part A Fulfilled (%) 100

B - Minor Road, Both Approaches

	Min. Req.	Min. Req.	15:00	19:00	13:00	17:00	14:00	18:00	16:00	09:00	Total
Volume	255	204	120	135	126	108	142	127	125	241	1,124
Compliance %	100	80	47	53	49	42	56	50	49	80	426

Part B Fulfilled (%) 53

Justification 1 Fulfilled (%) 53

Justification 2 - Delay to Cross Traffic

A - Major Road, Both Approaches

	Min. Req.	Min. Req.	15:00	19:00	13:00	17:00	14:00	18:00	16:00	09:00	Total
Volume	720	576	863	940	904	1,189	958	1,070	1,070	850	7,844
Compliance %	100	80	100	100	100	100	100	100	100	100	800

Part A Fulfilled (%) 100

B - Traffic Crossing Major Road

	Min. Req.	Min. Req.	15:00	19:00	13:00	17:00	14:00	18:00	16:00	09:00	Total
Volume	75	60	45	57	38	34	50	38	81	88	431
Compliance %	100	80	60	76	51	45	67	51	100	100	550

Part B Fulfilled (%) 69

Justification 2 Fulfilled (%) 69

Justification 3 - Volume/Delay Combination

Justification 1 Fulfilled 80% or More Was Fulfilled (%) 0

Justification 2 Fulfilled 80% or More Was Fulfilled (%) 0

Justification 3 Fulfilled (%) 0

Justification 4 - Minimum Four-Hour Vehicle Volume

Hour Ending	Total Volume of Both Major Approaches	Volume of Heaviest Minor Approach	Required Value	Requirement Satisfied?
14:00	958	142	111	yes
16:00	1,070	125	89	yes
17:00	1,189	107	80	yes
18:00	1,070	127	89	yes

Justification 4 Fulfilled (%) 100

Justification 5 - Collision Experience

A	Number of reportable collisions susceptible to prevention by a traffic signal	2
	Based on the minimum justification value of 5, Part A Fulfilled (%)	13
B	Adequate trial of less restrictive remedies requirement was fulfilled (%)	100

Justification 5 Fulfilled (%) 13

Justification 6 - Pedestrian Volume and Delay

A	Plotted point representing 8-Hour Pedestrian Volume vs. 8-Hour Vehicular Volume falls in Justified zone	n/a
B	Plotted point representing 8-Hour Volume of Pedestrians Experiencing Delays of 10 s or more vs. 8-Hour Pedestrian Volume falls in Justified zone	n/a

Justification 6 Fulfilled (%) n/a

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APPENDIX 4
STAGE 1 ARCHAEOLOGICAL ASSESSMENT – NORTHERN AVENUE CORRIDOR

**STAGE 1 ARCHAEOLOGICAL ASSESSMENT
NORTHERN AVENUE CORRIDOR
PART OF SEC 31-33 AND PART OF LOTS 1-6, CONCESSION 4
CITY OF SAULT STE. MARIE
FORMER TOWNSHIPS OF TARENTORUS AND STE. MARIE, ALGOMA DISTRICT**

ORIGINAL REPORT

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Ministry of Tourism, Culture and Sport PIF# P128-0127-2016
ASI File: 16EA-035

6 July 2016



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**STAGE 1 ARCHAEOLOGICAL ASSESSMENT
NORTHERN AVENUE CORRIDOR
PART OF SEC 31-33 AND PART OF LOTS 1-6, CONCESSION 4
CITY OF SAULT STE. MARIE
FORMER TOWNSHIPS OF TARENTORUS AND STE. MARIE, ALGOMA DISTRICT, ONTARIO**

EXECUTIVE SUMMARY

Archaeological Services Inc. (ASI) was contracted by Kresin Engineering Corporation on behalf of the City of Sault Ste. Marie to conduct a Stage 1 Archaeological Assessment (Background Study and Property Inspection) for the Northern Avenue Corridor Municipal Class Environmental Assessment. The project involves the possible reduction of lanes on Northern Avenue and addition of bike lanes, possible extension of Northern Avenue to Black Road, possible access/egress to the P-Patch subdivision through an existing utility corridor, and possible signalization of the Pine Street/Pleasant Drive in the City of Sault Ste. Marie. At present, no alterations are planned outside of the existing ROW between North Street and Pine Avenue.

The Stage 1 background study determined that one previously registered archaeological site is located within one kilometre of the study area. A review of the geography and history of the study area indicates that it includes features indicative of archaeological potential. However, due to the current conditions of the study area as a highly developed right of way (ROW), considered together with the Sault Ste. Marie archaeological management plan, only portions of the study area are considered to retain archaeological potential.

In light of these results, ASI makes the following recommendations:

1. Parts of the Northern Avenue Corridor study area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test-pit survey at five metre intervals, prior to any proposed impacts to the property;
2. The remainder of the study area does not retain archaeological potential due to deep and extensive disturbances and low and wet conditions. These lands do not exhibit archaeological potential and therefore do not require further archaeological assessment;
3. Should the proposed work extend beyond the current study area then further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.



PROJECT PERSONNEL

<i>Senior Project Manager:</i>	Lisa Merritt, MSc. (P094) <i>Senior Archaeologist, Manager EA Projects (East)</i> <i>Environmental Assessment Division</i>
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<i>Project Manager (Licensee):</i>	Katherine Hull, PhD (P128) <i>Senior Archaeologist, Manager of Historical Archaeology</i> <i>Environmental Assessment Division</i>
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TABLE OF CONTENTS

1.0 PROJECT CONTEXT 1

 1.1 Development Context 1

 1.2 Historical Context 2

 1.2.1 Indigenous Land Use and Settlement 2

 1.2.2 Historic Euro-Canadian Land Use: Township Survey and Settlement 4

 1.2.3 Historic Map Review 6

 1.2.4 Summary of Historical Context 7

 1.3 Archaeological Context 7

 1.3.1 Previous Archaeological Research 7

 1.3.2 Geography 8

 1.3.3 Current Land Use and Field Conditions 9

 1.3.4 Summary of Archaeological Context 9

2.0 FIELD METHODS 10

3.0 ANALYSIS AND CONCLUSIONS 10

 3.1 Analysis of Archaeological Potential 10

 3.2 Analysis of Property Inspection Results 11

 3.3 Conclusions 11

4.0 RECOMMENDATIONS 12

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION 12

6.0 REFERENCES CITED 13

7.0 MAPS 17

8.0 IMAGES 27

LIST OF TABLES

Table 1: Registered archaeological sites within 1 km of the study area 7

LIST OF FIGURES

Figure 1: Northern Avenue Corridor – Study Area Location 18

Figure 2: Northern Avenue Corridor study area (approximate location) overlaid on 1859 Plan of Town of Sault Ste. Marie 19

Figure 3: Northern Avenue Corridor Study Area (approximate location) overlaid on 1892 Map of Purtorah Township 20

Figure 4: Northern Avenue Corridor Study Area (approximate location) overlaid on 1902 Map of Tarentorus Township 21

Figure 5: Northern Avenue Corridor – Sault Ste. Marie Archaeological Potential Model 22

Figure 6: Northern Avenue Corridor – Quaternary Geology 23

Figure 7: Northern Avenue Corridor – Proximity of the Sheguiandah (Post-Algonquin) recessional beach to the study area 24

Figure 8: Northern Avenue Corridor – Property Inspection Results 25

Figure 9: Northern Avenue Corridor – Property Inspection Results 26



TABLE OF CONTENTS, continued

LIST OF PLATES

Plate 1: East view of Northern Avenue Corridor south side near North St.; area is disturbed with no archaeological potential.	27
Plate 2: East view of Northern Avenue Corridor, north side near Sackville St.; area is disturbed with no archaeological potential.	27
Plate 3: Southeast view of Northern Avenue Corridor between Great Northern Rd. and Willow Ave.; Housing frontage exhibits archaeological potential and requires Stage 2 test-pit survey	27
Plate 4: East view of Northern Avenue Corridor near Pine St.; area low and wet with no archaeological potential.....	27
Plate 5: Northwest view of Pine St. at Pleasant Dr. area is disturbed with no archaeological potential.....	28
Plate 6: Southwest view of Pine St. at Pleasant Dr. area is disturbed with no archaeological potential.....	28
Plate 7: North view of proposed Princeton Dr. to Northern Ave ROW; area is disturbed with no archaeological potential.....	28
Plate 8: South view of proposed Princeton Dr. to Northern Ave ROW; area is disturbed with no archaeological potential.....	28
Plate 9: East view of existing terminus of Northern Ave.; areas beside trail exhibits archaeological potential and requires Stage 2 test-pit survey.....	29
Plate 10: East view of ROW extension northern alternative from high ground; area exhibits archaeological potential and requires Stage 2 test-pit survey. Note that the study area descends into low and wet and poorly drained area in the background.	29
Plate 11: East view of ROW extension northern alternative; higher ground in immediate foreground area exhibits archaeological potential and requires Stage 2 test-pit survey. Background, following hydro corridor is low and wet with no potential.....	29
Plate 12: North view of ROW extension northern alternative near Pawating Pl.; area low and wet woods with no archaeological potential.	29
Plate 13: West view from Black Rd. of ROW extension northern alternative; area low and wet and disturbed with construction of drainage ditch; no archaeological potential.	30
Plate 14: Southeast view of ROW extension southern alternative; area exhibits archaeological potential and requires Stage 2 test-pit survey	30
Plate 15: Southeast view of ROW extension southern alternative; area between housing and trail exhibits archaeological potential and requires Stage 2 test-pit survey	30
Plate 16: Northwest view of ROW extension northern alternative; wooded area exhibits archaeological potential and requires Stage 2 test-pit survey	30
Plate 17: West view of ROW extension southern alternative crosses creek and existing trail; area low and wet with no archaeological potential.	31
Plate 18: West view from Black Rd. of ROW extension northern alternative; area low and wet with no archaeological potential.	31



1.0 PROJECT CONTEXT

Archaeological Services Inc. (ASI) was contracted by Kresin Engineering Corporation on behalf of the City of Sault Ste. Marie to conduct a Stage 1 Archaeological Assessment (Background Study and Property Inspection) for the Northern Avenue Corridor Municipal Class Environmental Assessment. The project involves the possible reduction of lanes on Northern Avenue and addition of bike lanes, possible extension of Northern Avenue to Black Road, possible access/egress to the P-Patch subdivision through an existing utility corridor, and possible signalization of the Pine Street/Pleasant Drive in the City of Sault Ste. Marie. At present, no alterations are planned outside of the existing ROW between North Street and Pine Avenue (Figures 1 and 2).

The 2011 *Standards and Guidelines for Consultant Archaeologists (S & G)*, administered by the Ministry of Tourism, Culture and Sport (MTCS), Section 1, discusses the objectives of a Stage 1 archaeological assessment as follows:

- To provide information about the geography, history, previous archaeological fieldwork and current land condition of the study area;
- To evaluate in detail the archaeological potential of the study area which can be used, if necessary, to support recommendations for Stage 2 archaeological assessment for all or parts of the property; and,
- To recommend appropriate strategies for Stage 2 archaeological assessment, if necessary.

This report describes the Stage 1 archaeological assessment that was conducted for this project and is organized as follows: Section 1.0 summarizes the background study that was conducted to provide the archaeological and historical context for the project study area; Section 2.0 addresses the field methods used for the property inspection that was undertaken to document the study area; Section 3.0 analyses the characteristics of the project study area and evaluates its archaeological potential; Section 4.0 provides recommendations for the next assessment steps; and the remaining sections contain other report information that is required by the S & G, e.g., advice on compliance with legislation, references cited and mapping.

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act*, RSO (1990) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted under the Municipal Class EA process.

All activities carried out during this assessment were completed in accordance with the Municipal Engineers' Association document *Municipal Class Environmental Assessment* (2000, as amended in 2007 and 2011), the *Ontario Heritage Act* (2005), and the 2011 *Standards and Guidelines for Consultant Archaeologists (S & G)*, administered by the Ministry of Tourism, Culture and Sport (MTCS).

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted to ASI by Kresin Engineering Corporation on February 11, 2016.



1.2 Historical Context

The purpose of this section, according to the S & G, Section 7.5.7, Standard 1, is to describe the past and present land use and the settlement history and any other relevant historical information gathered through the Stage 1 background research. First, a summary is presented of the current understanding of the Indigenous land use of the study area. This is followed by a review of the historical Euro-Canadian settlement history.

1.2.1 Indigenous Land Use and Settlement

Northern Ontario was colonized by human populations much later than the south. The Laurentide glacier would have retreated above the study area by approximately 10,500-10,000 BP (Karrow and Warner 1990: 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 BP, the environment had progressively warmed and populations now occupied less extensive territories (Ellis and Deller 1990:62-63).

The ice margin had retreated northward from Georgian Bay by 10,000 BP and the pro-glacial Lake Algonquin drained through the North Bay outlet (Karrow and Warner 1990: Fig. 2.9). From approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites that would have been located on those former shorelines are now submerged. From approximately 10,000-8,000 BP, northern Ontario was occupied by populations whose subsistence was focussed within the boreal forest environment (Wright 2001:101, 105, 106). Groups may have had seasonal prolonged residency at fords to take advantage of migrating animal herds, made vulnerable by the crossing, but otherwise likely subsisted at large in the forest environment (Wright 2001:112, 113).

By approximately 8,000 BP, subsistence shifted to an increased reliance on aquatic resources, likely anadromous fish. This is suggested by evidence from isotopic analysis of bone samples from the Wapekeka Burial site (dated to approximately 7,000 BP) (Wright 2001:125). Comparative evidence from the O.S.A Lake site near Georgian Bay suggests that contact existed between populations in north-central Ontario and those in southern Ontario (Wright 2001:123). Such communication networks certainly extended into northern Ontario as well.

By approximately 3,500 BP, 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).

By approximately 2,200 BP, populations focussed their habitation at rivers and lakes, while subsistence involved a variety of resources drawn from a wide territory. At this time, the earliest evidence exists for occupation located near prime fishing grounds. Soon after, burial mounds appear in the archaeological record, and the exotic nature of the grave offerings found associated with these burial mounds expands on the prior evidence for extensive exchange networks (Wright 2001:288, 291-293). Burial practise should be seen as deliberate and reflective of the cosmology of these people (Parker Pearson 1999:141).

All these new cultural features suggest new concepts of social organization, investment of labour and territorialism (Brown 1995:13; MacDonald *et al.* 1994:7-8). The prevalence of mound burial around the Upper Great Lakes reflects likely cultural connections with populations from Ohio and Illinois. There are differences in some burial mound practices in the Shield versus elsewhere in the Great Lakes basin in terms of stone cairn construction versus earthen mound construction. The apparent similarities in ceremonialism, however, as well as the material evidence for extensive cultural contacts across regions



may be part of a world-view which spanned the entire Great Lakes basin and likely beyond. Macro-band social organization and subsistence focussed on the seasonal exploitation of resources such as fish and wild rice (where available), though evidence from the Wabinoosh River site west of Lake Nipigon may indicate year-round occupation (Wright 1999: 749, 756, 765-776).

By approximately 1,000 BP until approximately 300 BP, archaeological evidence suggests lifeways similar to the historically described Indigenous groups. Populations in northern Ontario were Anishnaabeg speaking peoples who would have had contact with Anishnaabeg speaking peoples to the south, west and east. Such extensive networks are consistent with evidence dating to since approximately 3,000 BP and documented in historical accounts of the seventeenth century.

Historical documentation provides some information on the populations which lived in northern Ontario during the seventeenth century. The extensive mobility of these populations reflects a different sense of territoriality than the settled agricultural or even itinerant horticultural groups living to the south and data is often insufficient to accurately map the ranges of individual groups. The study area is located within the City of Sault Ste. Marie. The *sault* (“rapids”) on the St. Mary’s River is noted to have been occupied by the *Saulteaux* Ojibwe as well as the Odawa in the latter part of the seventeenth century (Feest and Feest 1978; Rogers 1978). The location is called *Bawating* in Anishnaabeg (ASI 2011).

The *Saulteaux* are understood to have been primarily settled at Bawating (Rogers 1978:Fig. 1), which would have been an important portage for any traffic between Lake Superior and Lake Huron as well as an important fishing ground for many groups in the upper Great Lakes. The *Saulteaux* practised some horticulture, however, these crops only complimented their diet as the climate did not always permit crops to ripen. Between the planting and harvest times, populations travelled throughout the Lake Huron northshore to take advantage of seasonal resources. During the summer and winter the *Saulteaux* gathered birch bark for canoe and lodge construction; during the autumn harvested blueberries and sturgeon for winter stores. Garden crops were harvested in late summer and in early winter people hunted beaver and moose along the Lake Huron north shore. The *Saulteaux* are known to have practised *Midewiwin*. Following the dispersal of the Huron at about 1650, the Ojibwe Nations began to be attacked by the Five Nations Iroquois. By approximately 1670 the *Saulteaux* had experienced significant population losses and united with other groups (Rogers 1978:760-763).

The Odawa were an Algonquian Nation who occupied Bruce County, Grey County and Manitoulin Island, and consisted of several groups. The Odawa subsisted primarily from fishing but also practiced horticulture and were extensively involved in trade. They were known to co-reside with Iroquoian populations (Thwaites 1896-1901, 21: 125). By the mid-seventeenth century, the Indigenous Nations occupying southern Ontario had largely been dispersed by the Five Nations Iroquois who sought to monopolize the beaver hunt. The Odawa moved throughout what are now the States of Michigan and Wisconsin until one of the Odawa groups, the *Kiskakon*, came to settle at Bawating in 1670/1671. In 1676 the *Kiskakon* moved subsequently to the Saint Ignace Mission at Mackinac (Feest and Feest 1978:772-773).

Information on Ojibwe lifeways along the north shore of Lake Huron during the eighteenth century into the early nineteenth century is limited. Some horticulture was still practised and hunting was focused on deer and fur-bearing quarry such as raccoon, beaver and marten. At Bawating, the whitefish fishery was of particular importance, as well as the collection of maple sugar during the spring. As the nineteenth century progressed, agriculture became more important to Ojibwe economy, however, traditional produce such as wild rice, maple sugar and fishing remained important. Despite the maintenance of many



traditional lifeways, throughout the nineteenth century pressure from Euro-Canadian culture affected many aspects of First Nations culture (Rogers 1978:762-765).

The Métis have been present in the Sault Ste. Marie area as early as the 1600's, particularly since the establishment of the first mission (Prefontaine 2003; Leffler 2006). The Métis typically settled in close proximity to rivers, “occupying strips of land perpendicular to and along the river” (Lytwyn 1998:1). This was the settlement pattern at Sault Ste. Marie in 1846 when Vidal surveyed the area, documenting each household and including a list of the head of each household. These included prominent Métis including Joseph Boissoneau, Joseph Boissoneau Jr., and Charles Oakes Ermatinger, a fur trader who had built the Old Stone House. At the time of the survey, amongst the 500 population of Sault Ste. Marie, Vidal specifically noted that there were Métis living near the mission (Osborne and Swainson 1986:22). Prior to 1846, the Métis community was documented to be comprised of one household in 1761 owned by Jean Baptiste Cadotte and 80 buildings in 1826 (Prefontaine 2003). In 1845, the Métis community was described as having a population of 250 people and 50 houses (Lytwyn 1998:1).

The Métis played an integral part in the fur trade taking place in the area during the seventeenth century at the mission which also operated as a trading post. They would continue to thrive later during the eighteenth and nineteenth century with the establishment of the Northwest Company, XY Company and the Hudson's Bay Company. Amongst other jobs held by the Métis, perhaps the most important was that of the “Coureur des Bois” – people who were responsible for transporting the furs to the French traders (Prefontaine 2003; Leffler 2006). In addition to the fur trade, the Métis were heavily involved in hunting and fishing, evident by their involvement in the finishing industry that developed during the nineteenth century. Processing maple sugar and cultivating/harvesting crops were also important to the Métis way of life (Lytwyn 1998).

In 1850, the Robinson-Huron Treaty was signed by the Ojibwe ceding the vast majority of land in northern Ontario for resource extraction and settlement. 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 (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 Shingwaukose from Garden River. However, regardless of the Crown's treatment of the Métis, the Ojibwe continued to regard the Métis as having the same rights as them (Lytwyn 1998; Prefontaine 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). The Robinson Treaty remains a contentious document.

1.2.2 Historic Euro-Canadian Land Use: Township Survey and Settlement

The study area is historically located in the Former Townships of Ste. Marie and Tarentorus, District of Algoma in part of Sec 31-33 and part of Lots 1-6, Concession 4.

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 which 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 m 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-travelled river routes. All of these occupations occurred at sites that afforded both natural landfalls for Great Lakes traffic 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).

Algoma District

The 1850 Robinson Treaty opened up the surrounding land for European settler occupation, moving the Aboriginal population onto reserves. Subsequent government jurisdiction and infrastructure expanded in the district, allowing for an increase in settler population (SCCM). The initial survey of the Algoma District commenced in the 1850s after negotiations had been concluded with the Indigenous peoples of the area to surrender the land north of Lakes Huron and Superior (Gentilcore and Head 1983:106). The area was surveyed using the United States section survey method, resulting in townships that were 36 miles square, which were further divided into sections of one square mile each. At the time of its initial survey, the Algoma District was relatively isolated since rail lines and roads had yet to be established. In 1869 the District was temporarily divided into the West (First) and East (Second) Algoma Districts. These were reorganized in 1871 into, once again, the Algoma District with the creation of the District of Thunder Bay (Ministry of Government and Consumer Services [MGCS] 2011). The Canadian Pacific Railway reached the Algoma District in 1883, which opened the area to settlement and the establishment of the logging industry (Andreae 1997). The eastern part of the Algoma District was reorganized into the Sudbury District in 1907 and by 1912 the modern boundaries of the Sudbury District had been determined (MGCS 2011).

Tarentorus and Ste. Marie Townships

Originally a Jesuit mission, the settlement of Ste. Marie became a fur trade post in the eighteenth century under French control and in turn came under control of the North West Company in 1788 (SCCM). The settlement continued as an unviable economic fur trade post, eventually falling under control of the Hudson's Bay Company (SCCM).

The Township of St. Mary was first surveyed and subdivided in 1859 by Provincial Land Surveyor A. P. Salter (ASI 2011). The township consisted of five sections, each approximately 856 acres. The township also consisted of approximately 3,330 acres of land designated as Park Lots. Tarentorus Township, as surveyed in 1859 by the Crown Lands Department, had an area of 13,988 acres. The name of the Township is rooted in Mohawk, meaning "tree splitter" (ASI 2011; Rayburn 1997:337). Salter divided these lands into sections and quarters whereby each quarter had an area of 160 acres. According to Salter, "with the exception of the northerly and north-easterly sections of Tarentorus, the whole township is fit



for settlement” and that “a serious drawback to the settlement will ... be found in the scarcity of timber, a very considerable portion of it having been overrun by fire, and in some sections the surface soil has been completely burned off, being of a peaty nature. This is to be regretted, as the soil is generally of good character, and affords a good opening to intending settlers” ([author unknown] 1864:425; ASI 2011).

By the 1870s, Ste. Marie was settled by several people and a few roads had been constructed. Records show that The Great Northern Road was constructed in phases throughout the decade and that by 1879 it had reached as far north as 5th Line. The town was made more accessible when two rail lines, the Canadian Pacific and the Grand Trunk, were both extended from Sudbury to the Sault in order to accommodate trade with the United States in the 1870s and 1880s. This overland link provided much needed accessibility that allowed for an expansion of industry, natural resources extraction, and tourism (SSMPL). In 1887, concessions 1, 2 and 3 of Park Lots as well as sections 3, 4, 6, 9 and 10 were annexed to the Village of Ste. Marie to form the new Town of Sault Ste. Marie. In 1902, the remainder of the Township, concession 4 of Park Lots, joined the new municipality of the Township of Tarentorus (ASI 2011).

1.2.3 Historic Map Review

To best use historic mapping to reconstruct/predict the location of former features within the modern landscape, maps are reviewed using geographic information systems (GIS). Using reference points which are likely to have remained constant through time, such as unimproved road intersections or Concession Lot vertices, these maps are georeferenced in order to project the most accurate location of former map features. There are numerous potential sources of error inherent in this process. These include idealism in the original map production, map scale, image resolution and reproduction accuracy. The significance of such potential error is often mitigated, however, through critical analysis of the sources in comparison with other map sources as well as the property inspection results.

It should be noted, also, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

There is little detailed nineteenth century mapping for the Township of St. Mary or Tarentorus. Figure 2 illustrates the subject property on the 1859 Township of St. Mary Plan after the area had been surveyed for occupation. There are no features indicating habitation on the plan, although it does indicate the study area is within the town limits. Figure 3 illustrates the subject property on the mapping attached to the sale of lots within Putorah Tract which was published in 1892, the present eastern-most portion of the City of Sault Ste. Marie. While no structures were illustrated on this map, several historic transportation routes are illustrated within the subject property, including present-day North Street, Wilson Street, Pine Street, Great Northern Road, and Willow Avenue. Figure 4 illustrates the subject property on the 1902 Tarentorus Township mapping, which was published as part of the separation process from the Municipality of Sault Ste. Marie. This map illustrates eight structures within the study area along present-day Northern Avenue.

1.2.4 Summary of Historical Context

The background research demonstrated that the study area has been occupied by Indigenous peoples for millennia. The study area is situated within the traditional territory of the Saulteaux Ojibwe and was also settled by the Métis. The study area is located within the historic settlement of Ste. Mary which was a focus of early Euro-Canadian settlement and activity. The historic mapping indicates that the study area is located in proximity to historic features, including the St. Mary's River and early transportation routes and structures.

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within 50 m of the study area, its environmental characteristics (including quaternary geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research in the study area; the site record forms for registered sites housed at the MTCS; published and unpublished documentary sources; and the files of ASI.

1.3.1 Previous Archaeological Research

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTCS. 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 km east to west, and approximately 18.5 km 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 *Cdlb*.

According to the OASD, one previously registered archaeological site is located within one kilometre of the study area (MTCS 2016). Details of this site is provided in Table 1.

Table 1: Registered archaeological sites within 1 km of the study area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
Cdlb-6	Soo College	Late Archaic (1600 BC)	findspot	Conway 1981

ASI (2011) completed the *Master Plan of Archaeological Resources for the City of Sault Ste. Marie*. The objective of this management plan was the preparation of a planning study which identifies, analyses, and establishes priorities concerning archaeological sites located within the boundaries of the City. The goals of the research included the compilation of inventories of registered and unregistered archaeological sites and of lands that no longer have archaeological integrity due to previous development activity; the preparation of an overview of the settlement history of the City, as it may be expected to pertain to archaeological resources; and, the development of an archaeological site potential model based on known site locations, past and present land uses, and environmental and cultural-historical data. According to the archaeological potential model prepared for the management plan, the study area retains potential in some areas, however many areas do not retain potential because of disturbances caused by construction of the Northern Avenue ROW and intensive urban development.

According to the background research, three previous archaeological assessments (ASI 2010a, 2011, and 2013) have been completed within 50 m of the study area. These reports are summarized below.



ASI (2010) conducted a Stage 1 archaeological assessment for the proposed Pine Street Extension in the City of Sault Ste. Marie on Lot 32 in the former Township of Tarentorus, Algoma District. The Stage 1 background assessment determined that one site had been registered within one kilometer of the subject property and the property inspection confirmed that the study corridor had been previously disturbed or contained lands that can be characterized as being low and wet, and therefore does not retain archaeological potential.

ASI (2011) completed *The Master Plan of Archaeological Resources for the City of Sault Ste. Marie* which was developed over a period of three years by ASI culminating in the *Archaeological Potential Model for the City of Sault Ste. Marie, Technical Report and Planning for the Conservation of Archaeological Resources in the City of Sault Ste. Marie* (ASI 2011). Preparation of the *Master Plan* included the compilation of inventories of registered and unregistered archaeological sites within the City and the preparation of an overview of the area's settlement history as it may be expected to pertain to archaeological resources; the development of an archaeological site potential model based on known site locations, past and present land uses, and environmental and cultural-historical data as well as a review of the current federal, provincial, and municipal planning and management guidelines for archaeological resources, culminating in the identification of a new recommended management strategy for known and potential archaeological resources within Sault Ste. Marie. The results of the *Potential Model for the City of Sault Ste. Marie* (ASI 2011) identified approximately 51% of the overall area of the municipality as lands having the potential for the recovery of archaeological resources, which was mapped on detailed GIS mapping, while the recommendations of the Technical and Planning manuals include the process of implementation of the *Master Plan*, improved municipal heritage protocols and as well as ongoing public and Aboriginal consultation.

ASI (2013) conducted a Stage 1&2 archaeological resource assessment of the proposed six parcels of land scheduled for development within the campus lands of Sault College, 443 Northern Avenue, Part of Park Lot 4, Concession 4, St. Mary's Township and Part of Section 32, Tarentorus Township, County of Algoma under the project direction of Blake Williams (P383). The Stage 1 background assessment determined that one site had been registered within proximity to the subject property, and that the study area exhibited potential for the presence of pre-contact Aboriginal and Euro-Canadian archaeological resources due to the proximity of a historic transportation route, the proximity of a registered pre-contact site and the location of the subject property being above the Post-Algonquin recessional beach. The Stage 2 field assessment identified disturbed and highly altered lands, in addition to low lying wet areas, all of which required no further assessment. The balance of the subject property was subject to test pitting at five metre intervals. Approximately half of these lands were disturbed and no archaeological resources were encountered. No further archaeological assessment of the property was recommended.

1.3.2 Geography

In addition to the known archaeological sites and historic features, the state of the natural environment is an important indicator of archaeological potential. Accordingly, a description of the study area geography, physiography and soils is provided below.

The S & G, Section 1.3.1, 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 BP (Karrow and Warner 1990: Figure 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.

The S & G, Section 1.3.1, lists other geographic characteristics that can indicate archaeological potential including: elevated topography (eskers, drumlins, large knolls, 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. Physical indicators of use may be present, 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.

The study area consists of glaciolacustrine and lacustrine deep water deposits, consisting of silt clay and sand, as well as till derived from the Jacobsville Formation (ASI 2011) (Figure 6).

The study area is situated within the Post-Algonquin Terraces physiographic region near the Sheguiandah recessional beach (Figure 7). This series of recessional beaches are the oldest beaches within Sault Ste. Marie. The Post-Algonquin Terrace was formed through the formation and eventual withdrawal of Glacial Lake Algonquin, around about 10,400BP. The sand and gravel shores of the lake gradually became the higher and better drained lands as the St. Mary's River formed and began to drain the area into the Lake Superior and Lake Huron basins. Approximately one thousand years later, the draining of glacial Lake Agassiz flooded the St. Mary's passage, draining into Glacial Lake Minong and Houghton (present-day Lake Huron). Multiple water courses flow through the terrace, draining this high sitting terrace down to the present-day St. Mary's River, which is approximately 120 km long and connects Lake Superior to Lake Huron. The St. Mary's River was designated as a Canadian Heritage River in 2000 (Canadian Heritage River Systems 2011).

1.3.3 Current Land Use and Field Conditions

A Stage 1 property inspection conducted on May 3 and 4 2016 noted the study area is within the downtown core of the City of Sault Ste. Marie and is surrounded by commercial and residential land development. The Northern Avenue ROW is a multi-lane road and carries utilities and public infrastructure within the city. The eastern portion of the study area is located within forested greenspace and wetland.

1.3.4 Summary of Archaeological Context

The review of archaeological work conducted in the area demonstrated that one previously registered archaeological site is located within one kilometre of the study area. Historic mapping indicates that the study area is located in proximity to historic transportation routes and within the historic settlement of Ste Marie. The study area is also located near a significant Post-Algonquin recessional beach. These criteria



are indicative that the study area exhibits potential for Indigenous and Euro-Canadian archaeological resources, depending on soil conditions and the degree to which soils have been subject to deep disturbance.

2.0 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 by Peter Carruthers (P163) on May 3-4 2016, 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 visual inspection only and did not include excavation or collection of archaeological resources.

Weather conditions for the inspection were sunny to overcast with temperatures between approximately 7 and 10 C. Previously identified features of archaeological potential were examined; additional features of archaeological potential not visible on mapping were identified and documented as well as any features that will affect assessment strategies. Field observations are compiled onto maps of the study area in Section 7.0 (Figure 8 and 9) and associated photographic plates are presented in Section 8.0 (Plates 1-18).

3.0 ANALYSIS AND CONCLUSIONS

The historical and archaeological contexts were analyzed to help determine the archaeological potential of the study area. A summary of the archaeological potential is presented in Section 3.1 of this report.

3.1 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:

- Water source: primary, secondary, or past water source (St. Marys River)
- Proximity to previously registered archaeological site (Soo College Site (CdIb-6))
- Proximity to early historical transportation routes (St. Marys River; Northern Avenue)
- Proximity to early settlements (Bawating; Sault Ste. Marie)



These criteria are indicative of potential for the identification of Indigenous and Euro-Canadian archaeological resources within the study area, depending on the soil conditions and the degree to which soils have been subject to disturbance. One previously registered archaeological site is located within one kilometer of the study area.

As the proposed impacts of the Northern Avenue Corridor project are not designed to depart the existing Northern Avenue ROW until east of Pine Street, there is little to no concern that archaeological resources or lands with archaeological potential will be impacted by the project in that area. The two alternative alignments for the Northern Avenue extension have not been previously developed and may retain archaeological potential, as indicated by the property inspection and the Sault Ste. Marie master plan of archaeological resources.

3.2 Analysis of Property Inspection Results

The property inspection determined that the Northern Avenue ROW from North Street to Great Northern Road, the proposed access/egress to the P-Patch, as well as the intersection of Pine Street and Pleasant Drive, have been subject to deep and extensive land disturbance, and these lands are considered to not retain archaeological potential (Plates 1, 2, 4-6; Figures 8 and 9: areas marked in yellow).

However, a section of residential housing frontage on the south side of the Northern Avenue ROW between Great Northern Road and Willow Avenue is considered to exhibit archaeological potential based on the presence of mature trees, which indicate that the frontages have not been subject to deep and extensive disturbance. If work impacts lands outside of the existing ROW these properties will require Stage 2 archaeological assessment by test-pit survey at five metre intervals, prior to any proposed disturbance to the properties (Plate 3; Figure 9: areas marked in green).

Both alternative alignments of the Northern Avenue ROW extension to Black Road contain areas that are considered to exhibit archaeological potential: the southern alignment west of Lake Street, and the northern alignment near Pawating Place. All of these lands require Stage 2 archaeological assessment by test-pit survey at five metre intervals prior to any proposed disturbance to the property. The remainder of these alignments consist of low and wet conditions east to Black Road and are considered to not exhibit archaeological potential.

3.3 Conclusions

The Stage 1 background study determined that one previously registered archaeological site is located within one kilometre of the study area. A review of the geography and history of the study area suggested that it has potential for the identification of Indigenous and Euro-Canadian archaeological resources, depending on the condition of soils.

The property inspection determined that most of the study area has been subject to deep and extensive land disturbance or exhibits low and wet conditions. These lands are considered to not retain archaeological potential. Parts of the study area, however, are considered to exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test-pit survey at five metre intervals, prior to any proposed disturbance to the property.



4.0 RECOMMENDATIONS

In light of these results, ASI makes the following recommendations:

1. Parts of the Northern Avenue Corridor study area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test-pit survey at five metre intervals, prior to any proposed impacts to the property;
2. The remainder of the study area does not retain archaeological potential on account of deep and extensive land disturbance, and low and wet conditions. These lands do not exhibit archaeological potential and therefore do not require further archaeological assessment;
3. Should the proposed work extend beyond the current study area then further Stage 1 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 Cultural Programs Unit of the MTCS should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI advises compliance with the following legislation:

- This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c. 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 fieldwork and report recommendations ensure the conservation, protection and preservation 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 MTCS a letter will be issued by the ministry stating that there are no further concerns with regard 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 fieldwork 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 human remains must notify the police or coroner; and,

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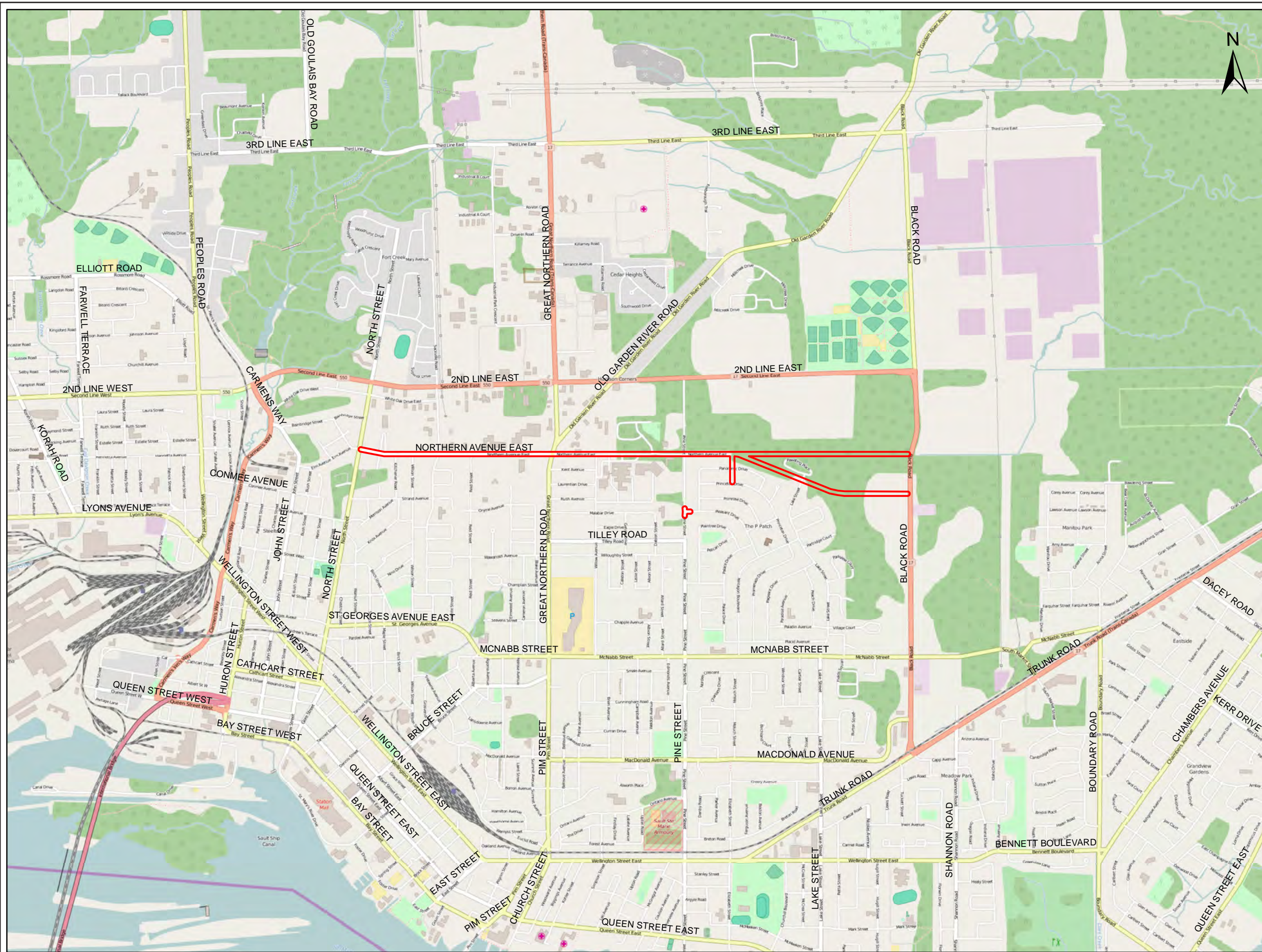
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1864 *Sessional Papers Volume II: Second Session of the Eighth Parliament of the Province of Canada*. Quebec: Hunter, Rose and Lemieux



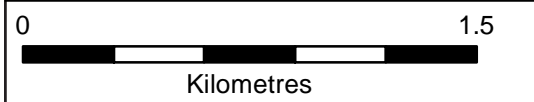
7.0 MAPS





 Study Area

BASE: (c) OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)

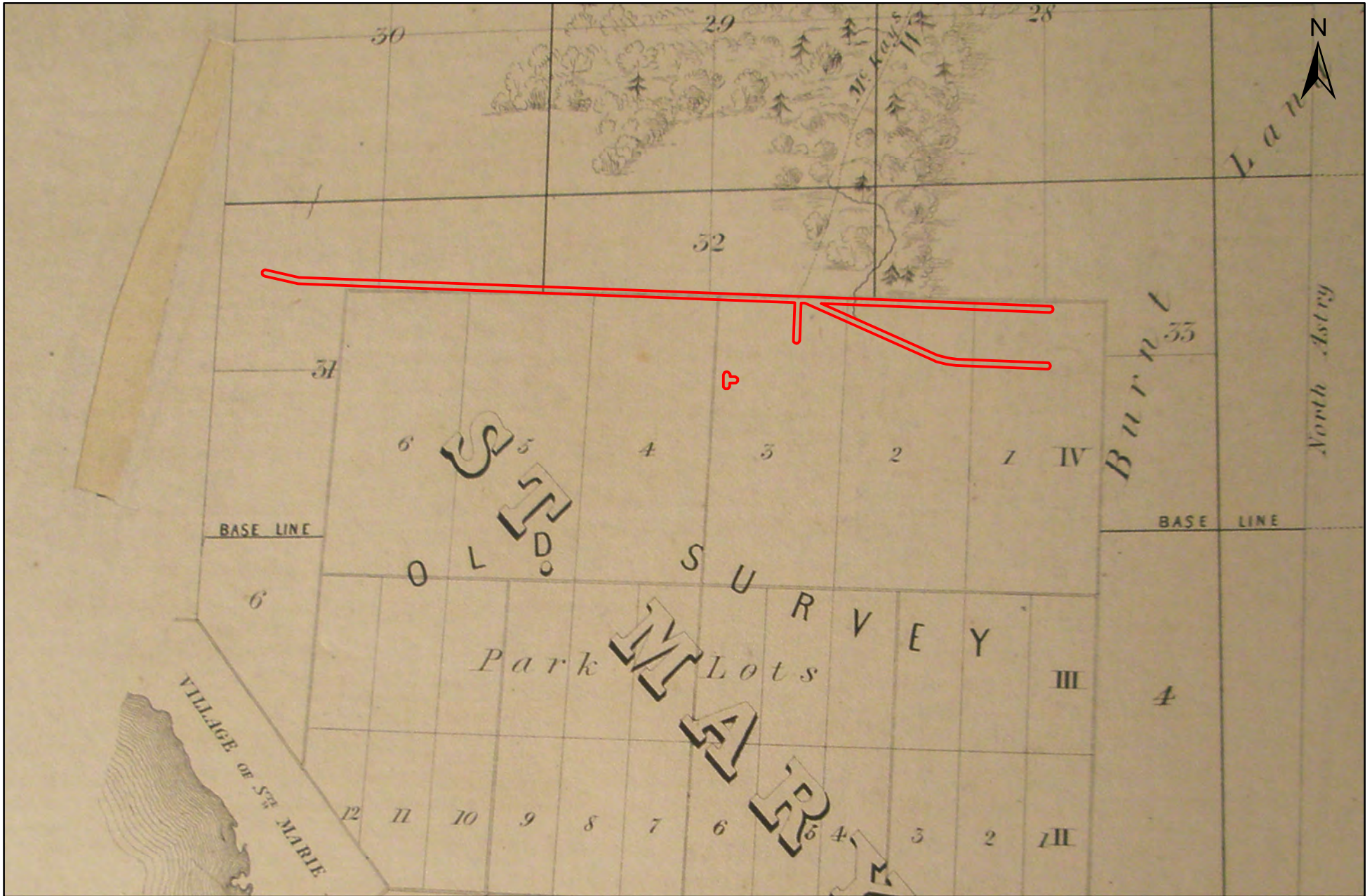


ASI PROJECT NO.: 16EA-035
DATE: 6/30/2016
DRAWN BY: JF
FILE: 16EA035_fig1



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Figure 1: Northern Avenue Corridor - Study Area Location





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Study Area

Base:
 1859 Twonship od Sault Ste Marie

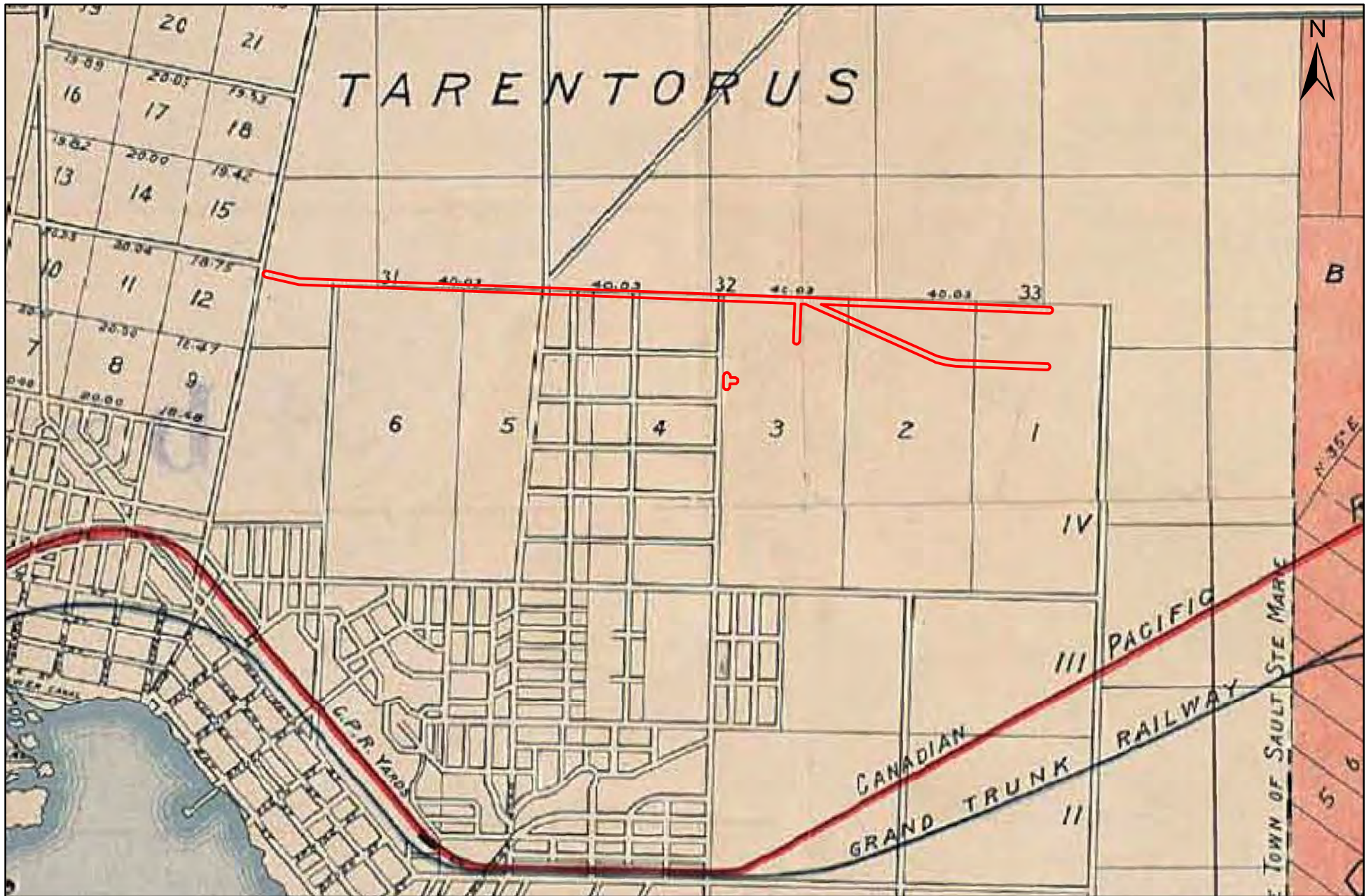
0 1.25



Kilometres

ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 7/6/2016 FILE: 16EA035_fig2_hist1859_v2

Figure 2: Northern Avenue Corridor Study Area (approximate location) overlaid on the 1859 Township of St. Mary Plan





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 Study Area

Base:
Map of Purtoerah 1892

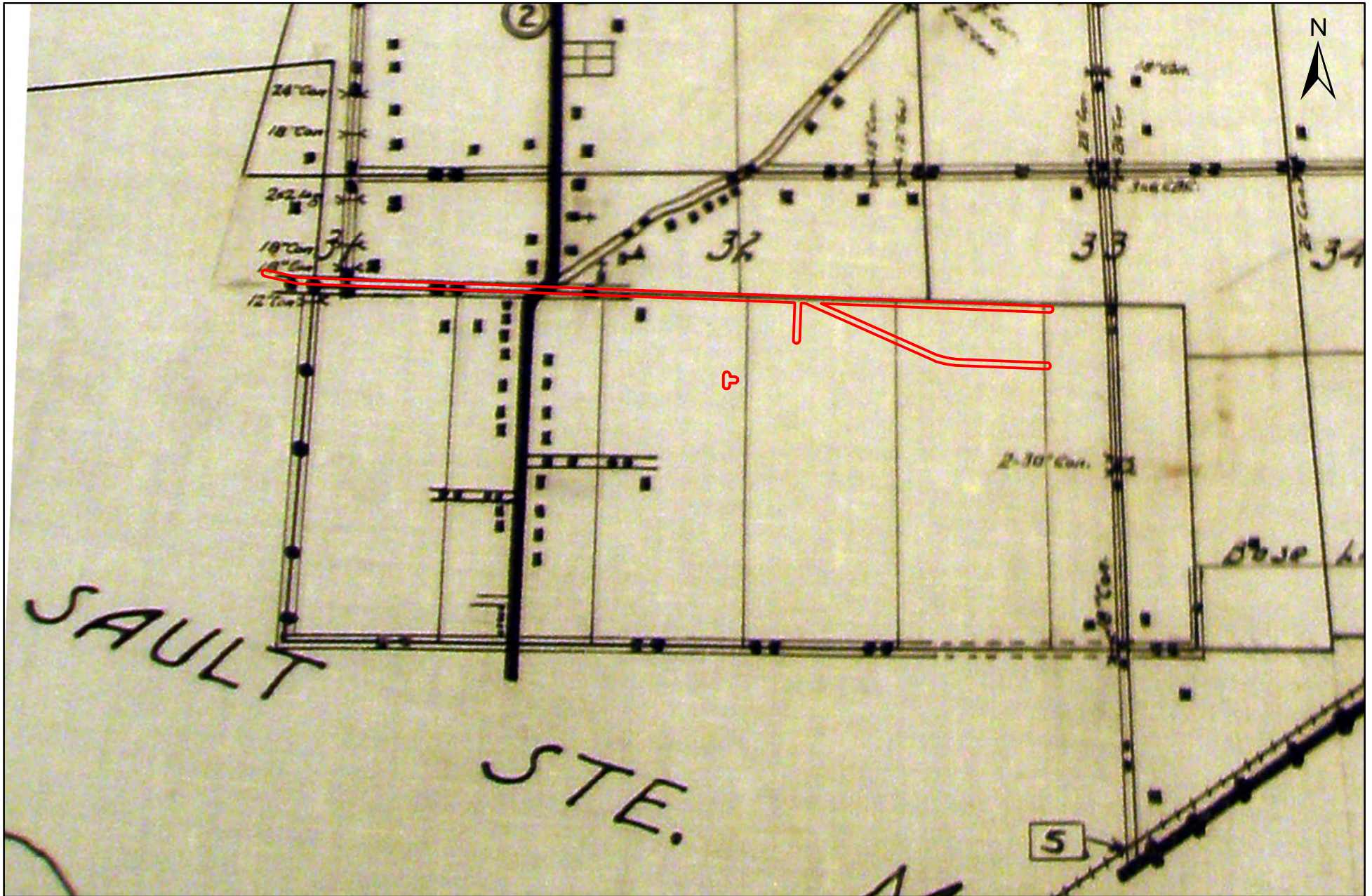
0 1.25



Kilometres

ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 6/30/2016 FILE: 16EA035_fig3_hist1892

Figure 3: Northern Avenue Corridor Study Area (approximate location) overlaid on the 1892 Map of Purtoerah Township





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Study Area

Base:
 20th Map of Tarentorus

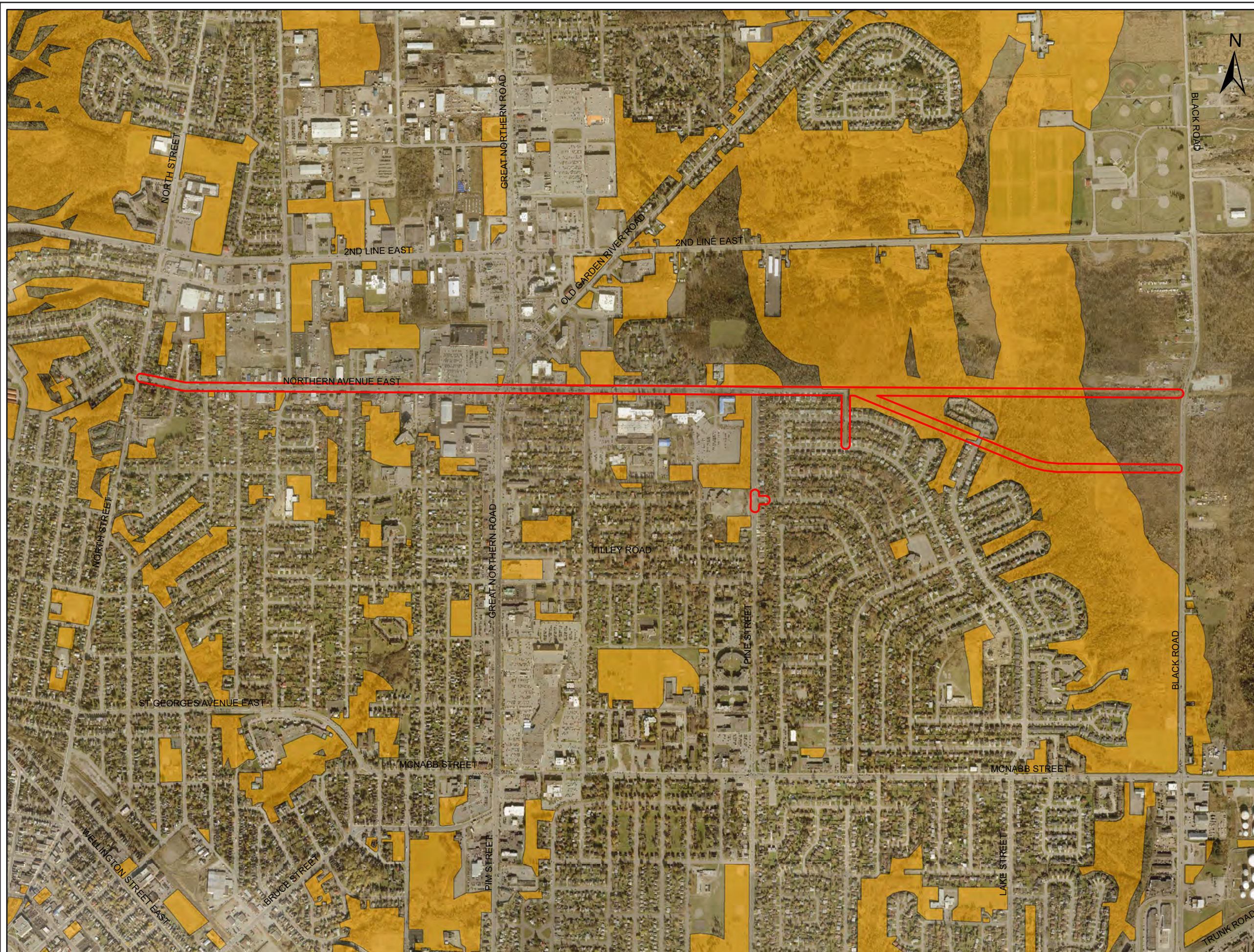
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Kilometres

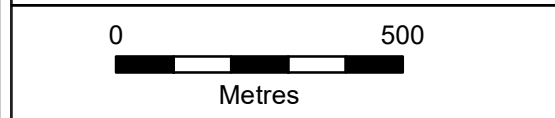
ASI PROJECT NO.: 16EA-035	DRAWN BY: JF
DATE: 6/30/2016	FILE: 16EA035_fig4_hist1902

Figure 4: Northern Avenue Corridor Study Area (approximate location) overlaid on the 1902 Map of Tarentorus Township



- Study Area
- Area of Archaeological Potential

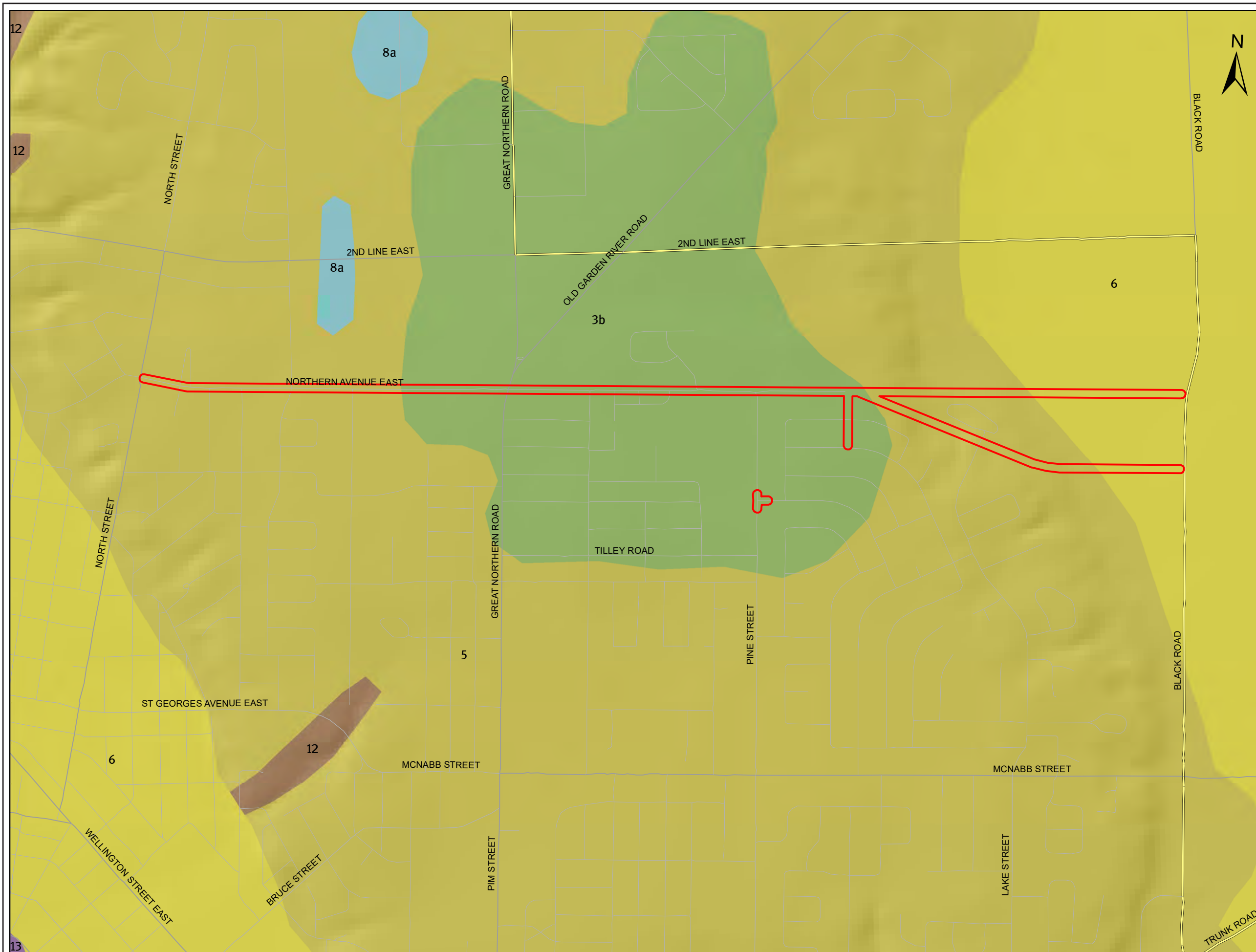
BASE:
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ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 7/4/2016 FILE: 16EA035_Fig5_ArchPoten

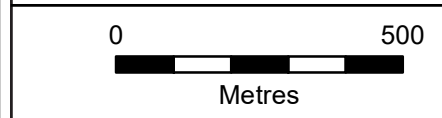
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Figure 5: Northern Avenue Corridor – Sault Ste. Marie Archaeological Potential Model



- Study Area
- 13: Man-made deposits
- 12: Modern alluvium
- 8a: Glaciolacustrine and lacustrine beach deposits
- 6: Glaciolacustrine and lacustrine shallow water deposits
- 5: Glaciolacustrine and lacustrine deep water deposits
- 3b: Till derived from Jacobsville Formation

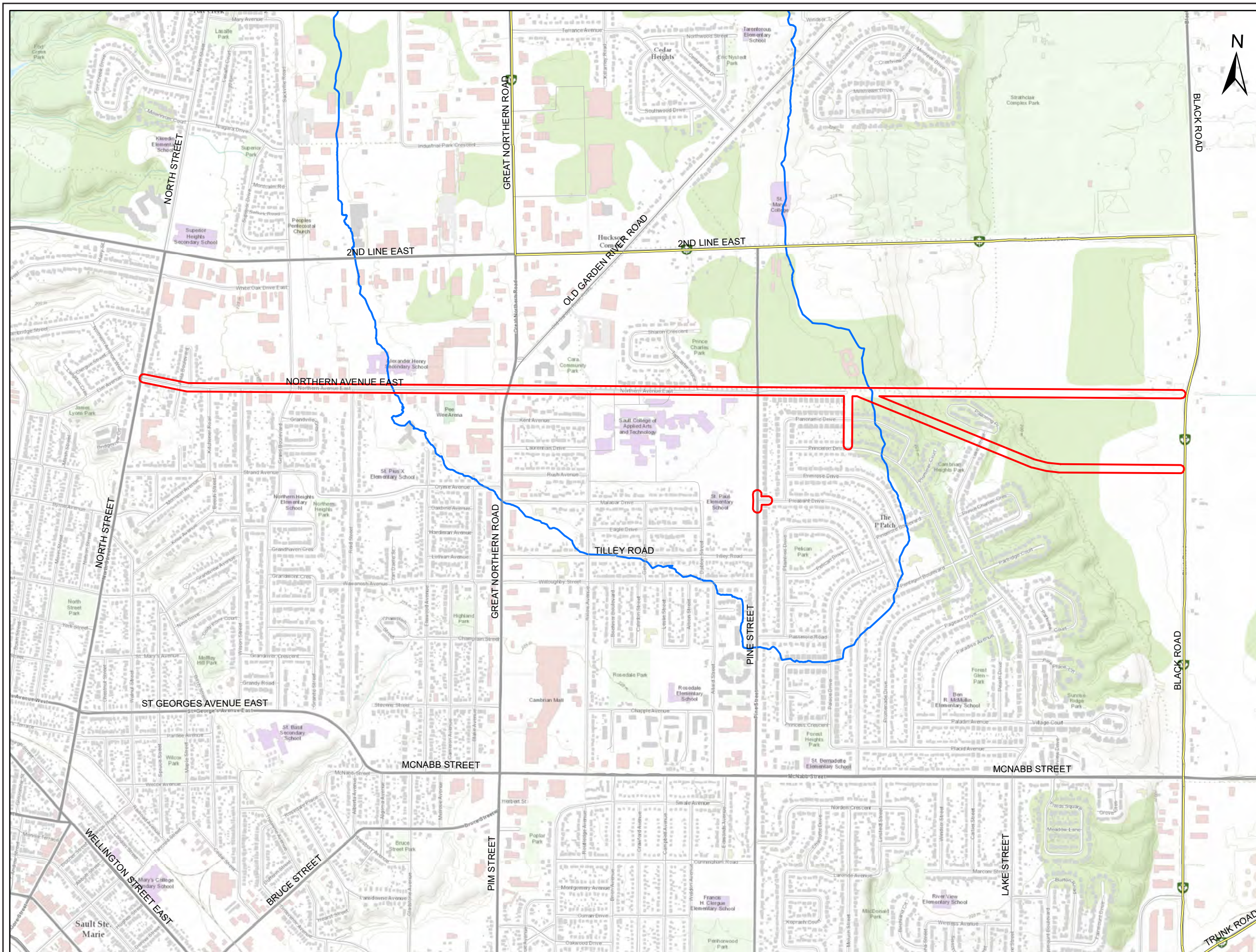
BASE:
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ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 7/4/2016 FILE: 16EA035_Fig6_quaternary

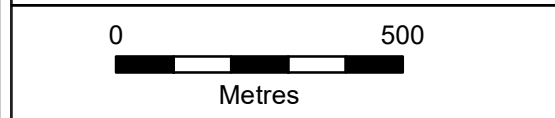
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Figure 6: Northern Avenue Corridor – Quaternary Geology



Study Area
Algonquin and post-Algonquin beach
— Paleo-beach - Sheguiandah

BASE:
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ASI PROJECT NO.: 16EA-035
 DATE: 7/4/2016
 DRAWN BY: JF
 FILE: 16EA035_Fig7_paleobeach


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Figure 7: Northern Avenue Corridor – Proximity of the Sheguiandah (Post-Algonquin) recessional beach to the study area




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 Study Area
 Photo Location and Direction

Stage 1 Assessment
 Archaeological Potential

 No Potential - Disturbed
 No Potential - Low & wet

BASE:
 Ortho
 2008


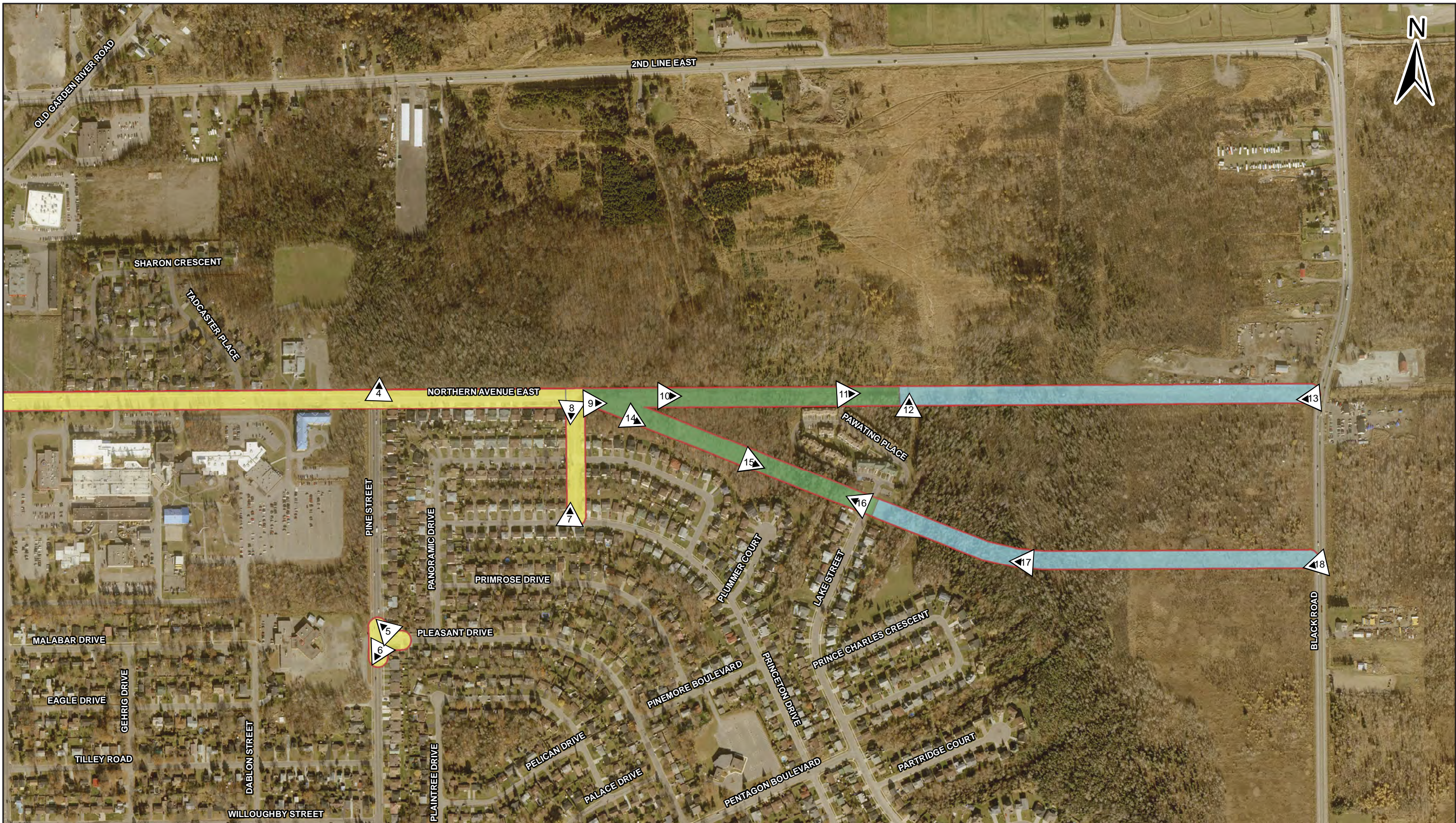


0  250
Metres
 ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 7/5/2016 FILE: 16EA035_fig8_stage1_S1


Figure 8: Northern Avenue Corridor – Property Inspection Results



Path: X:\2016 Projects\EA\16EA-035 Northern Ave Corridor\View\16EA035_Results.mxd




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 Study Area
 Photo Location and Direction

Stage 1 Assessment
 Archaeological Potential

 No Potential - Disturbed
 No Potential - Low & wet

BASE:
 Ortho
 2008


0  250
Metres
 ASI PROJECT NO.: 16EA-035 DRAWN BY: JF
 DATE: 7/6/2016 FILE: 16EA035_fig9_stage1_S2

Figure 9: Northern Avenue Corridor – Property Inspection Results

8.0 IMAGES



Plate 1: East view of Northern Avenue Corridor south side near North St.; area is disturbed with no archaeological potential.



Plate 2: East view of Northern Avenue Corridor, north side near Sackville St.; area is disturbed with no archaeological potential.



Plate 3: Southeast view of Northern Avenue Corridor between Great Northern Rd. and Willow Ave.; Housing frontage exhibits archaeological potential and requires Stage 2 test-pit survey



Plate 4: East view of Northern Avenue Corridor near Pine St.; area low and wet with no archaeological potential.



Plate 5: Northwest view of Pine St. at Pleasant Dr. area is disturbed with no archaeological potential.



Plate 6: Southwest view of Pine St. at Pleasant Dr. area is disturbed with no archaeological potential.



Plate 7: North view of proposed Princeton Dr. to Northern Ave ROW; area is disturbed with no archaeological potential



Plate 8: South view of proposed Princeton Dr. to Northern Ave ROW; area is disturbed with no archaeological potential



Plate 9: East view of existing terminus of Northern Ave.; areas beside trail exhibits archaeological potential and requires Stage 2 test-pit survey.



Plate 10: East view of ROW extension northern alternative from high ground; area exhibits archaeological potential and requires Stage 2 test-pit survey. Note that the study area descends into low and wet and poorly drained area in the background.



Plate 11: East view of ROW extension northern alternative; higher ground in immediate foreground area exhibits archaeological potential and requires Stage 2 test-pit survey. Background, following hydro corridor is low and wet with no potential.



Plate 12: North view of ROW extension northern alternative near Pawating Pl.; area low and wet woods with no archaeological potential.



Plate 13: West view from Black Rd. of ROW extension northern alternative; area low and wet and disturbed with construction of drainage ditch; no archaeological potential.



Plate 14: Southeast view of ROW extension southern alternative; area exhibits archaeological potential and requires Stage 2 test-pit survey



Plate 15: Southeast view of ROW extension southern alternative; area between housing and trail exhibits archaeological potential and requires Stage 2 test-pit survey



Plate 16: Northwest view of ROW extension northern alternative; wooded area exhibits archaeological potential and requires Stage 2 test-pit survey



Plate 17: West view of ROW extension southern alternative crosses creek and existing trail; area low and wet with no archaeological potential.



Plate 18: West view from Black Rd. of ROW extension northern alternative; area low and wet with no archaeological potential.

APPENDIX 5
EVALUATION MATRIX AND RATIONALE

OPPORTUNITY A: LANE REASSIGNMENT

<p>A1 NO LANE REASSIGNMENT (DO NOTHING)</p>	<p>A2 FULL LANE REASSIGNMENT (NORTH ST. TO PINE ST.)</p>	<p>A3 LANE REASSIGNMENT IN SELECT LOCATIONS</p>
--	---	--

1.0 TECHNICAL CRITERIA

1.1 VEHICULAR TRAFFIC FLOW

<ul style="list-style-type: none"> No change to vehicular traffic along the Northern Avenue corridor. 	<ul style="list-style-type: none"> Not expected to impact the overall flow of traffic based on the observed volume. Will maintain efficient access to adjacent properties. Transit vehicles with frequent stops may affect traffic flow during peak hours. Special considerations (i.e. maintain existing configurations) may be required at intersections to ensure efficient intersection operations. 	<ul style="list-style-type: none"> Inconsistent lane configurations block to block may cause confusion. May cause conflict areas at transitions (i.e. four to three lanes). Will maintain efficient access to adjacent properties. Transit vehicles with frequent stops may affect traffic flow during peak hours. Special considerations (i.e. maintain existing configurations) may be required at intersections to ensure efficient intersection operations.
1	2	3

1.2 PEDESTRIAN AND CYCLING TRAFFIC FLOW

<ul style="list-style-type: none"> Existing conditions are maintained. 	<ul style="list-style-type: none"> No change to pedestrian facilities. Provides designated cycling lanes, improving cycling traffic facilities. Provides an opportunity to improve “road efficiency” with respect to mode share and safety along the corridor. 	<ul style="list-style-type: none"> No change to pedestrian facilities. Provides intermittent cycling facilities Fractured cycling facilities may discourage use and cause traffic confusion.
3	1	2

1.3 IMPLEMENTATION

<ul style="list-style-type: none"> No changes to existing conditions. 	<ul style="list-style-type: none"> No physical modifications required – line painting only. Includes the reduction of Northern Avenue from four to three lanes with a continuous turn lane between North Street and Pine Street. Includes a designated bike lane along the north and south sides 	<ul style="list-style-type: none"> No physical modifications required – line painting only. Includes the reduction of from four to three lanes with a continuous turn lane between North Street and Pine Street in select locations only. A designated bike lane may be included in select locations
--	---	---

OPPORTUNITY A: LANE REASSIGNMENT

A1 NO LANE REASSIGNMENT (DO NOTHING)	A2 FULL LANE REASSIGNMENT (NORTH ST. TO PINE ST.)	A3 LANE REASSIGNMENT IN SELECT LOCATIONS
--	--	--

1	of the Northern Avenue corridor. 2	along the north and south sides of the Northern Avenue corridor. 2
---	---	--

2.0 ENVIRONMENTAL CRITERIA

2.1 IMPACTS TO THE NATURAL ENVIRONMENT

<ul style="list-style-type: none"> No change to impacts. 	<ul style="list-style-type: none"> No construction required other than line painting. Possible positive impacts due to encouraging mode shift away from automobiles. 	<ul style="list-style-type: none"> No construction required other than line painting. Possible positive impacts due to encouraging mode shift away from automobiles; although not as great as A2.
2	1	2

3.0 SOCIAL CRITERIA

3.1 IMPACTS ON LAND USERS, RESIDENTS AND OWNERS

<ul style="list-style-type: none"> This alternative, if implemented, is expected to have negligible impacts on users and land owners. 	<ul style="list-style-type: none"> Decreases vehicle travel lanes for pedestrians to cross (i.e. increases safety). Improves safety by increasing distance between cyclists and vehicles. May help to maintain speed limit compliance (i.e. speed controlled by lead vehicle). Having a designated bike lane provides a greater buffer between cyclists/ pedestrians along the sidewalk, making the corridor more inviting to some users. 	<ul style="list-style-type: none"> Decreases vehicle travel lanes for pedestrians to cross (i.e. increases safety) in areas selected for lane reassignment. Improves safety by increasing distance between cyclists and vehicles in areas with designated bike lane. May increase safety concerns along the corridor as vehicles traveling along the corridor may increase speed in an attempt to avoid bottlenecks at areas of lane reassignment.
2	1	3

OPPORTUNITY A: LANE REASSIGNMENT		
A1 NO LANE REASSIGNMENT (DO NOTHING)	A2 FULL LANE REASSIGNMENT (NORTH ST. TO PINE ST.)	A3 LANE REASSIGNMENT IN SELECT LOCATIONS

3.2 IMPACTS ON GREATER COMMUNITY		
<ul style="list-style-type: none"> This alternative, if implemented, is expected to have negligible impacts on the greater community. 	<ul style="list-style-type: none"> Positive impacts to the greater community are expected through the encouragement of active lifestyles and the diversification of transportation modes. 	<ul style="list-style-type: none"> Positive impacts to the greater community are expected through the encouragement of active lifestyles and the diversification of transportation modes. Potential for fractured and inconsistent lane arrangements may discourage use.
2	1	2

4.0 ECONOMIC CRITERIA		
4.1 COST OF IMPLEMENTATION		
<ul style="list-style-type: none"> The cost of implementing this alternative includes the continued costs related to the maintenance and operation of Northern Avenue as it is now. These costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> The cost of implementing this alternative is expected to include line painting for a designated bike lane and to reassign vehicle travel lanes. 	<ul style="list-style-type: none"> The cost of implementation of this alternative is expected to include line painting for a designated bike lane and to reassign vehicle travel lanes.
1	2	2
TOTAL	10	16
	(Lowest Score Is Preferred)	

OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE

B1 NO EXTENSION OF NORTHERN AVENUE (DO NOTHING)	B2 EXTEND EASTERLY TO BLACK ROAD	B3 EXTEND SOUTHEASTERLY TO LAKE STREET	B4 EXTEND SOUTHEASTERLY TO BLACK ROAD
---	-------------------------------------	---	--

1.0 TECHNICAL CRITERIA

1.1 VEHICULAR TRAFFIC FLOW

<ul style="list-style-type: none"> No effect on vehicular traffic along the Northern Avenue corridor. 	<ul style="list-style-type: none"> May result in increased traffic flow, countering the opportunity of a possible lane reassignment. Potential for reduction in traffic along Second Line. Provides an additional east-west route. May exacerbate traffic/intersection capacity issues along Great Northern Road. 	<ul style="list-style-type: none"> May result in increased traffic flow, countering the opportunity of a possible lane reassignment. Traffic expected to increase along Lake Street. May exacerbate traffic/intersection capacity issues along Great Northern Road. 	<ul style="list-style-type: none"> May result in increased traffic flow, countering the opportunity of a possible lane reassignment. May exacerbate traffic/intersection capacity issues along Great Northern Road. Potential for reduction in traffic along Second Line. Provides an additional east-west route.
1	2	3	2

1.2 PEDESTRIAN AND CYCLING TRAFFIC FLOW

<ul style="list-style-type: none"> Existing pedestrian and cycling traffic flow paths are not changed. 	<ul style="list-style-type: none"> Provides an opportunity to construct additional pedestrian/cycling facilities. 	<ul style="list-style-type: none"> Provides an opportunity to construct additional pedestrian/cycling facilities. 	<ul style="list-style-type: none"> Provides an opportunity to construct additional pedestrian/cycling facilities. Provides access to the Hub Trail.
2	1	2	1

1.3 IMPLEMENTATION OF THE ALTERNATIVES

<ul style="list-style-type: none"> With the implementation of this alternative, there would be no supplementary opportunities to upgrade underground or aerial infrastructure. 	<ul style="list-style-type: none"> Is expected to provide significant opportunities to install new infrastructure along the approximate 1200 meters of new road. 	<ul style="list-style-type: none"> Implementation of this alternative is expected to provide opportunities to install new infrastructure along the approximate 520 meters of new road. 	<ul style="list-style-type: none"> Is expected to provide significant opportunities to install new infrastructure along the approximate 1250 meters of new road. May be possible to eliminate Upper Lake Pump Station and enhance the City's water distribution network.
3	1	2	1

OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE

B1 NO EXTENSION OF NORTHERN AVENUE (DO NOTHING)	B2 EXTEND EASTERLY TO BLACK ROAD	B3 EXTEND SOUTHEASTERLY TO LAKE STREET	B4 EXTEND SOUTHEASTERLY TO BLACK ROAD
--	-------------------------------------	--	---

1.3 IMPLEMENTATION

<ul style="list-style-type: none"> The implementation of the “Do Nothing” alternative is relatively simple when compared on a technical basis to the other alternatives. 	<ul style="list-style-type: none"> Includes the construction of Northern Avenue along undeveloped land to intersect with Black Road. Includes the construction of pedestrian and/or cycling facilities along the extended corridor. Involves the construction of a new intersection at Black Road. 	<ul style="list-style-type: none"> Includes the construction of Northern Avenue along undeveloped land to intersect with Lake Street. Includes the construction of pedestrian and/or cycling facilities along the extended corridor. Involves the construction of a new intersection at Lake Street. 	<ul style="list-style-type: none"> Includes the construction of Northern Avenue along undeveloped land to intersect with Black Road. Includes the construction of pedestrian and/or cycling facilities along the extended corridor. Involves the construction of a new intersection at Black Road.
1	3	2	3

2.0 ENVIRONMENTAL CRITERIA

2.1 IMPACTS TO THE NATURAL ENVIRONMENT

<ul style="list-style-type: none"> Impacts to the natural environment attributable to selecting this alternative over one of the others would be negligible. 	<ul style="list-style-type: none"> Minimal loss of trees and wooded area due to the existing cleared utility corridor. Silt and sediment contamination of storm water runoff during construction are expected to be mitigated through standard construction procedures. 	<ul style="list-style-type: none"> Environmental impact due to loss of trees and wooded area. Silt and sediment contamination of storm water runoff during construction are expected to be mitigated through standard construction procedures. 	<ul style="list-style-type: none"> Environmental impact due to loss of trees and wooded area. Silt and sediment contamination of storm water runoff during construction are expected to be mitigated through standard construction procedures.
1	2	3	3

OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE

B1 NO EXTENSION OF NORTHERN AVENUE (DO NOTHING)	B2 EXTEND EASTERLY TO BLACK ROAD	B3 EXTEND SOUTHEASTERLY TO LAKE STREET	B4 EXTEND SOUTHEASTERLY TO BLACK ROAD
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3.0 SOCIAL CRITERIA

3.1 IMPACTS ON LAND USERS, RESIDENTS AND OWNERS

<ul style="list-style-type: none"> This alternative, if implemented, is expected to have negligible impacts on users and land owners. 	<ul style="list-style-type: none"> May negatively impact adjacent properties as a result of possible increase traffic volumes along Northern Avenue. 	<ul style="list-style-type: none"> May negatively impact adjacent properties as a result of possible increase traffic volumes along Northern Avenue and Lake Street. Better access to properties in the upper Lake area. 	<ul style="list-style-type: none"> May negatively impact adjacent properties as a result of possible increase traffic volumes along Northern Avenue. Alteration of green space may impact those using the Hub Trail. Better access to properties in the upper Lake area.
1	3	2	3

4.0 ECONOMIC CRITERIA

4.1 COST OF IMPLEMENTATION

<ul style="list-style-type: none"> The cost of implementing this alternative includes the continued costs related to the maintenance and operation of Northern Avenue as it is now. These costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Capital costs will include road construction through challenging topography, utility installation and construction of an intersection at Black Road. Property acquisition required for right-of-way. Expected maintenance costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Capital costs will include road construction through challenging topography, utility installation and construction of an intersection at Black Road. Property acquisition required for right-of-way. Expected maintenance costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Capital costs will include road construction through challenging topography, utility installation and construction of an intersection at Black Road. Property acquisition required for right-of-way. Costs include installation of sanitary sewer and decommissioning of Upper Lake Pump Station. Long term cost savings as a result of decommissioning Upper Lake pump station (i.e. maintenance/ operational costs).
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OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE

B1 NO EXTENSION OF NORTHERN AVENUE (DO NOTHING)	B2 EXTEND EASTERLY TO BLACK ROAD	B3 EXTEND SOUTHEASTERLY TO LAKE STREET	B4 EXTEND SOUTHEASTERLY TO BLACK ROAD
---	-------------------------------------	---	--

			<ul style="list-style-type: none"> Expected maintenance costs include snow removal, line painting, patching and resurfacing.
1	3	2	3

TOTAL	10 (Lowest Score Is Preferred)	15	16	16
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OPPORTUNITY C: P-PATCH ACCESS

C1 NO NEW ACCESS INTO P-PATCH (DO NOTHING)	C2 NEW ROAD TO PANORAMIC DRIVE	C3 NEW ROAD TO PRINCETON DRIVE	C4 INSTALL TRAFFIC LIGHTS AT PINE STREET/PLEASANT DRIVE
--	-----------------------------------	-----------------------------------	---

1.0 TECHNICAL CRITERIA

1.1 VEHICULAR TRAFFIC FLOW

<ul style="list-style-type: none"> The Pine Street/Pleasant Drive intersection will continue to function at its current capacity. 	<ul style="list-style-type: none"> North/west bound traffic in the vicinity of Panoramic Drive will likely be diverted to the new road. May reduce traffic at Pine Street/Pleasant Drive intersection. 	<ul style="list-style-type: none"> North/west bound traffic in the vicinity of Princeton Drive will likely be diverted to the new road. May reduce traffic at Pine Street/Pleasant Drive intersection. 	<ul style="list-style-type: none"> Traffic flow will be interrupted along Pine Street. May allow for shorter wait times for those vehicles traveling south from Pleasant Drive.
3	2	1	3

1.2 PEDESTRIAN AND CYCLING TRAFFIC FLOW

<ul style="list-style-type: none"> Existing pedestrian and cycling traffic flow paths are not changed. 	<ul style="list-style-type: none"> Existing pedestrian and cycling traffic flow paths are not expected to change. 	<ul style="list-style-type: none"> Existing pedestrian and cycling traffic flow paths are not expected to change. 	<ul style="list-style-type: none"> Existing pedestrian and cycling traffic flow paths are not expected to change. Wait time to cross Pine Street may be reduced.
3	2	2	1

1.3 IMPLEMENTATION

<ul style="list-style-type: none"> The implementation of the “Do Nothing” alternative is relatively simple when compared on a technical basis to the other alternatives. 	<ul style="list-style-type: none"> Includes the construction of a new road along an existing City owner right-of-way between Northern Avenue and Panoramic Drive. Includes construction of pedestrian/cycling facilities along the new road. 	<ul style="list-style-type: none"> Includes the construction of a new road along an existing City owner right-of-way between Northern Avenue and Princeton Drive. Includes construction of pedestrian/cycling facilities along the new road. 	<ul style="list-style-type: none"> Includes the installation of traffic lights at the Pine Street/ Pleasant Drive intersection.
1	2	2	3

OPPORTUNITY C: P-PATCH ACCESS

<p>C1 NO NEW ACCESS INTO P-PATCH (DO NOTHING)</p>	<p>C2 NEW ROAD TO PANORAMIC DRIVE</p>	<p>C3 NEW ROAD TO PRINCETON DRIVE</p>	<p>C4 INSTALL TRAFFIC LIGHTS AT PINE STREET/PLEASANT DRIVE</p>
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2.0 ENVIRONMENTAL CRITERIA

2.1 IMPACTS TO THE NATURAL ENVIRONMENT

<ul style="list-style-type: none"> • Impacts to the natural environment attributable to selecting this alternative over one of the others would be negligible. • Air quality impacts 	<ul style="list-style-type: none"> • Minimal impact on the natural environment due to existing clearing along the right-of-way. • Helps to maintain traffic movement, helping to alleviate negative air impacts. 	<ul style="list-style-type: none"> • Minimal impact on the natural environment due to existing clearing along the right-of-way. • Helps to maintain traffic movement, helping to alleviate negative air impacts. 	<ul style="list-style-type: none"> • Negligible impact on the natural environment due to the existing development. • Air quality impacts as a result of increased vehicle idle times at intersection.
1	2	2	3

3.0 SOCIAL CRITERIA

3.1 IMPACTS ON LAND USERS, RESIDENTS AND OWNERS

<ul style="list-style-type: none"> • This alternative, if implemented, would result in users/land owners using the existing limited access/egress locations to the P-Patch. 	<ul style="list-style-type: none"> • Enhanced access to the P-Patch. • May negatively impact neighbouring properties as it is anticipated that traffic will increase. 	<ul style="list-style-type: none"> • Enhanced access to the P-Patch. • May negatively impact neighbouring properties as it is anticipated that traffic will increase. 	<ul style="list-style-type: none"> • Improves safety for pedestrians/cyclists crossing Pine Street. • May help maintain speed limit compliance along Pine Street. • May increase travel times for those using Pine Street.
3	1	1	2

OPPORTUNITY C: P-PATCH ACCESS

C1 NO NEW ACCESS INTO P-PATCH (DO NOTHING)	C2 NEW ROAD TO PANORAMIC DRIVE	C3 NEW ROAD TO PRINCETON DRIVE	C4 INSTALL TRAFFIC LIGHTS AT PINE STREET/PLEASANT DRIVE
--	-----------------------------------	-----------------------------------	---

4.0 ECONOMIC CRITERIA

4.1 COST OF IMPLEMENTATION

<ul style="list-style-type: none"> The cost of implementing this alternative include the continued costs related to the maintenance and operation of the current Pine Street/Pleasant Drive intersection. These costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Costs will include road construction through the existing right-of-way between Northern Avenue and Panoramic Drive. Expected maintenance costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Costs will include road construction through the existing right-of-way between Northern Avenue and Princeton Drive. Expected maintenance costs include snow removal, line painting, patching and resurfacing. 	<ul style="list-style-type: none"> Costs will include those associated with the installation of traffic lights as well as improvements to the Pine Street/Pleasant Drive intersection. Ongoing costs for operation and maintenance at signalized intersection.
1	2	2	3

TOTAL

12	11	10	15
(Lowest Score Is Preferred)			

APPENDIX 6
JUNE 22, 2016 PUBLIC INFORMATION CENTRE

The Sault Star
June 11, 2016



CITY INFORMATION

The Corporation of the City of Sault Ste. Marie

Watch City Council live on Shaw TV Cable 10 and Local2.ca
Council info available at saultstemarie.ca/CityCouncil

NOTICE OF PUBLIC INFORMATION CENTRE MUNICIPAL ENVIRONMENTAL ASSESSMENT Northern Avenue Corridor Improvements

The City of Sault Ste. Marie (City) is initiating a study to investigate alternatives to improve the efficiency of the Northern Avenue Corridor.

It has been identified as part of the City's 2015 Transportation Master Plan that Northern Avenue is a candidate for potential lane reassignment and/or elimination between North Street and Pine Street and that an extension of Northern Avenue to Black Road may help to improve road network connectivity as well as reduce the traffic demands on Second Line. In conjunction with these potential improvements, the City has also identified the opportunity to integrate improvements to the access/egress of the P-Patch subdivision.

The study is being undertaken as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment ("Class EA"). The study will include public and external agency consultation as well as review the need and justification for possible improvements to the existing corridor. The study will also evaluate alternative designs based on their potential impacts on the natural, social and economic environments. Preceding any decisions recommending or accepting a preferred alternative, interested party will have the opportunity to review the study findings and provide input and comments into the evaluation.

Public Information Centre

To present the recommended solution, further facilitate input and ensure that anyone interested in this Study has the opportunity to get involved, the City is holding a come-and-go Public Information Centre as follows:

Wednesday, June 22, 2016 – 3 to 7 p.m.

Russ Ramsay Board Room – Level 3, Civic Centre, 99 Foster Drive

All members of the public are welcome to attend. City staff and Consultants will be available to discuss the project.

Please contact one of the following project team members if you would like to be included on the project mailing list, have any questions or wish to obtain more information on the project:

City of Sault Ste. Marie: Don Elliott, P. Eng., Director of Engineering
99 Foster Drive, Sault Ste. Marie, ON
705-759-5329 or d.elliott@cityssm.on.ca

Kresin Engineering Corp.: Michael Kresin, P. Eng, Consulting Engineer
536 Fourth Line East, Sault Ste. Marie, ON
705-949-4900 or northernave@kresinengineering.ca

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

This notice published on June 11 and 18, 2016.

705-759-2500 • saultstemarie.ca • [@CitySSM](https://www.facebook.com/CitySSM)

The Sault Star
June 18, 2016



CITY INFORMATION

The Corporation of the City of Sault Ste. Marie

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NOTICE OF PUBLIC INFORMATION CENTRE MUNICIPAL ENVIRONMENTAL ASSESSMENT Northern Avenue Corridor Improvements

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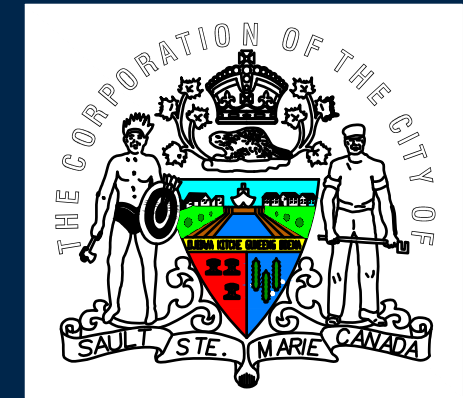
Kresin Engineering Corp.: Michael Kresin, P. Eng., Consulting Engineer
536 Fourth Line East, Sault Ste. Marie, ON
705-949-4900 or northernave@kresinengineering.ca

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

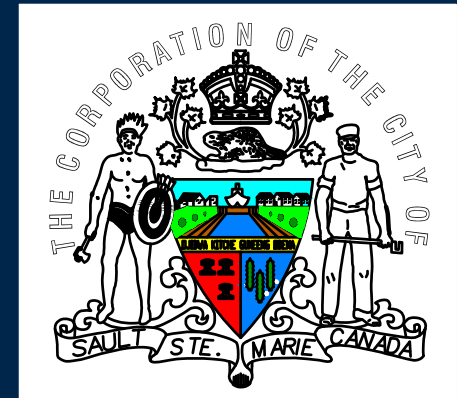
This notice published on June 11 and 18, 2016.

Appendix 6a
Information Presented

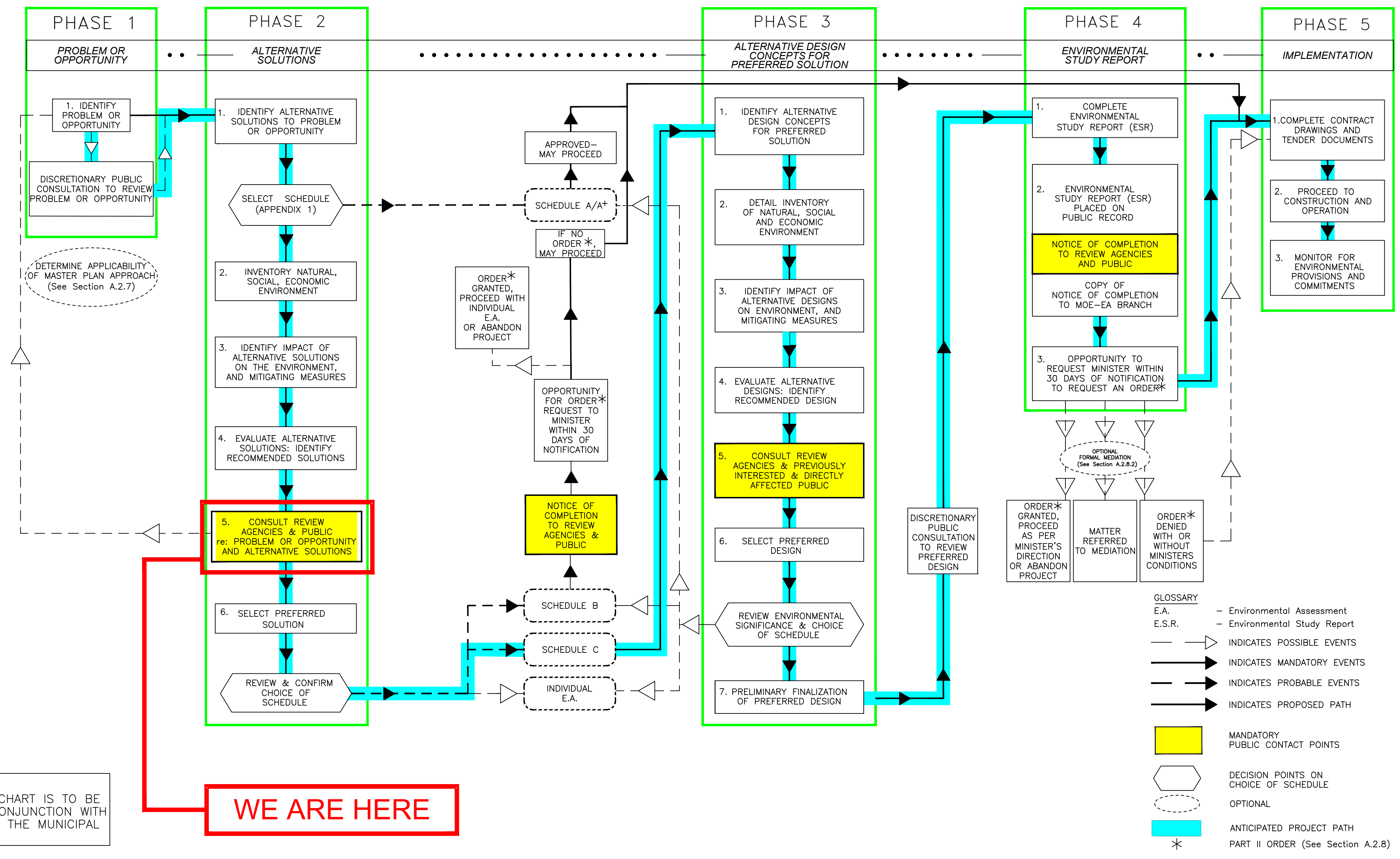
WHY IS THIS PROJECT BEING UNDERTAKEN?



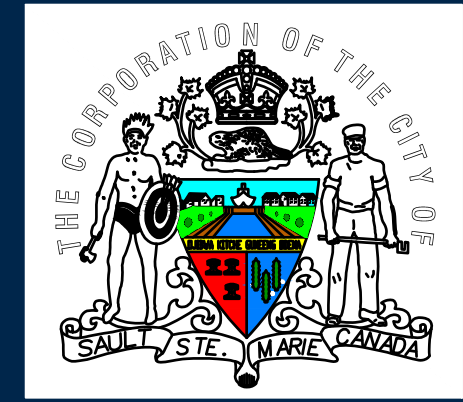
- The purpose of this study is to investigate alternatives to improve the efficiency of the Northern Avenue corridor.
- The opportunity for Northern Avenue to undergo a possible lane reassignment and/or elimination as well as a possible extension to Black Road was presented in the City of Sault Ste. Marie's Transportation Master Plan, completed in 2015.
- The City has also identified the opportunity to possibly incorporate improvements to the access/egress of the P-Patch subdivision.
- Upon completion of the EA process, the City will have a preferred design which can be implemented as required and when funding is available.



MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS



OPPORTUNITY STATEMENT



Vehicular travel patterns throughout Sault Ste. Marie have shifted over the years as a result of development in the north end of the City. Improving the efficiency of the Northern Avenue corridor is one of the recommendations of the recently completed Transportation Master Plan meant to help accommodate this shift.

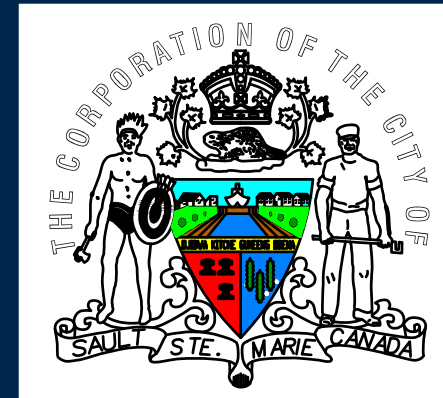
Potential improvements noted in the Transportation Master Plan include:

- Opportunity A: Lane reassignment or elimination along the Northern Avenue Corridor
- Opportunity B: Extension of Northern Avenue to Black Road

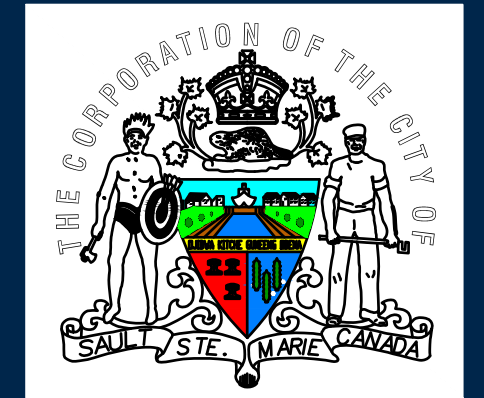
In conjunction with these possible improvements, the City has also identified:

- Opportunity C: Improvements to the access/egress of the P- Patch subdivision

STUDY AREA



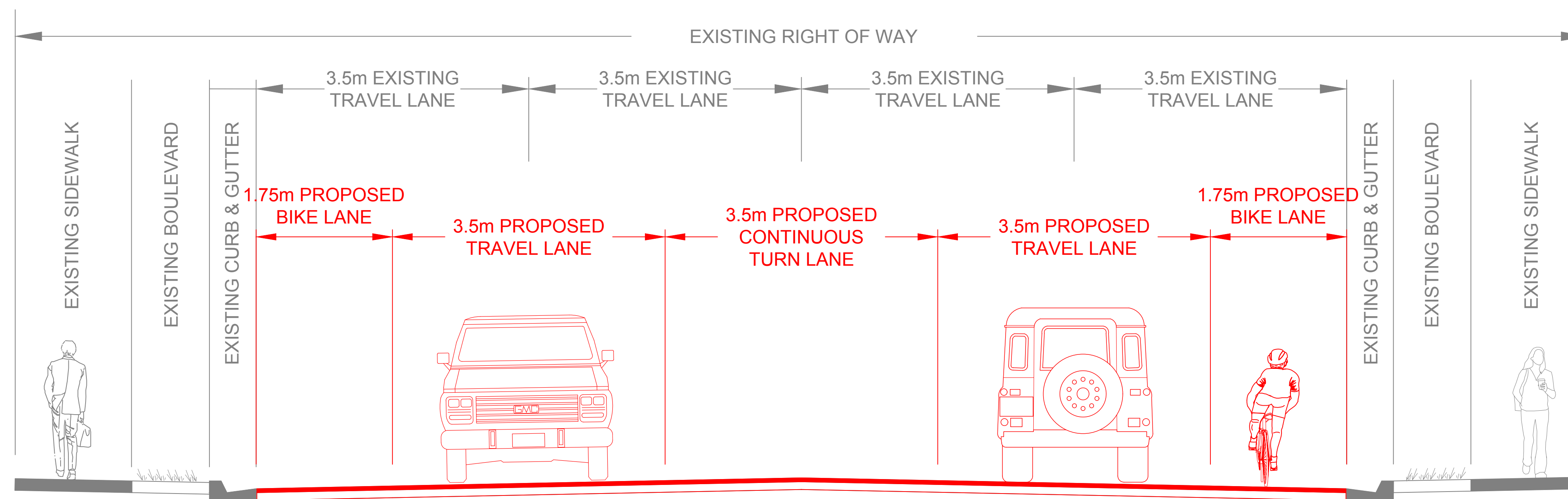
OPPORTUNITY A: LANE REASSIGNMENT



ALTERNATIVE SOLUTIONS

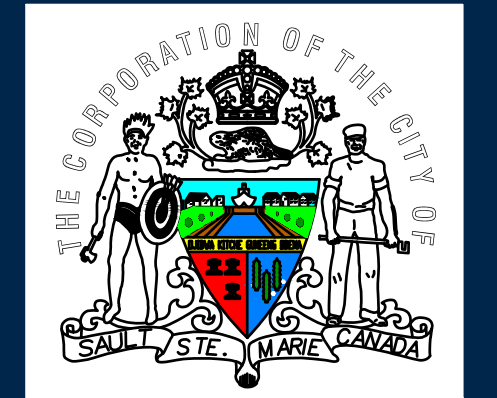
- A1: No Lane Reassignment
- A2: Full Length Lane Reassignment (North Street to Pine Street)
- A3: Lane Reassignment in Select Locations

- Current traffic volumes support a lane reassignment.
- Special considerations may be required at intersections (i.e. Great Northern Road, Willow Ave).

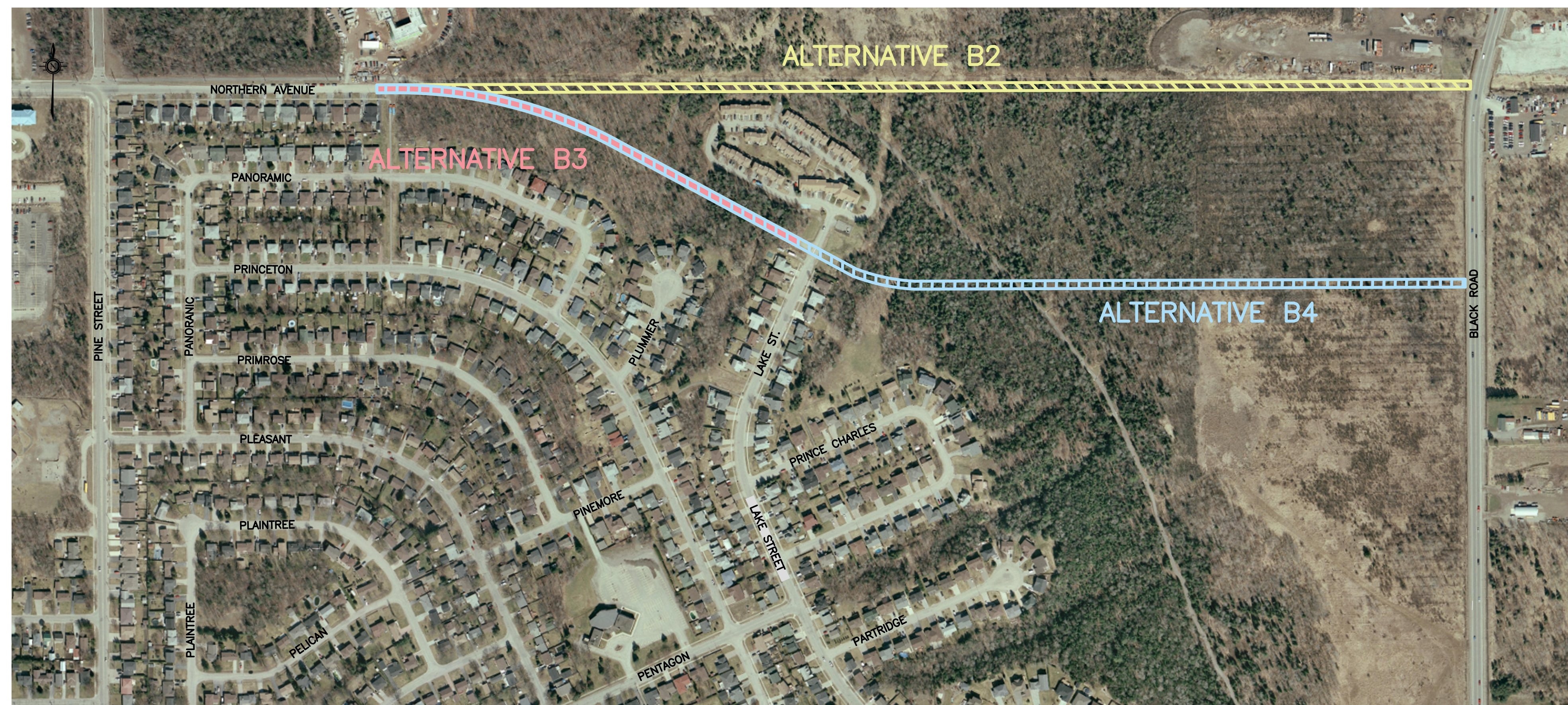


CROSS SECTION: GREY IS EXISTING, RED IS PROPOSED

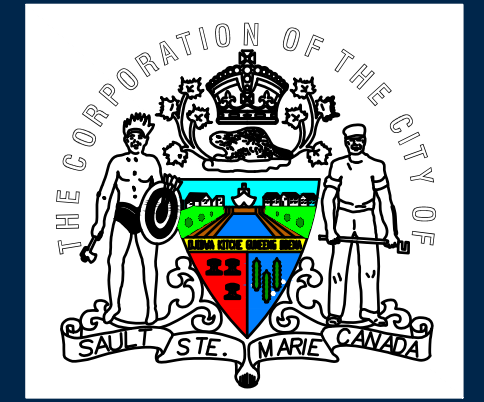
OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE



- Alternative B1: No extension of Northern Avenue
- Alternative B2: Extend easterly to connect to Black Road
- Alternative B3: Extend southeasterly to connect to Lake Street
- Alternative B4: Extend southeasterly to connect to Black Road



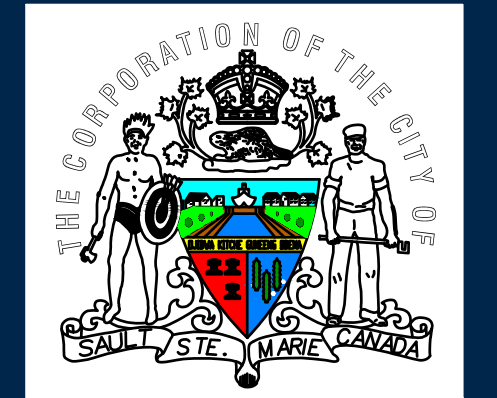
OPPORTUNITY B: EXTENSION OF NORTHERN AVENUE



- Alternative B1: No extension of Northern Avenue
- Alternative B2: Extend easterly to connect to Black Road
- Alternative B3: Extend southeasterly to connect to Lake Street
- Alternative B4: Extend southeasterly to connect to Black Road

- An extension of Northern Avenue counters the opportunity of a possible lane reassignment as an extension will likely result in increased traffic along the corridor.
- Previous assessments have noted that an extension of Northern Avenue (to Black Road or Lake Street) could exacerbate traffic capacity issues along Great Northern Road by directing traffic to an area of concern (Great Northern Road between Northern Avenue and Second Line).
- An extension may severely impact intersection capacity at the Great Northern Road/Northern Avenue intersection.
- Extending Northern Avenue may negatively impact adjacent properties.
- An extension of Northern Avenue through challenging topography is anticipated to result in high construction costs.
- An extension of Northern Avenue to Lake Street or southeasterly to Black Road (via Lake Street) would allow for better access to properties in the upper Lake Street area, however, traffic will likely increase on Lake Street.
- Extending Northern Avenue southeasterly to Black Road would potentially provide an opportunity for the removal of the existing Upper Lake Street Sewage Pump Station via diversion to the trunk sewer east of Black Road.

OPPORTUNITY C: P-PATCH ACCESS



Alternative C1: No new access into the P-Patch

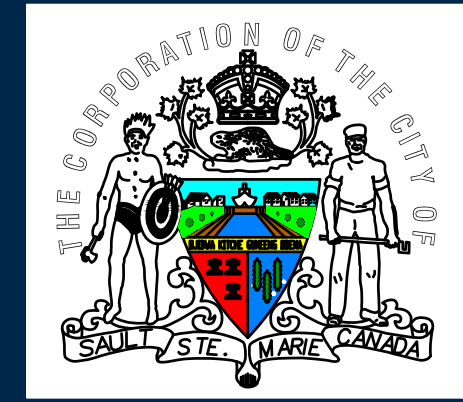
Alternative C2: New road to Panoramic Drive

Alternative C3: New Road to Princeton Drive

Alternative C4: Install traffic lights at Pine Street/Pleasant Drive intersection



OPPORTUNITY C: P-PATCH ACCESS



Alternative C1: No new access into the P-Patch

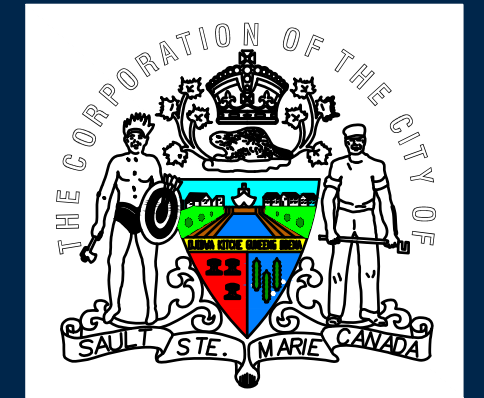
Alternative C2: New road to Panoramic Drive

Alternative C3: New Road to Princeton Drive

Alternative C4: Install traffic lights at Pine Street/Pleasant Drive intersection

- Construction of a new road (to Panoramic Drive or to Princeton Drive) will allow enhanced access/egress to the P-Patch.
- There is an existing city owned right-of-way between Northern Avenue and Princeton Drive.
- Potential negative impacts of a new road are anticipated for neighboring properties as traffic will increase.
- Previous studies have concluded that traffic lights or an all-way stop is not warranted at the intersection of Pine Street and Pleasant Drive as the intersection operates with acceptable volume to capacity ratios and levels of service for all approaches.

RECOMMENDED SOLUTION



Based on evaluation of the identified Alternative Solutions, the following Recommended Solution is proposed.

Alternative A2 Implement Northern Avenue lane reassignment between North Street and Pine Street:

- Reduce from four lanes to three lanes with a continuous centre turn lane
- Designate bike lane along north and south sides of corridor where possible
- Existing pedestrian sidewalks and boulevards to remain

Alternative B1 No extension of Northern Avenue to Lake Street or Black Road

Alternative C3 Construct access/egress to the P-Patch subdivision:

- Construct a new two-lane road from the existing east termination of Northern Avenue south to Princeton Drive

Appendix 6b
Attendance List

Appendix 6c
Comments Received

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I am pleased that the current recommendations concerning an extension from Northern Ave. to Black Rd. do not extend. I appreciate the engineers reasoning, but I'd add that it would be problematic for the following reasons: 1. Not convinced that it would reduce bottlenecks at 2nd Line & St. Northern Rd. 2. P-Patch residents and other Sault residents would be greatly opposed to it. 3. Since no need and not desired/unpopular then does not make sense to fund with tax payer funds.

I understand that some of my neighbours would be displeased with connections via a road through Princeton and Panoramic to Northern Ave; however, I believe that it is necessary in order to alleviate bottlenecks at Pine & Pleasant (Not-so-Pleasant). I say this through an objective lens, and admit that I would not favour the possibility of increased traffic on my street.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) C. Denton Middaugh
Address 177 Princeton Dr.
Phone No. _____

Please leave the completed form with the project team or deliver/email to:

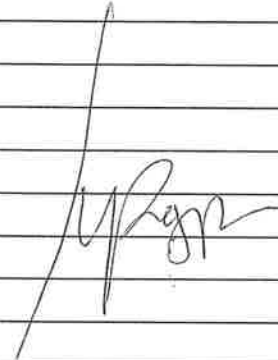
Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

① Traffic east from Northern Rd cross Pine, and turning right from Pine St travels at great speed. With increased traffic onto Northern Ave, this section will be very dangerous because of traffic speed to pedestrians. also increased noise to residents.

② Increase traffic into P-patch will destroy roads and neighbour hood, making a very nice area to walk into a hazard.



Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Dr William Kaupp

Address 1016 Pine St

Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)

I/We have reviewed the project material and have the following comments:

OK = no extension Northern to ~~the~~ Black-Yeah!

OK = new exit @ north end of P Patch to Northern

Please fix the light on McNabb @ Pentagon.

-it should only turn red for McNabb traffic
IF @ (L+) turn from Pentagon OR McNabb
or pedestrian But NOT for Rt turn
from Pentagon to McNabb

if this light is removed or fixed, then im OK
with light on Pine @ Pleasant.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Janice Knapp

Address 54 Jean Ave.

Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

- Minimize the damage to the Hurl Trail
- Bike lanes on Northern - ^{is} "fantastic" improve
- ment to cycling
- light on Pine makes sense -
- Connection to Black Road or Lake
Street - would take up too
much green space - interfere with
bike traffic
- minimize damage to Sault College
forest -
- access at Pine Hinton - would
be up to local residents - would
seek to minimize damage to bike
& natural areas

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Chuck Miller
Address 46 Nolich St, SSM P6B 3A8
Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

Please forward me Pdf documents of proposals
for review.

CHRIS KELLY:

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) _____
Address _____
Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

① REALLY LIKE THE REDUCTION TO 3 LANES
ON NORTHER AVENUE TO THE ADDITION
OF BIKE

② ALSO PREFER OPTION C3

③ YES TO B-1

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) PETER O ANNE McLARTY
Address 755 FIFTH LINE
Phone No. 1507170

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

Opportunity A - Fully support lane reassignment on Northern

Opportunity B - I do not support Northern Avenue extension into the green space surrounding Hub Trail that extends to Black Rd.

Opportunity C - While I support an extension a new road to Princeton, my preferred solution would be to install lights on Pine. It would improve traffic flow on lower streets (Willoughby + Tilley), as well as improve the crosswalk situation in front of the school. The speed limit is not respected nor is the cross walk, which can have affect the children walking in the area.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Laura Marsh

Address 205 Panoramic Drive

Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I am concerned about an increased level of traffic on Panoramic dr. as it may become a through street. Panoramic is a quiet subdivision with lots of children, could be a danger. Panoramic is also very uneven and may not be able to handle increased traffic levels.

Extension to Black rd from northern does not seem to make sense as it will not ease traffic on second line significantly.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Jan Klingenberg

Address 165 Panoramic dr. SSM ON

Phone No.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I agree with and support many of the aspects of the recommended solution. However, I strongly urge the designation of bike lanes along the entirety of Northern Avenue, from North street to the east termination of Northern Avenue.

Many, many P-Patch motorists will use the new access/egress to Northern Avenue. Beyond the morning and late-day increase in volumes, it will be used throughout the day and evening (and heavily on weekends) to access Superior Heights, St. Mary's College, Strathclair, PeWee arena, West End soccer facility, library and shopping venues on Great Northern Road. The short stretch of Northern between Pine and the new P-Patch access will no longer be a quiet dead end.

Bike traffic along Northern Avenue will increase with the addition of bike lanes. Bicycle traffic will flow along Northern, both east and west, with the majority joining or leaving via the Hub Trail through Finn Hill. Continuous consistent bike lanes along the entire duration of Northern is safest and most efficient for both cyclists and motorists.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) JAMES STEELE

Address 44 Woodhurst Dr.

Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I fail to see how the recommended road will alleviate, what is, in this neighbourhood, the main egress issue - turning (especially left) at Pine and Pleasant.

I would like to know the following:

1. Who is asking for better access/egress in the P. Patch and what exactly are they asking for?
2. How will the Princeton to Northern Ave. road alleviate the egress issue for people heading downtown? I see no reason to use this proposed road unless heading north or west and there is no problem doing that from Pleasant and Pine.
3. What are the numbers that warrant an all-way stop at a corner?
4. What are the numbers for Pine and Pleasant?
5. How do the numbers compare to other all way and three way stops in the city?
6. Is it really prudent to encourage increased vehicular traffic in the vicinity of a nursing home? Many people use the pathway to safely walk patients in a quiet, relaxed area.
7. Why would the City choose to increase traffic at a prime hub-trail access point?

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Jeanette Cowen

Address 136 Panoramic Drive

Phone No. _____

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

Jennifer Sharpe

From: Michael Kresin
Sent: Thursday, June 23, 2016 1:30 PM
To: Northern Avenue EA
Subject: FW: northern ave

From: Robert Rattle
Sent: Thursday, June 23, 2016 12:32 PM
To: Michael Kresin <Mike@kresinengineering.ca>
Cc: Don Elliott <d.elliott@cityssm.on.ca>; Matthew Shoemaker <m.shoemaker@cityssm.on.ca>; Judy Hupponen <j.hupponen@cityssm.on.ca>
Subject: northern ave

Hi Mike,

Thank you for organising the consult today for Northern Ave. My comments are as follows:

I agree with the evaluation of the traffic and network configuration to recommend not to extend Northern Ave. to Lake or Black Road.

I can appreciate why neighbours would be concerned about option C3 (?) for the northerly access point into the p-patch. I would have preferred to see a controlled intersection at Pine to facilitate improved access into and out of the P-patch, as we have off of McNabb. I suppose my question would be that if the traffic counts/delays do not warrant a traffic signal at that intersection, then how do the traffic counts/delays justify creating the new access point? I believe the current configuration produces a very high quality of life for the residents, and any additional access point(s) would erode that.

As discussed, I have several concerns about the three lane configuration along Northern Ave. While I understand that major work is not part of this EA, I would prefer to see three main features incorporated into Northern Ave. at the earliest:

- 1) a grade separated non-motorised path, perhaps similar to what is being provided along Bay Street. This would increase safety considerably, could be configured to minimise pedestrian-cycle conflicts, and would eliminate the debris, water, maintenance and other problems identified in similar configurations, such as along Queen in the outside/curb cycle lanes.

- 2) a two lane configuration without the centre turn lane. My observations and SSMPS communications indicate that a good number of drivers continue to use the centre lane for driving through, and overtaking other vehicles (as an aside, just a few moments ago I was returning from SAH to Killarney road and encountered a car followed by a dump truck travelling in centre turn lane - they must be more apparent when thinking about them! I would, however, Matthew, for that and other reasons like to see the GNR, Queen East, Second Line East and West, and Trunk Road centre turn lanes eliminated, and replaced with a boulevard opened only at major intersections that are controlled...they do this very much in larger urban centres and it appears for very good reason). At the same time, a significantly reduced lane width along Northern would not only help serve to 'calm' the traffic, it would afford more space for a grade separated configuration on both sides with perhaps better design to accommodate different forms of non-motorised traffic. Failing a two lane configuration, a centre turn lane that is regularly interrupted with pedestrian refuges, boulevards, light standards and landscaping would enable essential left turns while preventing improper, dangerous and illegal use of the centre lane. I also expect any of the above suggestions would sufficiently calm and slow traffic along Northern to improve safe access to residential driveways. A slower posted speed limit, traffic calming features such as humps, chicanes, vertical landscaping along the centre, and the above noted lane narrowings would also serve to increase access and safety for residents.

- 3) several cross walks (half signals?) located at walking-centered intervals to enable pedestrians to access the College, bus stops (on both sides of Northern), and the north side parking lot. Can we also eliminate that prohibited crossing on the west side of Willow - I'd like to see free access to cross Northern Ave. for pedestrians from either side of Willow (and elsewhere around town where pedestrians should be given priority access according to the new TMP).

Finally, I am glad to hear there is interest in applying a traffic circle around town. I agree it could prove a benefit to traffic efficiency, and think it's about time this city explored the opportunities of a traffic circle. Obviously, one at the top of Willow would be inappropriate given the EMS access point.

Jennifer Sharpe

From: Michael Kresin
Sent: Thursday, June 23, 2016 1:49 PM
To: 'Matthew Shoemaker'
Cc: 'Don Elliott (d.elliott@cityssm.on.ca)'; Northern Avenue EA
Subject: RE: Northern Avenue EA

Mr. Shoemaker,

Thank you for your comments.

The potential for extending Northern Avenue to Lake Street will be discussed further with the project team.

Mike

Michael Kresin, P.Eng.
Consulting Engineer

Kresin Engineering Corporation
536 Fourth Line East, Sault Ste. Marie, ON, P6A 6J8
tel: 705-949-4900, fax: 705-949-9965

The information contained in this e-mail is confidential and intended only for the addressee(s). If you have received this communication in error, please notify us immediately and delete and/or destroy it and all copies of it. Thank you.

-----Original Message-----

From: Matthew Shoemaker [mailto:m.shoemaker@cityssm.on.ca]
Sent: Thursday, June 23, 2016 1:42 PM
To: Michael Kresin <Mike@kresinengineering.ca>
Subject: Northern Avenue EA

Mike, I personally would like to have some more consideration given to Northern being extended to Lake. Forget about extending it to Black Road, that seems like a waste.

You mentioned yesterday it would encourage traffic to go from McNabb to Northern using Lake as a by-pass, but I will share that I already get calls that people are doing that by going from McNabb to Pentagon, to Pleasant, and out of the P-Patch, or, alternatively they go from McNabb to Pentagon to Palace to Passmore, then out of the P Patch. So they are already doing so, and on streets without sidewalks (Pleasant and Passmore).

Matthew Shoemaker
Councillor - Ward 3
www.matthewshoemaker.ca

Sent from mobile

Jennifer Sharpe

From: Michael Kresin
Sent: Thursday, June 23, 2016 1:58 PM
To: Northern Avenue EA
Subject: FW: Northern Avenue Env. Assessment

FYI

From: Ron Prickett [mailto:ron_prickett@cityssm.on.ca]
Sent: Thursday, June 23, 2016 1:58 PM
To: Don Elliott <d.elliott@cityssm.on.ca>; MARK CROFTS
Cc: Michael Kresin <Mike@kresinengineering.ca>
Subject: Re: Northern Avenue Env. Assessment

Hello all: Please keep us in the loop if the final city plan ends up going forward with the extension and whether the extension will impact the Basswood trees mentioned by Mark.

Thank you for your attention to this matter.

Ron Prickett
 President Sault Field Naturalists

From: Don Elliott <d.elliott@cityssm.on.ca>
To: MARK CROFTS
Cc: 'Ron Prickett' <ron_prickett@cityssm.on.ca>; "Michael Kresin (mike@kresinengineering.ca)" <mike@kresinengineering.ca>
Sent: Thursday, June 23, 2016 10:49 AM
Subject: RE: Northern Avenue Env. Assessment

Dear Mr. Crofts: The preliminary recommendation in the EA is not to extend Northern Avenue to Black Road. I have copied your e-mail concern to Mike Kresin for inclusion in the EA documentation.

Thank you and Regards,
 Don Elliott

From: Ron Prickett [mailto:ron_prickett@cityssm.on.ca]
Sent: Thursday, June 23, 2016 10:25 AM
To: MARK CROFTS; Don Elliott
Subject: Re: Northern Avenue Env. Assessment

Hi Mark: Thanks for the info. Will look into this. Will need your help down the road for more information.

Thanks.

Ron Prickett

President Sault Field Naturalists of Michigan and Ontario

From: MARK CROFTS ·
To: d.elliott@cityssm.on.ca
Cc: Ron Prickett >
Sent: Thursday, June 23, 2016 10:13 AM
Subject: Northern Avenue Env. Assessment

Hi..

I speak for the trees :)

Near where the Hub Trail turns west at the base of Finn Hill at the Northern Ave powerline corridor there are a couple of Basswood trees...not great specimens...but they are the furthest north (at least on the east side of Lake Superior) that I know off. Trees at the edge of their ranges are generally regarded as significant. The proposed Northern Ave. extension to Black Road might affect those trees.

Just an FYI

Mark Crofts
Tree hugger

Jennifer Sharpe

From: Al Wright
Sent: Thursday, June 23, 2016 6:50 PM
To: Northern Avenue EA; Matthew Shoemaker; Judy Hupponen
Subject: Northern Avenue Improvements

Thank you for the opportunity to reply.

My wife and I attended the open house held June 22nd at the Civic Centre to review the above proposals. We live on Pinemore Blvd. and travel through the Pine/Northern Ave. area almost daily.

Since the opening of Pine St. to Second Line and especially when schools are open, the intersection of Pleasant and Pine becomes congested during certain times of the day. Those times, like the rest of the city are usually during the "rush hour" when children are going to/from school and adults and going to/from work.

In the area of Pine from Pleasant to Second Line there is pedestrian traffic related to St. Paul's school, Sault College and St. Mary's High School. Traffic exiting Pleasant drive contends with not only heavy pedestrian traffic, but also vehicular traffic on Pine. There are children crossing Pine St. with the assistance of school guards and school buses turning in all directions including into a parking area at the rear of St. Paul's school.

My wife and I agree your proposal to create another entrance/exit point to the P-patch at the east end of Northern Avenue will help especially as an alternative from exiting from Pleasant Dr. to head north on Pine. It will not help much when heading south, however there are some other alternatives, such as driving south on Pentagon to McNabb or in the future through the proposed Princeton/Northern Ave. exit then turn back south on Pine or Great Northern.

In relation to turning Northern Ave into a 3 lane roadway, similar to Queen St., I think the situation for these roads may be a little different. On Queen there is little westbound traffic that turns left until you get near the Doctor's Building. Most left turning traffic comes from eastbound traffic. By the way, I was in favour of turning Queen into a 3 lane roadway, and wrote our previous counselors to encourage the change.

On Northern Ave there will be more equal number of east/west bound traffic making left turns, which will add to the chance of two vehicles going in opposite directions trying to make to same manoeuvre to the centre turning lane at the same time, therefore more chance of collisions. Currently eastbound traffic at Great Northern Rd. is often congested. Any lane reductions in this area would aggravate an already poor situation.

On one last matter. I have a concern that I didn't raise at the open house at the Civic Centre. When driving east on Second Line and attempting to turn south (right) on Pine St. I find this a difficult turn. It seems like a very tight radius when making this turn. Traffic appears to want to cross the centre line on Pine St; and I would expect there will be some collisions at that location in the future.

I pull a 5th wheel trailer with my truck and avoid this intersection when returning southbound from Great Northern Rd. With the tight radius, I think it would be difficult to make the turn without running my right rear trailer wheels up over the curb. At most intersections you can swing out to the left a little more to avoid this - but not at Second Line and Pine due to the tight radius. I would expect quite a few vehicles pulling boat trailers would be making that turn as they head to the Pine St; Marina from the north/west end of the city. Not sure what can be done about this now, but something to think about in future road design in this city.

Thanks again for the opportunity to participate in this planning process and look forward to the day when I can use the new exit/entrance to the P-patch.

Al Wright
9 Pinemore Blvd.
Sault Ste. Marie ON P6B4E4

Jennifer Sharpe

From: Andre Riopel
Sent: Thursday, June 23, 2016 9:33 PM
To: Northern Avenue EA
Cc: Steve Turco; d.mcconnell@cityssm.on.ca; Donna Hilsinger; Deane Greenwood; Robert Rattle
Subject: Re: Northern Avenue - June 23, 2016 Display Boards

Great work!

instead of bike lanes, consideration should be given to a segregated 2 way bike path as a continuation of the Hub Trail along the north side of the roadway. This could be a grade separation, bollards or whatever Book 18 recommends. It seems that all Canadian cities are moving towards segregated cycling infrastructure and we already have precedent on Queen and the proposed Bay Street project. which might work well here.

Why such a wide centre lane. The folks at MMM suggest going as narrow as possible to slow traffic down, making more room for the bike lanes and making crossing the road safer for pedestrians. Consideration should also be given to raised pedestrian islands to make it safer for the high volume of pedestrians who dash across the road from the parking lot to the college. A study should be done to see how many people do this now. People will always take the shortest path regardless of jaywalking rules so why not accommodate them. It also prevents motorists from using the centre lane to pass.

What exactly would connecting Northern Avenue to the P patch accomplish? I don't see any major gridlock here. The current path creates a nice quiet link for cyclists and pedestrians and would encourage students to walk/cycle more.

Andre

On Jun 23, 2016, at 1:39 PM, Northern Avenue EA <NorthernAve@kresinengineering.ca> wrote:

Good afternoon Mr. Riopel,

Re: Northern Avenue Improvements – Municipal Class Environmental Assessment

As requested, please follow the link below to view the display boards presented at yesterday's Public Information Centre for the Northern Avenue Corridor Improvements.

http://www.kresinengineering.ca/documents/assets/uploads/files/en/northern_avenue_june_2016_pic_display_boards.pdf

Regards,
Jennifer

Jennifer Sharpe, B.Sc.
Environmental Scientist

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 6J8

Jennifer Sharpe

From: Northern Avenue EA
Sent: Friday, June 24, 2016 9:13 AM
To: 'Colleen'
Subject: RE: Northern Avenue Corridor Improvements - Public Information Center

Good morning Ms. Bennett,

If you were unable to make the PIC for Northern Avenue, the link below will direct you to the display boards that were presented.

http://kresinengineering.ca/documents/assets/uploads/files/en/northern_avenue_june_2016_pic_display_boards.pdf

Regards,
Jennifer

Jennifer Sharpe, B.Sc.
Environmental Scientist

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
S7A 6J8

Tel: 705-949-4900
Fax: 705-949-9965
jennifer@kresinengineering.ca

From: Colleen [
Sent: Friday, June 17, 2016 11:59 AM
To: Northern Avenue EA <NorthernAve@kresinengineering.ca>
Subject: Re: Northern Avenue Corridor Improvements - Public Information Center

is this the only day that is available or will there be another oppourtunity?

----- Original Message -----

From: Northern Avenue EA
To: Undisclosed recipients:
Sent: Friday, June 17, 2016 11:32 AM
Subject: Northern Avenue Corridor Improvements - Public Information Center

To Whom It May Concern,

Re: Notice of Public Information Centre: Northern Avenue Corridor Improvements – Municipal Class Environmental Assessment

Please see the attached regarding the above.

Should you have any questions, please feel free to contact the undersigned.

Regards,
Jennifer

Jennifer Sharpe, B.Sc.
Environmental Scientist

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 6J8

Tel: 705-949-4900
Fax: 705-949-9965
jennifer@kresinengineering.ca

Jennifer Sharpe

From: Renewable Energy Vehicles <
Sent: Monday, June 27, 2016 11:31 AM
To: Northern Avenue EA
Subject: Northern Avenue Improvements - Public Comment

To Whom It May Concern:

After attending the public information session on Wednesday, June 22, 2016 regarding the reconstruction of Northern Avenue in Sault Ste. Marie, ON I have the following comments to make.

First of all I am in favour of the recommendation put forth for Northern Avenue improvements to turn the current four lane configuration to a three lane configuration plus two bike lanes as has been successfully done with Queen Street East. Queen Street East has been transformed from a four lane road to the three lane plus two bike lane configuration and as a result seems to be much more inviting, calmer and attractive. I am of the opinion that if traffic levels permit the same can be accomplished on Northern Avenue and so I am in support this recommendation.

As a driver and an avid electric bike (e-bike) user I would very much appreciate the extra safety margin that the bike lanes could provide for both type of commuters. E-bikes appear to be big in Sault Ste. Marie if sales figures are any indication on a per capita basis. Right now e-bikes sales in North America are thought to be just over 150,000 units per year. This is not very much in comparison to sales of e-bikes of the rest of the world in particular Europe where sales are 10x greater or China where e-bike sales are huge with over 33 million units being sold annually. This figure surpasses world car and light truck sales and is expected to grow. A recent article in Bloomberg BusinessWeek asked – “Electric Bikes Won Over China. Is the U.S. Next?” – June 2, 2016. This question is not irrelevant and trivial as it may appear at first blush. With the recent Paris Agreement on Climate Change countries will find that one of the quickest and most significant reductions in greenhouse gas emissions can be realized in the transportation sector by deploying electric vehicles (EVs), plug-in hybrid electric vehicles (PHEVs) including e-bikes and electric scooters (e-scooters). Besides bicycles, e-bikes and e-scooters are the most efficient and cleanest means of personal transportation on the planet followed by EVs and PHEVs. They are also the most economical and quiet. The proposed bike lanes on Northern Avenue will encourage anyone who would not have ridden a bicycle, e-bike or an e-scooter because of safety concerns to now bike or e-bike, bike and e-bike more often and feel safer doing it. This would be good for the environment and for the health of the community. This is all relevant to today’s discussion. I see the three lane plus two bike lane configuration for Northern Avenue as the right solution for the times. Thank you for the opportunity to comment.

Sincerely,

Pete Bulas
Consultant and Business Development Manager
Renewable Energy Vehicles



Jennifer Sharpe

From: J C
Sent: Monday, June 27, 2016 4:42 PM
To: Northern Avenue EA
Cc: Don Elliott
Subject: Re: Northern Avenue Corridor Improvements - Public Information Center
Attachments: Corporation of the City of Sault Ste.docx

Just some comments i would like to forward to you both thanks..

From: "Northern Avenue EA" <NorthernAve@kresinengineering.ca>
Sent: Friday, June 17, 2016 11:32:35 AM
Subject: Northern Avenue Corridor Improvements - Public Information Center

To Whom It May Concern,

Re: Notice of Public Information Centre: Northern Avenue Corridor Improvements – Municipal Class Environmental Assessment

Please see the attached regarding the above.

Should you have any questions, please feel free to contact the undersigned.

Regards,
Jennifer

Jennifer Sharpe, B.Sc.
Environmental Scientist

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 6J8

Tel: 705-949-4900
Fax: 705-949-9965
jennifer@kresinengineering.ca

Corporation of the City of Sault Ste. Marie



NORTHERN AVENUE IMPROVEMENTS

PUBLIC INFORMATION
CENTRE
COMMENT SHEET -(please print
clearly)

We have review the project material and have the following comments:

- Installing a traffic light at Pine St. And Pleasant would be the logical way to levitate the traffic problem at this intersection for these reasons:
 1. **Issue:** School crossing which is holding up traffic between the hours of 8:30 am to 9:00am 3:209pm to 4:00pm
Solution: Install a traffic light to assist the 2 crossing guards to allow traffic to stop from all three directions, which also allows the traffic to flow with controlled mechanism (traffic light).With the Pine St. Extension from Second Line vehicle traffic is moving at a high rate of speed as there are no intersections between Northern Ave. & McNabb St. That have neither traffic lights nor a 3or 4 way stop to slow the traffic down.
 2. **Issue:** There has been increase of traffic from the Pine St. Extension from Second Line which has been making it difficult to exit Pleasant when turning left onto Pine St.
Solution: Install traffic light to allow traffic exiting left from Pleasant onto Pine St.with a controlled mechanism (traffic light). There is no issue turning right onto Pine St, from Pleasant. There is not a problem neither turning left off of Pine St. onto Pleasant nor turning right off of Pine St. onto Pleasant.

Putting a road from Northern Avenue to Princeton does not make logical sense for these reasons:

- Opening road would cause increased traffic through a residential neighborhood
- Would increase excessive noise pollution, trash pollution & road dust. Especially in Spring.
- Excessive snow plowing pushing snow into properties and driveways adjacent to proposed roadway.
- Decreasing the value of the 8 properties adjacent to the proposed Northern Avenue to Princeton Road Extension.
- Turning what was purchased originally regular property lots next to a lane way to proposed corner lot properties.
- Increasing the risk of contact between vehicles to pedestrian traffic example: Panoramic Dr. without pedestrian sidewalks. Winter the road narrows approx. 6 feet. 3 feet per side of street.
- Would levitate the traffic from major arteries and increase to residential streets. Example: would divert traffic flow at McNabb and Lake and just be a short cut through the residential P-patch instead of keeping the traffic to major arteries.

Name John Colombi
Address 146 Panoramic Dr.

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6JB
Fax: (705) 949-9965
Email: northernave@kresinengineering.ca

Attention: Michael Kresin, P. Eng

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Tuesday, June 28, 2016 8:07 AM
To:
Cc: Northern Avenue EA
Subject: RE: Northern Avenue Improvements

Jeanette: There is plenty of time. You can provide your comments within the next few weeks. There will also be an opportunity to comment in the fall after the second open house.

Regards,
Don Elliott

From:
Sent: Monday, June 27, 2016 9:32 PM
To: Don Elliott
Subject: Re: Northern Avenue Improvements

Thanks very much Don. Can you tell me when the deadline to submit comments is?
Thanks,
Jeanette

Sent from my BlackBerry 10 smartphone on the Bell network.

From: Don Elliott
Sent: Monday, June 27, 2016 8:39 AM
To:
Cc: northernave@kresinengineering.ca
Subject: RE: Northern Avenue Improvements

Hello Jeanette: Thank you for your e-mail. The slides from the open house are available online at: saultstemarie.ca/NorthernAveEA

Regards,
Don Elliott

From:
Sent: Sunday, June 26, 2016 2:41 PM
To: Don Elliott
Subject: Northern Avenue Improvements

Hi there,
I came to the open house last week and learned about the recommendation to build a road from Princeton Ave. To Northern Ave. I would like to share the information with my landlord and am having trouble locating it on the City's website. Can you please send me the link?
Thank you,
Jeanette

Jennifer Sharpe

From: Cecilia Fernandez
Sent: Tuesday, June 28, 2016 9:06 AM
To: d.elliott@cityssm.on.ca
Cc: Northern Avenue EA
Subject: Northern Avenue Improvements

Dear Mr. Elliott,

I would like to be included on your project mailing list. My property would be directly affected by this project so I would be pleased to review any relevant information regarding the EA, etc you may have available.

Best regards,

Cecilia Fernandez

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Thursday, June 30, 2016 10:45 AM
To:
Cc: Northern Avenue EA
Subject: RE: Northern Ave Improvement

Dear Mr. and Mrs. Greenwood: Thank you for your comments – this is excellent feedback for us. Your comments will be considered as the EA moves forward.

Regards,
 Don Elliott

From:
Sent: Wednesday, June 29, 2016 8:09 PM
To: northernave@kresinengineering.ca
Cc: Don Elliott
Subject: Northern Ave Improvement

Hello Michael

My wife and I attended the recent Northern Ave Improvements Public Information Centre describing the options being recommended and would like to submit our comments through this email. We appreciate the opportunity provided and the time you and city officials invested. I know open houses can swing between little and too much interest, boredom and controversy, and often 'Nimbyism' at it best. I hope this session didn't fall into these extremes and instead proved useful for you.

We are residents of the P-Patch but live quite some way from the proposed changes. Our interest is therefore as citizens that will be affected but not from a Nimby perspective.

We agree with all 3 of the recommended alternatives, with one serious caveat related to Alternative C as noted below.

Alternative A2 - We fully support this alternative, recognizing traffic volumes do not generally require 4 lanes. We would bring to your attention two areas that we believe require special lane marking to reduce congestion and frustration. The right turn lane heading east on Northern onto Willow south is heavily used and keeps traffic flowing, especially at red lights. It should continue to be available. Likewise, the right turn lane when heading west on Northern that turns north onto Great Northern Rd should also remain. I note that there are often drivers who use this right turn lane then proceed straight through the intersection to make the right turn into the Lowe's parking lot easier. This creates a problem (and close calls) for drivers using the straight through lane who also want to access this parking lot but find themselves blocked. If there is some way to prevent this through better lane marking (i.e. eliminate the lane across the intersection from the right turn lane), this would be an improvement.

Alternative B1 - We also fully support this alternative. Lake St is not currently built to act as a thoroughfare and any connection to it would cause it to become one, impacting its residential nature, crossings to Ben R McMullan School etc. Both suggested routes to Black Rd would entail negotiating the steep hill involved, creating yet another winter maintenance problem (and cost) similar to those navigating this old river bank elsewhere in the city. It would also require a very wide right of way for proper roadside slope engineering. Most seriously, either route would have to cross one of the heaviest used sections of the Hub Trail and one of only 2 sections involving any length of natural area. A major road crossing of the Hub Trail here would virtually ruin this trail section, not to mention create a safety risk given its high use in all 12 months.

Alternative C3 - We support the concept of adding new access/egress to the P-Patch but with a caveat. Given the frustration and danger already existing at the Pine St/ Pleasant Dr. intersection, we believe both C3 and C4 (lights at this intersection) should be implemented.

While traffic studies suggest lights may not be warranted based on volume, I would question whether this is a case of statistics not reflecting the whole or accurate story. Not having seen the studies, I wonder how well they reflect the congestion here during the morning and evening to/from work periods. After the opening of the high school at Pine and Second Line, I have waited in 4 to 5 car lines to turn south onto Pine from Pleasant. I have timed from 1 to 2 minutes per car, equating to waiting over 5 minutes during the busy periods. With a right turn lane here also, vehicles block each other's views to make turns safely. This causes drivers to inch forward on each other to try see, all in a state of frustration. The obvious outcome is that people take chances with unsafe turns. When you add the school crossing that operates here (primary school and Sault College students), I've witnessed some outright dangerous situations and close calls take place. I'm sure the crossing guards posted here could add to what I've seen. I wonder how well the traffic volume studies capture these considerations.

While the above might suggest a more detailed traffic study, it would need to be done when the primary and secondary schools plus Sault College are convened, or it would not accurately portray the situation. My guess is that several lights can be found installed in the Sault that wouldn't satisfy the traffic volume criteria, so I find it odd that this was seemingly the primary criteria for rejecting this alternative.

By only implementing alternative C3, I also believe you are underestimating just how much traffic the residential Princeton Dr and new connecting road will end up carrying. With frustration so high at the Pine/Pleasant intersection, even with stop signs and other potential deterrents, I believe this egress will be the one of choice for the whole P-Patch when going north or west. I am also seeing more traffic using Lake St N and Pleasant Ave to 'cut through' the P-Patch. This traffic will undoubtedly grow with any new egress onto to Northern Ave, especially one that avoids the Pleasant/Pine situation.

Because of the above, we firmly believe both Alternatives C3 and C4 should be recommended. Failing this, we would support C4, not C3 on its own.

If any of this raises questions or the need for clarification, please feel free to contact me by reply email or phone. Good luck with the project.

Yours truly,

Rich and Sue Greenwood
184 Promenade Dr.
Sault Ste. Marie, ON. P6B 5J6

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Monday, July 04, 2016 3:42 PM
To: 'Betty Vankerkhof'
Cc: Northern Avenue EA
Subject: RE: Northern Avenue Corridor

Good afternoon: Thank you for your comments. They will be included in the environmental assessment evaluation.

Regards,
Don Elliott

-----Original Message-----

From: Betty Vankerkhof
Sent: Sunday, July 03, 2016 11:12 AM
To: Don Elliott; northernave@kresinengineering.ca
Cc:
Subject: Northern Avenue Corridor

Good morning,

Thank you for the opportunity to comment on the alternatives proposed in relation to the Northern Avenue Corridor. As a resident of the area I would like the city to consider the policies and objectives of the 2014 Provincial Policy Statement, Ontario's Climate Change Strategy and Ministry of Health and Long-Term Care (MOHLTC) during planning and development. MOHLTC information indicates that chronic disease rates are higher than the provincial average in northern Ontario, with one of the major risk factors being physical inactivity. Planning should promote healthy, liveable and safe communities that accommodate recreation, parks and open spaces; promote cost effective development; conserve biodiversity e.g. Protect natural features and areas; promote active transportation and reduce green house gas emissions. In my opinion alternatives B2,B3 and B4, as well as C2 and C3 do not support these policies and objectives but move in the opposite direction. Lane re-assignments A2 and A3 provide a safe connection for a portion of the Hub Trail that is currently missing and support a healthy active lifestyle and active transportation that B2, B3 and B4 do not.

B3 and B4 would be the most destructive because they would destroy existing green belt and natural heritage features and greatly diminish the natural trail experience created by the development of the Hub Trail in that area. The 2010 Natural Heritage Reference Manual, including section 2.1 identifies the need to conserve diversity and connectivity of natural heritage features, surface water and ground water. The green space in this corridor provides natural vegetation recreational opportunities otherwise missing in the immediate area and provides refuge as well as a travel corridor for many non-human species. The area along the slope from Mapleview to Finn hill includes species that are part of the Great Lakes St.Lawrence Forest but are less common particularly in the northern ends of the ranges and should therefore be conserved not only for biodiversity reasons but also for potential climate change adaptation opportunities. These species include, basswood, white ash (if any survive EAB), pockets of hemlock and scattered white pine. These species and their other associates provide refuge habitat for other species, including barred and saw whet owls, sometimes moose and Lynx. The wetlands at the base of the hill may also support species of turtles as recently found by a neighbour. Any development of this area will fragment it such that it may no longer be able to provide refuge and a travel corridor for species. Development of the hill area may also require additional storm water management as it will disrupt the natural hydrology on the slope and destroy the natural wetlands providing natural storm water functions along base of hill. Is this area considered hazard land in the municipal plan?

B2,B3, B4, C2 and C3 will increase traffic in a quiet attractive residential neighbourhood, negating the reason many may have located here. These proposals will increase non-resident traffic to use the area to bypass traffic lights on McNabb, Great northern, Second Line and Black Road. Non-resident traffic does occur via Lake/Promenade/Pleasant and Pine at higher rates of speed. I would suggest that the city survey traffic in the area and determine the breakdown of resident versus non-resident traffic. If we are really concerned about access in and out of the P Patch, install a traffic light or a 4 way stop at Pleasant and Pine. This would allow the access and discourage non-resident traffic as it would no longer be quicker as a bypass. It would also allow school children to safely cross Pine on foot or on bikes. Many parents drive their children to St. Paul's because they are concerned about the safety of crossing Pine Street, which does not promote active transportation among our youth who already have high rates of childhood obesity. Encourage traffic to use the existing planned travel corridors of Great Northern, McNabb, Second Line and Black Roads as opposed to turning residential roads into thoroughfares. The city already has issues with its tax base, is challenged to meet existing needs including maintaining roads and should not be building additional roads at an additional cost to develop and maintain.

Again, thank you for the opportunity to comment. I would like to be kept apprised of any future work on this matter and would like to be on the mailing list.

Regards,

Betty van Kerkhof and Michael Nearing
72 Prince Charles Crescent

Sent from my iPad

Jennifer Sharpe

From: Sam Colizza
Sent: Tuesday, July 12, 2016 9:22 AM
To: Michael Kresin
Cc: Northern Avenue EA; 'Don Elliott (d.elliott@cityssm.on.ca)'
Subject: RE: Northern Avenue Corridor EA

Mike, Thanks for the reminder. As long as the Pine/Pleasant intersection location does not change, as the St. Paul busbay entrance lines up with it, the school Board has no comments.

Sam Colizza
Manager of Plant Services
Huron-Superior Catholic District School Board
(705 945 5644)

From: Michael Kresin [mailto:Mike@kresinengineering.ca]
Sent: July-07-16 9:11 AM
To: Sam Colizza
Cc: Northern Avenue EA; 'Don Elliott (d.elliott@cityssm.on.ca)'
Subject: Northern Avenue Corridor EA

Hi Sam,

I'm not sure if you're aware or not, but Kresin Engineering is working with the City of Sault Ste. Marie on a study for improvements to the Northern Avenue corridor – part of this study includes possible improvements to the P-Patch access/egress. This means that we are including the Pine/Pleasant intersection in our study. This intersection is directly adjacent to the bus-bay entrance at St. Paul's elementary school.

There was an information session held a couple of weeks ago and we have not seen any input from HSCDSB, so I thought I would make sure you know what's going on. The presentation materials are available on-line at <http://www.saultstemarie.ca/City-Hall/City-Departments/Engineering-and-Planning/Engineering-and-Construction/Class-EA/Northern-Avenue.aspx>

Please note that the recommendations presented do not include improvements at Pine/Pleasant intersection.

If you, or anyone from HSCDSB would like to meet and discuss this study, please let me know and we will set something up.

Thanks,
Mike

Michael Kresin, P.Eng.
Consulting Engineer

Kresin Engineering Corporation
536 Fourth Line East, Sault Ste. Marie, ON, P6A 6J8
tel: 705-949-4900, fax: 705-949-9965

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APPENDIX 7
CITY OF SAULT STE. MARIE
TRAFFIC REPORT – NORTHERN AVENUE ROAD DIET AND P-PATCH ACCESS TRAFFIC REVIEW

City of Sault Ste. Marie

Traffic Report

Northern Avenue Road Diet and P-Patch Access Traffic Review

B000699

January 2017

B000699

Kresin Engineering Corporation

Traffic Report

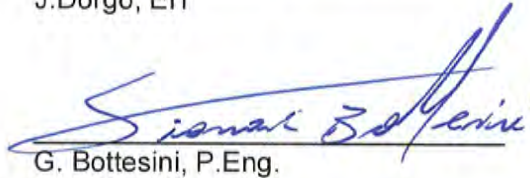
Northern Avenue Road Diet and P-Patch Access Traffic Review

B000699

Prepared by :



J. Dorgo, EIT



G. Bottesini, P.Eng.

Verified by :



S. Keen, P.Eng.

CIMA+

3027 Harvester Road, Suite 400
Burlington, ON L7N 3G7
289-288-0287

January 2017

B000699



Table of contents

1. Introduction	1
1.1 Background and Purpose.....	1
1.2 Road Diets.....	1
1.3 Study Area.....	3
1.4 Study Approach.....	5
2. Existing Conditions.....	6
2.1 Roadway Cross-Section	6
2.2 Traffic Volumes and Speed Data	8
2.3 Pedestrian Facilities.....	9
2.4 Bicycle Facilities.....	10
2.5 Transit Services.....	11
2.6 Parking Restrictions	13
2.7 Left-turn Operations.....	13
2.8 Review of Traffic Operations.....	13
3. Proposed Road Diet Cross Section	19
3.1 North Street to Sackville Road/ Grand Boulevard.....	21
3.2 Sackville Road to Great Northern Road.....	21
3.3 Great Northern Road to Pine Street.....	22
3.4 Intersections	22
4. Expected Benefits and Disbenefits of Proposed Road Diet	24
4.1 Safety	24
4.2 Bicycle Lanes.....	24
4.3 Parking	25
4.4 Transit	25
5. Traffic Operations – Future Conditions with Road Diet.....	25
5.1 Future Intersection Lane Configurations	25
5.2 Traffic Forecasting.....	27
5.3 Future Intersection Traffic Operations.....	28

B000699

6. Review of Proposed P-Patch Access	30
6.1 Current Trip Generation and Distribution.....	31
6.2 Estimation of Redirected Trips.....	32
6.3 Trip Reassignment.....	34
6.4 Intersection Operations	38
7. Conclusions.....	40

List of Tables

Table 1: LOS Criteria for Intersections.....	5
Table 2: City of Sault Ste. Marie Signalized Intersection LOS Criteria	6
Table 3: Traffic Volume and Speed Data for Northern Avenue.....	8
Table 4: Turning Movement Counts.....	14
Table 5: Existing Conditions Operational Analysis	18
Table 6: 2026 Future Intersection Operations with Road Diet	28
Table 7: 2026 Future Intersection Operations ('Do Nothing' Option).....	30
Table 8: Existing Volumes and Trip Generation Comparison	31
Table 9: P-Patch "Travel Impedances" to Northern Avenue & Pine Street.....	34
Table 10: 2026 Intersection Operations (Pine Street & Pleasant Drive).....	38
Table 11: 2026 Intersection Operations (Northern Avenue & Pine Street)	39

List of Figures

Figure 1: Typical Road Diet.....	2
Figure 2: Study Area and Focus Area.....	3
Figure 3: Study Area Land Use	4
Figure 4: Northern Avenue – Existing Cross-Section	7
Figure 5: Depressed Curb on Northern Avenue at Anita Boulevard.....	9
Figure 6: Desirable cycling Facility Nomograph	10
Figure 7: Drainage Grate on Northern Avenue.....	11
Figure 8: Sault Ste. Marie Transit Route Map	12
Figure 9: Typical Transit Stop Sign.....	12
Figure 10: Total Entering Volumes for Different Peak Hours	15

B000699



Figure 11: Existing Turning Movement Volumes 16

Figure 12: Northern Avenue Lane Configurations 17

Figure 13: Cross-Section with Minimum Lane Widths per Standards and Guidelines (with gutters) . 20

Figure 14: Cross-Section with Minimum Lane Widths per Standards and Guidelines (without gutters) 20

Figure 15: Proposed Road Diet Configuration between North Street and Sackville Road (Section A) 21

Figure 16: Proposed Configuration between Sackville Road and Great Northern Road (Section B). 22

Figure 17: Proposed Road Diet Configuration between Great Northern Road and Pine Street (Section C and D) 22

Figure 18: Bicycle Lanes Adjacent to Combined Through/ Right-Turn Lane 23

Figure 19:Taper for Introduced and Discontinued Bicycle Lanes 23

Figure 20: Northern Avenue - Intersection Lane Configurations with Road Diet..... 26

Figure 21: Northern Avenue – Future Volumes 27

Figure 22: Existing Trip Distribution 32

Figure 23: P Patch Travel Time Analysis Points 33

Figure 24: P-Patch Residences Affected by Options C2 and C3 35

Figure 25: 2026 Future Volumes Without C2 or C3 ('Do Nothing') 36

Figure 26: 2026 Future Volumes (Option C2) 37

Figure 27: 2026 Future Volumes (Option C3) 37

Figure 28: Proposed Road Diet Configuration between North Street and Sackville Road 40

Figure 29: Proposed Configuration between Sackville Road and Great Northern Road 40

Figure 30: Proposed Road Diet Configuration between Great Northern Road and Pine Street 41

Figure 31: Bicycle Lanes Adjacent to Combined Through/ Right-Turn Lane 42

Figure 32:Taper for Introduced and Discontinued Bicycle Lanes 42

Appendices

- Appendix A: Traffic Volumes
- Appendix B: Signal Timing Plans
- Appendix C: Synchro Reports

B000699

1. Introduction

1.1 Background and Purpose

The City of Sault Ste. Marie is undertaking a study to improve traffic operations and safety along the Northern Avenue Corridor. A series of opportunities for improvements were identified in the City's 2015 Transportation Master Plan (TMP), including lane reassignment or elimination along the corridor (road diet); extension of Northern Avenue to Black Road; and improvements to the access/egress of the P-Patch subdivision (located southeast of the intersection of Northern Avenue and Pine Street).

Kresin Engineering is leading the Class Environmental Assessment (EA) and conducted a preliminary assessment of multiple variations of the following opportunities:

- + Lane reassignment (full extension or select locations);
- + Extension of Northern Avenue (east or southeast to Black Road or Lake Street); and
- + P Patch access (new road to Panoramic Drive, new road to Princeton Drive, or traffic signal at Pine Street & Pleasant Drive).

As a result of the preliminary assessment, the following recommended solutions are being proposed:

- + A2: Implement Northern Avenue lane reassignment between North Street and Pine Street, including reduction from four to three lanes with a continuous left-turn lane and bicycle lanes along corridor, where possible (road diet);
- + B1: No extension of Northern Avenue; and
- + C3: Construct access/egress to the P-Patch subdivision (new two-lane road from the existing east termination of Northern Avenue south to Princeton Drive).

Kresin Engineering retained CIMA Canada Inc. (CIMA+) to further evaluate the proposed solutions from a traffic engineering perspective. This report provides a quantitative and qualitative review of the benefits and disbenefits of the proposed road diet, as well as capacity analysis of the intersection of Northern Avenue & Pine Street as a result of the proposed access to the P-Patch subdivision.

1.2 Road Diets

According to the Federal Highway Administration's (FHWA) Road Diet Informational Guide, a road diet is generally described as "removing travel lanes from a roadway and utilizing the space for other users and travel modes". The most common road diet reconfiguration consists of converting an undivided four-lane roadway to a three-lane undivided roadway (one of which being a two-way left-turn lane), and reassigning the remaining width to be reallocated for bicycle lanes, parking lanes, pedestrians or transit users. **Figure 1** illustrates a typical road diet.

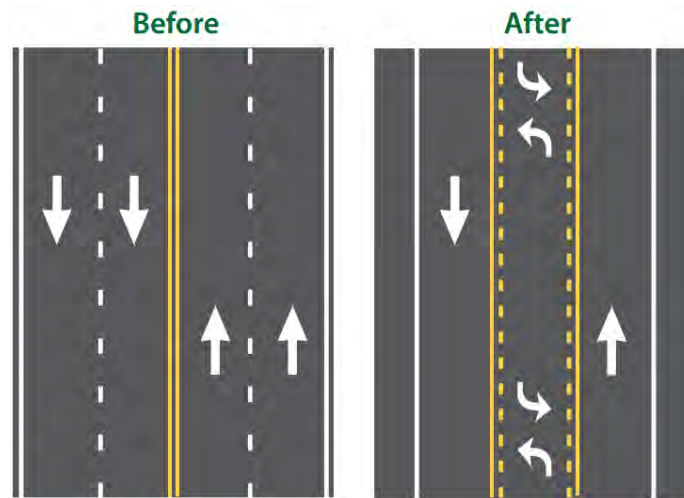


Figure 1: Typical Road Diet¹

Since their inception, road diets have consistently produced reductions in operating speeds, collisions and aggressive driving behaviours. Conceived as a reaction to over-designed four-lane roadways where growth was anticipated beyond what actually developed, as well as certain operating difficulties with four-lane roadways, road diets provide an adequate solution for neighbourhood thoroughfares where more effective, but correspondingly more intrusive, measures such as speed humps are considered inappropriate.

Some of the first recorded road diets took place in Billings, Montana, in 1979. With an average daily traffic (ADT) of 10,000, reductions in collisions without increase in delay were recorded after a conversion from a four-lane cross-section to a three-lane cross-section with a centre two-way left-turn-lane (TWLTL).² Further studies in the area, with more in-depth analysis, as well as studies which examined road diets incidentally, such as studies of TWLTLs, showed similar results, as well as reductions in operating speeds (3-5 mph, or 5-8 km/h).

More locally, many cities in southern Ontario have implemented road diets to great effect. In the Region of Waterloo, Frederick Street between Bruce and Edna Streets was reduced from two travel lanes in each direction to one travel lane per direction and a TWLTL, resulting 44% fewer collisions.³ The City of Toronto reduced St. George Street between Bloor and College Streets West from four lanes to two lanes with left-turn lanes at major intersections. This resulted in a 40% reduction in collisions, as well as an increase in cycling by 10%. Further, it comprised a cycling network with Davenport Road, Gerrard Street, Sherbourne Avenue and Harbord Street, each with various cycling facilities installed over comparable time-periods, which saw cycling trips rise by 23%.⁴

¹ [FHWA Road Diet Informational Guide](#) (p. 3)

² [FHWA Road Diet Informational Guide](#) (p. 5)

³ [Region of Waterloo, Road and Traffic Safety, Road Diets](#)

⁴ [Transport Canada – St. George Street Revitalization: “Road Diets” in Toronto](#)



1.3 Study Area

Figure 2 shows the Study Area, including the P-Patch subdivision, and the Focus Area, consisting of Northern Avenue from North Street to Pine Street. Northern Avenue is a four-lane urban collector⁵ with a speed limit of 50 km/h per Highway Traffic Act (the speed limit is not posted) extending from North Street in the west to approximately 320 metres east of Pine Street. Within the study and focus areas, the unposted speed limit is 50 km/h.

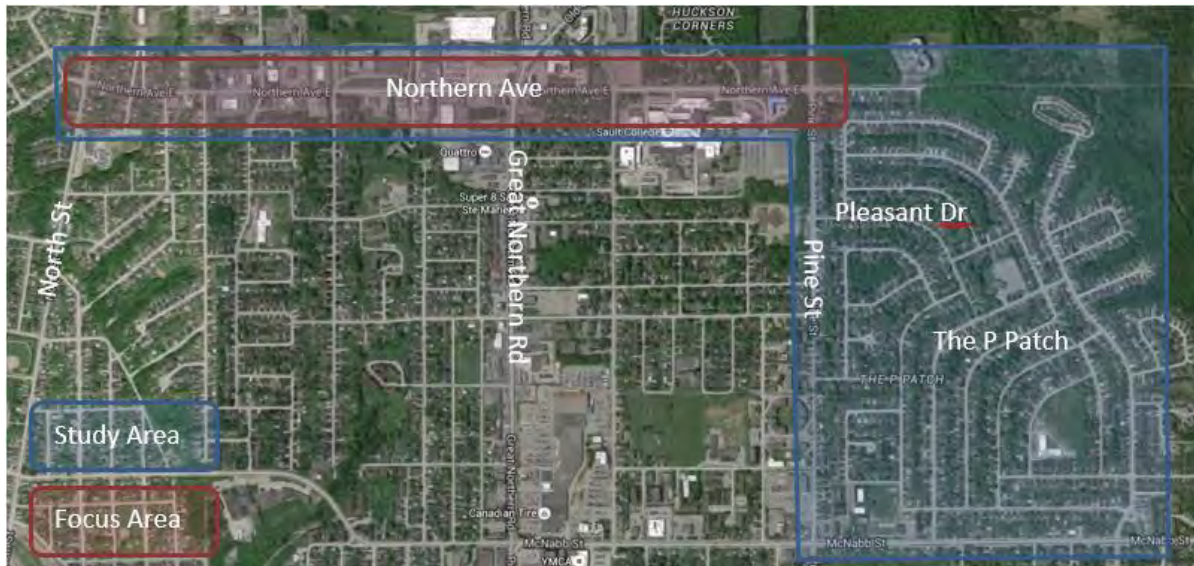


Figure 2: Study Area and Focus Area

As seen in **Figure 3**, the land use along Northern Avenue is predominately commercial and industrial to the west of Great Northern Road and residential to the east. The north-west and south-west corners of the intersection of Northern Avenue and Great Northern Road are comprised of commercial lands that extend southerly along Great Northern Road. The land use throughout the focus area also includes occasional institutional and industrial developments.

B000699

⁵ City of Sault Ste. Marie Transportation Master Plan, 2015, Exhibit 3-1: Existing Road Classifications



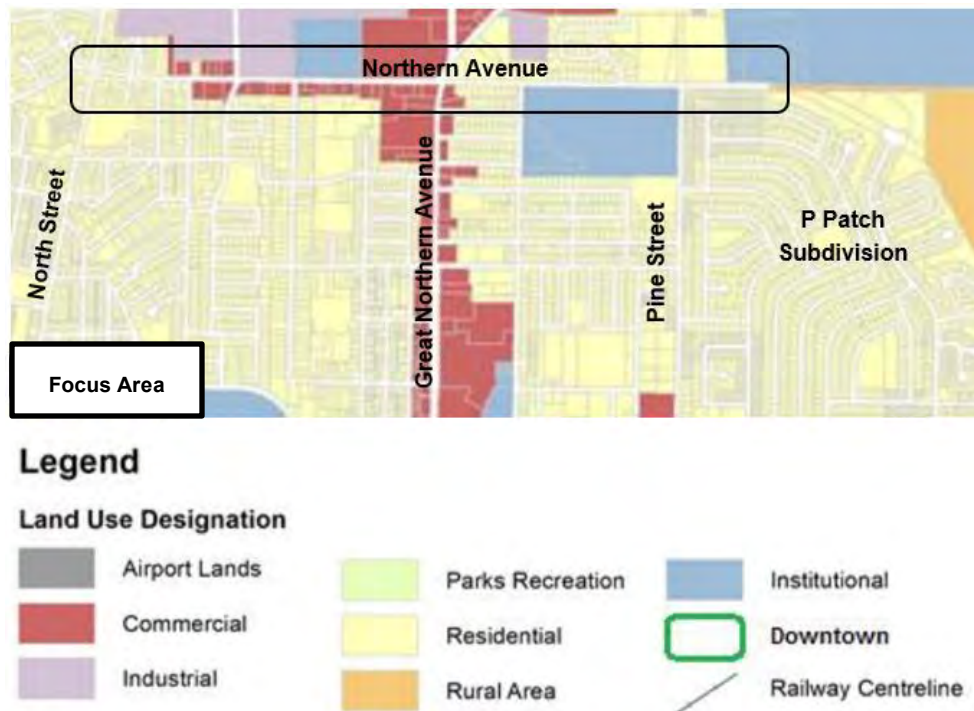


Figure 3: Study Area Land Use⁶

The focus area includes ten intersections with Northern Avenue, as follows:

- + **North Street (4-leg, signalized);**
- + Anita Boulevard (4-leg, minor road stop control);
- + Kitchener Road (3-leg, minor road stop control);
- + Wilson Street (3-leg, minor road stop control);
- + **Grand Boulevard/ Sackville Road (4-leg, signalized);**
- + Reid Street (3-leg, minor road stop control);
- + Pee Wee Arena/ Mall Entrance (4-leg, signalized);
- + **Great Northern Road (4-leg, signalized);**
- + **Willow Avenue (4-leg, signalized, north leg is a driveway for Fire and EMS only);**
- + Tadcaster Place (3-leg, minor road stop control); and
- + **Pine Street (4-leg, signalized).**

Capacity analysis was conducted for the five signalized intersections highlighted in **bold** above.

The study area includes six intersections which provide access to the P-Patch subdivision, as follows:

- + Northern Avenue & Pine Street (3-leg, signalized);
- + Pine Street & Pleasant Drive (3-leg, minor road stop control);
- + Pine Street & Passmore Road (3-leg, minor road stop control);
- + Pine Street & McNabb Street (4-leg, signalized);

⁶ City of Sault Ste. Marie, Transportation Master Plan, January 2015, Official Plan Land Use Designation



- + McNabb Street & Pentagon Boulevard (3-leg, signalized); and
- + McNabb Street & Lake Street (4-leg, signalized).

Capacity analysis was conducted for the intersections of Northern Avenue & Pine Street and Pine Street & Pleasant Drive only. However, traffic volumes at the remaining intersections were reviewed in order to understand traffic patterns and reassign traffic to the proposed access.

1.4 Study Approach

The study was divided into two major components. The first consisted of a review of the potential benefits and disbenefits of the proposed road diet, including: a qualitative review that evaluated the pros and cons in terms of pedestrian and cyclist safety and convenience, transit services, parking operations, and overall traffic safety; and a quantitative review that evaluated signalized intersection operations in terms of capacity, delays and queues as a result of the reduced number of lanes. The second component consisted of a review of traffic patterns associated with the P-Patch subdivision, the reassignment of traffic resulting from the implementation of the proposed access, and the evaluation of intersection operations at Northern Avenue & Pine Street and Pine Street & Pleasant Drive.

Intersection capacity analysis was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and queueing.

LOS is a qualitative measure of operational performance and is based on control delay. The LOS criteria for signalized intersections are illustrated in **Table 1**. LOS A is represented by a control delay of less than 10 seconds per vehicle (referred to as free flow operating conditions). LOS F is represented by a control delay greater than 80 seconds per vehicle (referred to as restricted flow operating conditions) or if the volume-to-capacity ratio for the movement exceeds 1.0, regardless of the control delay.

Table 1: LOS Criteria for Intersections

Level-of-Service (LOS)	Control Delay (seconds/vehicle)	
	Signalized	Unsignalized
A	0 – 10	0 – 10
B	>10 – 20	>10 – 15
C	>20 – 35	>15 – 25
D	>35 – 55	>25 – 35
E	>55 – 80	>35 – 50
F	>80	>50

The v/c ratio is the ratio between traffic volumes and the capacity of an intersection movement. A v/c ratio greater than 1.0 indicates that the movement is operating over capacity.

B000699



95th Percentile Queue is the queue length that has only a 5 percent probability of being exceeded during the analysis period. It is industry practice and accepted methodology to use the 95th percentile queue length for design and operational analysis purposes.

The analysis methodology is consistent with the City’s Transportation Master Plan (2015)⁷ which indicates the following performance measures:

- + Capacity of all intersection movements, which is based on a volume-to-capacity ratio and must be below 1.00 for all movements. V/C ratios that exceed 0.85 are flagged for monitoring; and
- + Level of Service (LOS) for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall. As per HCM, the unsignalized LOS criteria are outlined in **Table 2**. Intersections should be monitored for improvements at LOS D-E and are recommended for improvements if operating at LOS F.

Table 2: City of Sault Ste. Marie Signalized Intersection LOS Criteria

Level of Service	Average Control Delay (sec/veh)	Recommended Improvement Criteria
A	≤10 sec	Acceptable
B	10-20 sec	Acceptable
C	20-35 sec	Acceptable
D	35-55 sec	Monitor
E	55-80 sec	Monitor
F	≥80 sec	Unacceptable

2. Existing Conditions

2.1 Roadway Cross-Section

Within the study area, Northern Avenue presents four slightly different cross-sections as illustrated in **Figure 4**. The available curb-to-curb width ranges from 12.4 metres to 13.2 metres and consists of two 3.0- to 3.3-metre wide travel lanes in both the eastbound and westbound directions. Gutters are present on both sides on the roadway in Section A where the effective road width available to traffic is 12.4 metres. It should be noted that west of the study area limits at North Street, Northern Avenue transitions into a two-lane roadway.

⁷ City of Sault Ste. Marie, Transportation Master Plan, January 2015, pg. 70.



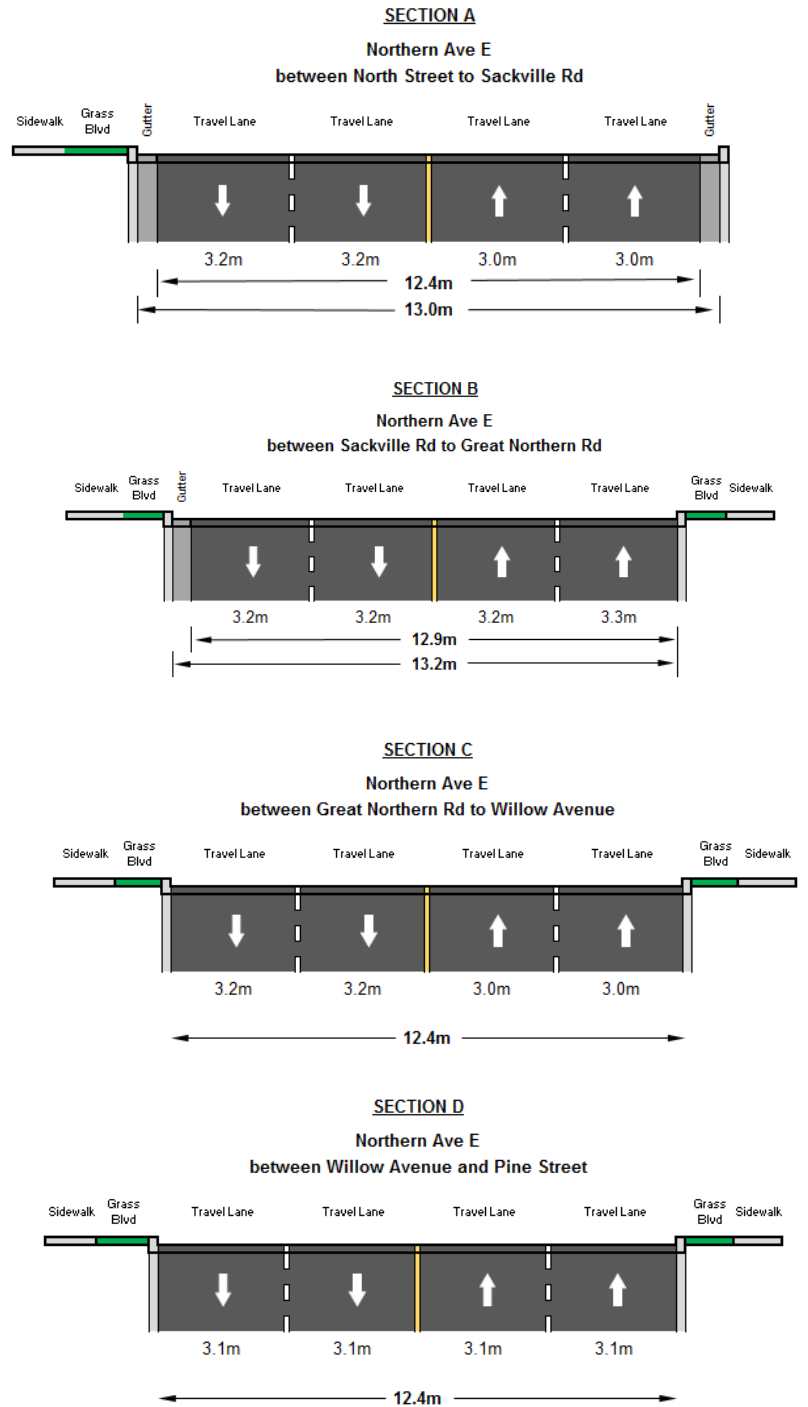


Figure 4: Northern Avenue – Existing Cross-Section

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The major differences between each of the cross-sections is the presence and widths of gutters, boulevards and sidewalks. Where boulevards are available, these areas can be used for roadway expansion if ultimately required; however, widening beyond the existing roadway width would be very costly due to the presence of hydro poles that would need to be relocated.

2.2 Traffic Volumes and Speed Data

Traffic volume and speed data were provided by the City and are summarized in **Table 3**.

Table 3: Traffic Volume and Speed Data for Northern Avenue

Location	Direction	Date	AADT	85 th Percentile Speed
Wilson St to Sackville Rd	EB	May 2014	6,015	-
West of Sackville Rd	EB	July 2015	5,682	60 km/h
East of North St	EB	September 2016	4,652	-
Kitchener Rd to Wilson St	WB	July 2014	6,212	-
East of North St	WB	September 2016	4,462	69 km/h
North St to Sackville Rd	EB + WB	Average	10,800	60 – 69 km/h
Pee Wee Arena Entrance to Reid St	EB	August 2014	7,329	-
West of Great Northern Rd	EB	August 2015	8,000	52 km/h
Pee Wee Arena Entrance to Reid St	WB	May 2014	8,302	-
Sackville Rd to Great Northern Rd	WB	July 2015	5,897	34 km/h
Sackville Rd to Great Northern Rd	EB + WB	Average	14,800	34 – 52 km/h
Great Northern Rd to Willow Ave	EB	May 2013	10,362	-
West of Willow Ave	EB	December 2015	6,069	-
Great Northern Rd to Willow Ave	WB	June 2013	7,922	-
East of Great Northern Rd	WB	August 2015	6,310	56 km/h
Great Northern Rd to Willow Ave	EB + WB	Average	15,300	56 km/h
West of Pine St	EB	June 2015	5,774	60 km/h
Tadcaster Place to Pine St	EB	May 2013	7,017	-

B000699



Willow Ave to Tadcaster Place	WB	May 2013	3,972	-
East of Willow Ave	WB	December 2015	3,766	-
Willow Ave to Pine St	EB + WB	Average	10,300	60 km/h

The traffic volumes provided for review were collected over various dates, which yields a wide range of volumes. Based on the average volumes, the AADT within the study area ranges approximately between 10,000 and 15,000. The Geometric Design Standards for Ontario Highways (GDSOH)⁸ describes urban collector roadways as having an average daily traffic range between 1,000 and 20,000 vehicles. The 24-hour volumes recorded along Northern Avenue fall in the mid-range based on GDSOH's descriptions. According to the TAC Geometric Design Guide⁹, Northern Avenue could be classified either as an urban commercial collector (up to 12,000 vehicles per day) or as an urban minor arterial (up to 20,000 vehicles per day). The classification of Northern Avenue based on both guidelines is therefore consistent with the City of Sault Ste. Marie TMP road classification.

Overall, the 85th percentile speed recorded on Northern Avenue ranges from 34 to 70 km/h. However, the study that reported 34 km/h is likely to be atypical. If this study is not considered, operating speeds along Northern Avenue range between approximately 50 and 70 km/h.

2.3 Pedestrian Facilities

Pedestrians are accommodated with 1.3 to 1.5 metre wide sidewalks located on both sides of Northern Avenue. Depressed curbs are also present at all intersection sidewalk approaches as illustrated in **Figure 5**.

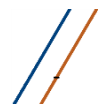


Figure 5: Depressed Curb on Northern Avenue at Anita Boulevard¹⁰

⁸ Geometric Design Standards for Ontario Highways (Table A5-5, p. A5-15)

⁹ TAC Geometric Design Guide (Table 1.3.4.2, p. 1.3.4.3)

¹⁰ Google Maps, <https://www.google.ca/maps/dir//46.5343046,-84.2991819/@46.5343184,84.3341229,214m/data=!3m1!1e3!4m2!4m1!3e0>



Crossing opportunities for pedestrians are provided at signalized intersections every 200 to 600 metres. Ontario Traffic Manual (OTM) Book 15 does not state any specific guidance for distances to which crossing opportunities should be provided, therefore, it should be established by the local road authority according to local conditions.¹¹ The spacing provided is similar to what would be found in similar areas in other municipalities, and can be considered reasonable. Crosswalk pavement markings accompanied by stop bars are provided at all the signalized intersections in the study area.

2.4 Bicycle Facilities

Dedicated bicycle facilities are currently not present on Northern Avenue resulting in bicyclists having to share the road with vehicular traffic and parked vehicles (where parking is permitted). As discussed in section 2.2, the existing traffic volumes along Northern Avenue range between approximately 10,000 and 15,000 and 85th percentile speeds range between 50 and 70 km/h. Based on OTM Book 18's Desirable Cycling Facility Pre-selection Nomograph, illustrated in **Figure 6**, a designated cycling operating space such as exclusive bicycle lanes or a separate facility such as separate bicycle lanes would be appropriate for Northern Avenue. Although volumes are relatively high, the range of operating speeds places Northern Avenue in the 'transition' area between these two types of facilities. Considering that a road diet is expected to influence drivers to reduce their speed, bicycle lanes can be considered adequate if operating speeds can be maintained between 50 and 60 km/h.

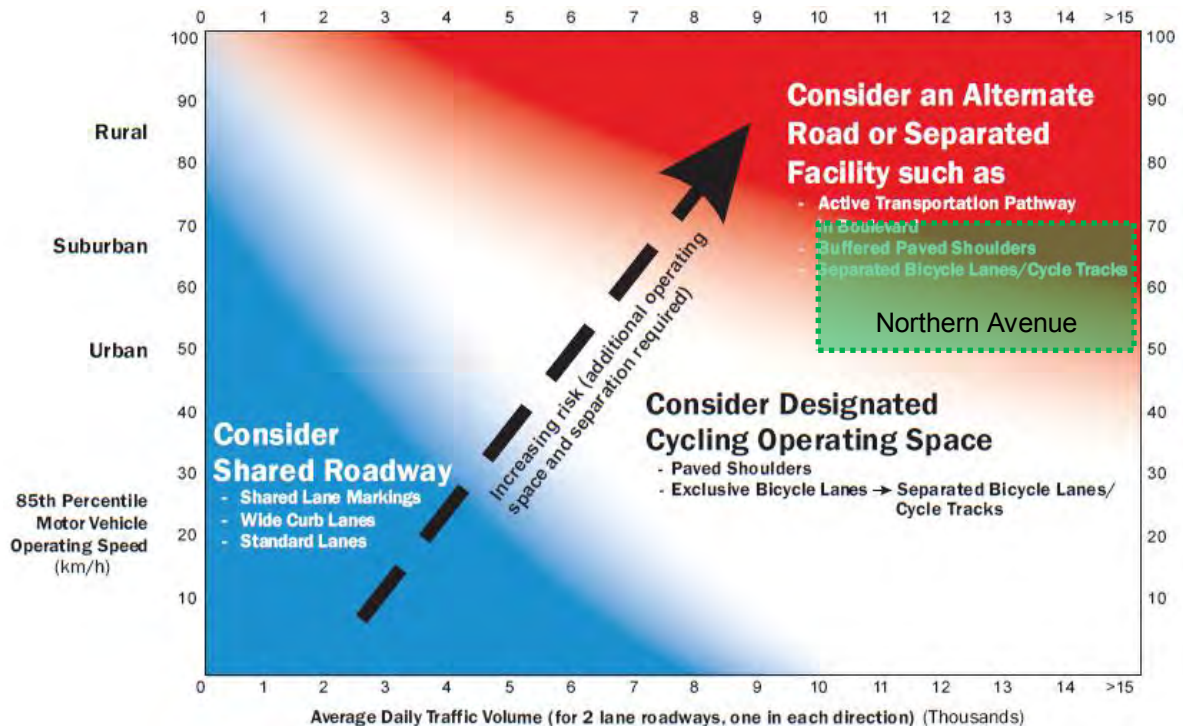


Figure 6: Desirable cycling Facility Nomograph¹²

¹¹ OTM Book 15 (p. 47)

¹² OTM Book 18 (Figure 3.3, p. 30)



Drainage grates around catch basins were also noted along Northern Avenue as illustrated in **Figure 7**. These grates may increase the risk to bicyclists due to depressions created in the roadway, becoming slippery when wet and/or through the formation of potholes around the drainage grate frame.



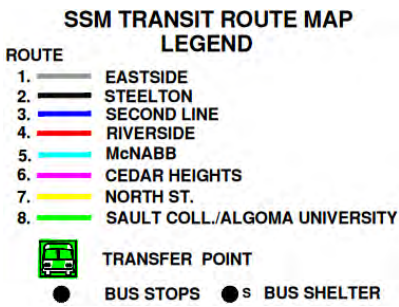
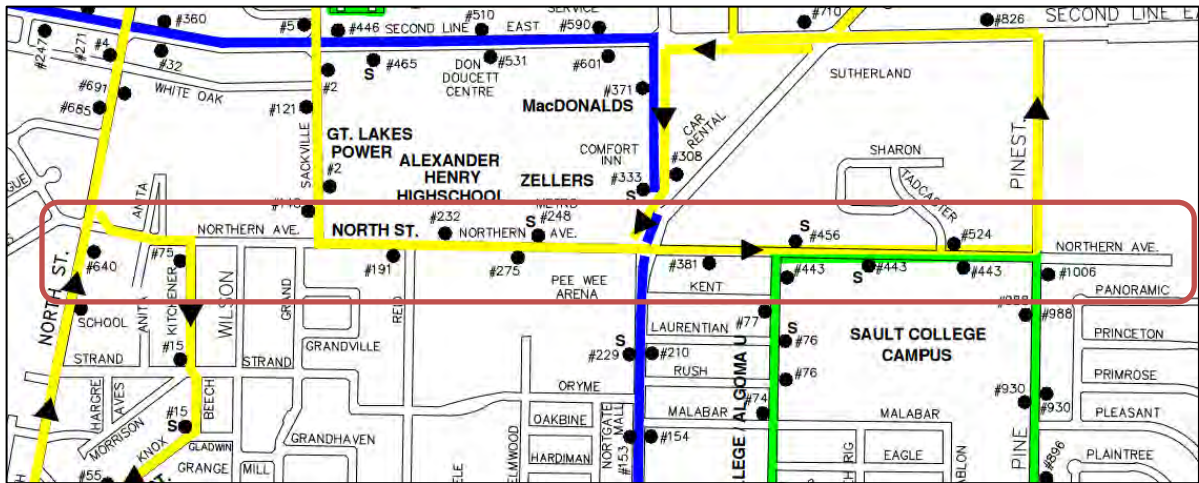
Figure 7: Drainage Grate on Northern Avenue¹³

2.5 Transit Services

Although subject to changes in the near future, at the time of writing the present report Northern Avenue was served by public transit. As illustrated in **Figure 8**, Sault Ste. Marie Transit operates two bus routes along Northern Avenue: #7 North Street and #8 Sault College/Algoma University. The #7 North Street route services Northern Avenue between Sackville Road/Grand Boulevard and Great Northern Road on the westbound route. On the eastbound route #7 operates on Northern Avenue between Sackville Road/Grand Boulevard and Pine Street, and between North Street and Kitchener Road.

The #8 Sault College/Algoma University route services Northern Avenue between Willow Avenue and Pine Street. Both routes provide Monday to Friday service with departures every 30 minutes from 5:45 AM to 6:15 PM. Hourly service begins at 7:15 PM and ends at 12:10AM. Weekend service is also hourly.

¹³ Google Earth, August 2012, Northern Avenue approximately 400m east of Great Northern Road



Focus Area

Figure 8: Sault Ste. Marie Transit Route Map¹⁴

Northern Avenue has 5 and 4 transit stops in the eastbound and westbound directions, respectively. The majority of bus stops are marked with transit signs mounted on hydro/illumination poles or wooden posts (Figure 9).



Figure 9: Typical Transit Stop Sign¹⁵

¹⁴ City of Sault Ste. Marie, Transportation Master Plan, January 2015, Transit Route Map

¹⁵ Google Maps, Northern Avenue between Reid Street and Great Northern Avenue, City of Sault Ste. Marie

B000699

2.6 Parking Restrictions

Parking is prohibited through most of study area. On the north and south side of Northern Avenue, parking is prohibited from North Street to Pine Street at all times.¹⁶ “No Parking” signs are present along the corridor on hydro/illumination poles or wooden posts. East of Pine Street, parking is permitted on both sides of the road adjacent to residential lands after 2pm except from September 1st to June 15th, weekends and holidays excepted.¹⁷

2.7 Left-turn Operations

The current configuration of Northern Avenue may require drivers attempting to turn left into residential or commercial driveways to wait for gaps in opposing traffic while standing on the left-side lane. This could create the risk of rear end collisions.

Exclusive left turn lanes for east and westbound traffic are provided on Northern Avenue at the intersection with Great Northern Road and for westbound traffic turning left onto North Street. The remaining intersections present shared through/left-turn lanes.

At the intersection of Northern Avenue and Great Northern Road, commercial developments are present at all corners of the intersection. Additionally, the development along the south side of Northern Avenue west of Great Northern Avenue is highly commercial. These developments may potentially cause issues for vehicles attempting to enter and exit the parking lots as accesses are frequent and fairly close to the intersection. Access to Sault College and an affiliated residence, between Willow Avenue and Pine Street, may also cause traffic congestion and greater risk for westbound drivers waiting for gaps in traffic to turn left.

2.8 Review of Traffic Operations

2.8.1 Intersection Volumes and Lane Configurations

Traffic volume data, in the form of Turning Movement Counts (TMC) were collected by the City on the dates shown in **Table 4** and utilized in the operational analysis. The referenced traffic volume data are provided in **Appendix A**. Traffic signal timing plans were also provided by the City and are provided in **Appendix B**.

¹⁶ City of Sault Ste. Marie, By-law No. 77-200 Schedule A, June 13, 2016
¹⁷ City of Sault Ste. Marie, By-law No. 77-200 Schedule A, June 13, 2016



Table 4: Turning Movement Counts

Intersection	Date
Northern Ave & North St	Tuesday, September 27, 2016
Northern Ave & Grand Blvd/Sackville Rd	Tuesday, July 07, 2015
Northern Ave & Great Northern Rd	Tuesday, May 26, 2015
Northern Ave & Willow Ave	Thursday, December 03, 2015
Northern Ave & Pine St	Wednesday, May 13, 2015

Because the counts were conducted on different dates, the peak hours were slightly different for each intersection. The TMCs were reviewed in order to determine the analysis period based on total entering volumes at all intersections (**Figure 10**). The resulting peak hours were 8:00 to 9:00 and 16:00 to 17:00.

The turning movement volumes utilized in the operational analysis are illustrated in **Figure 11**, and existing lane configurations are illustrated in **Figure 12**.

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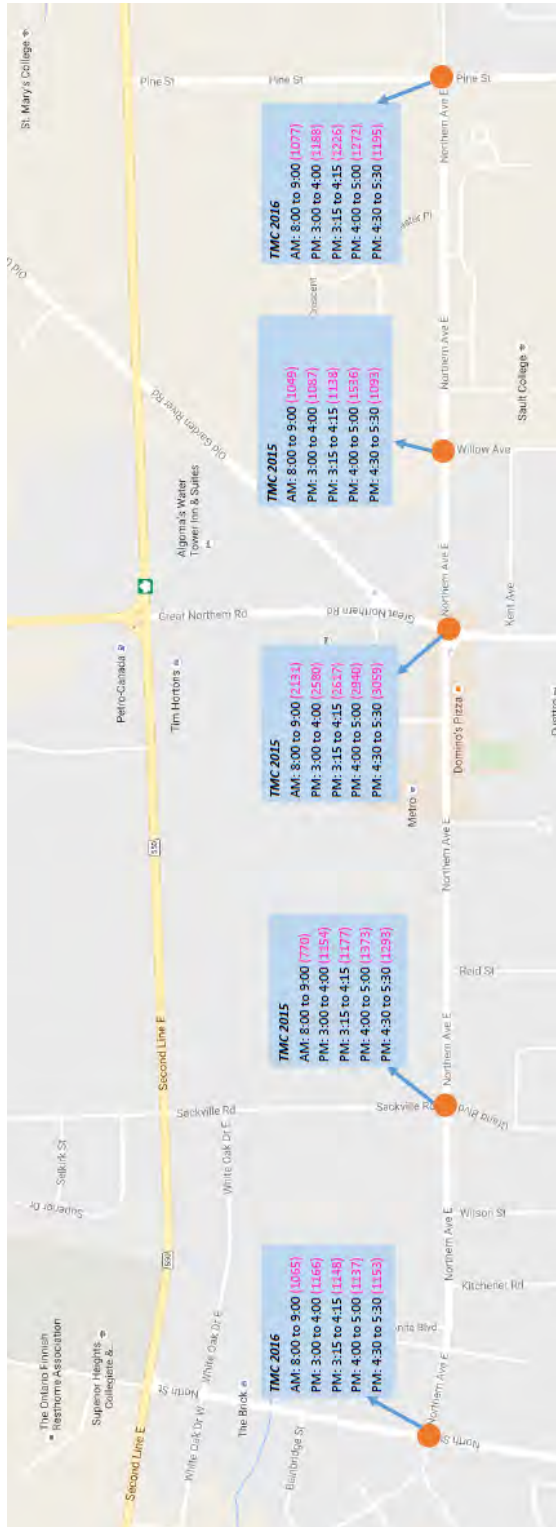


Figure 10: Total Entering Volumes for Different Peak Hours

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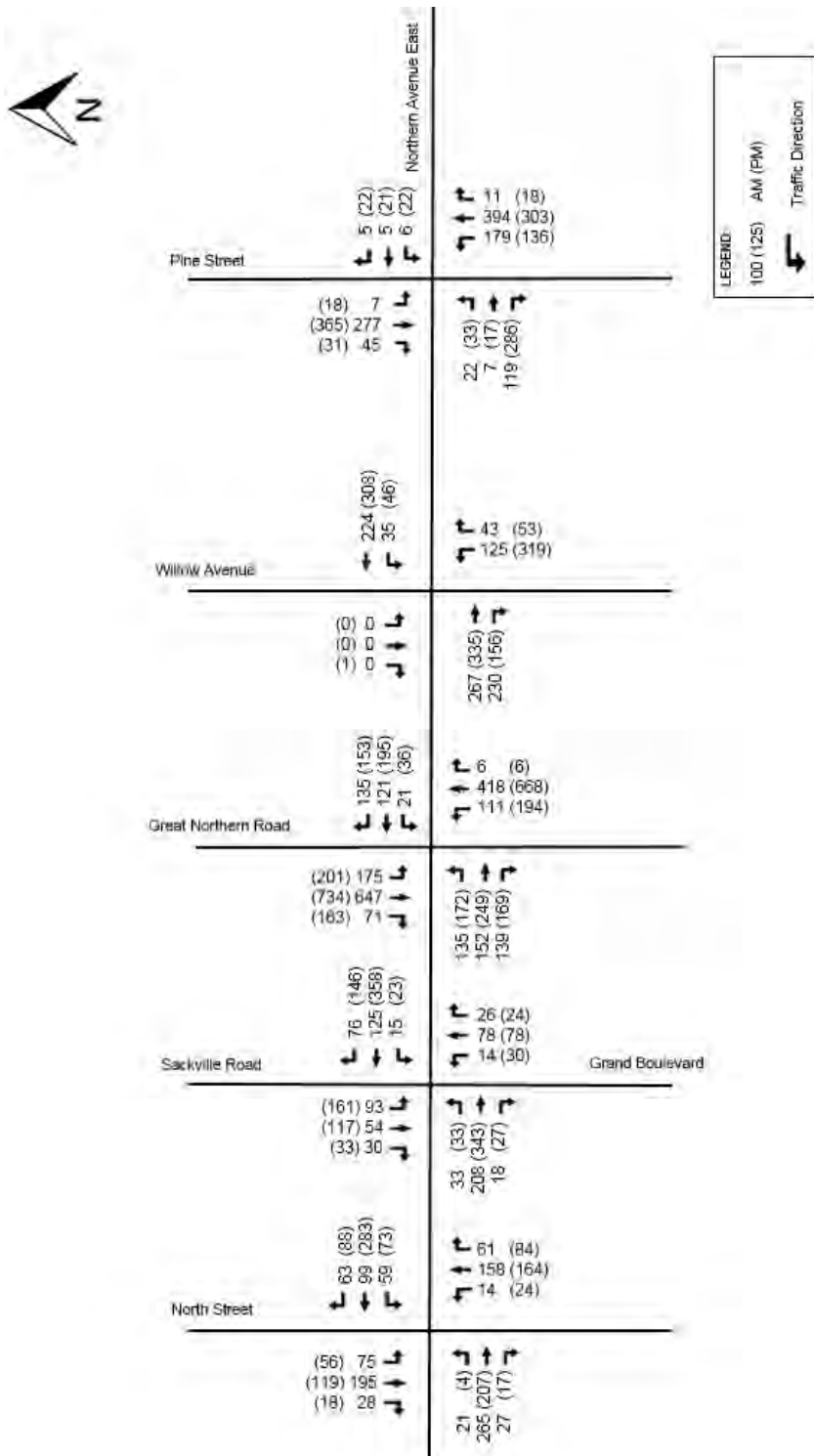


Figure 11: Existing Turning Movement Volumes

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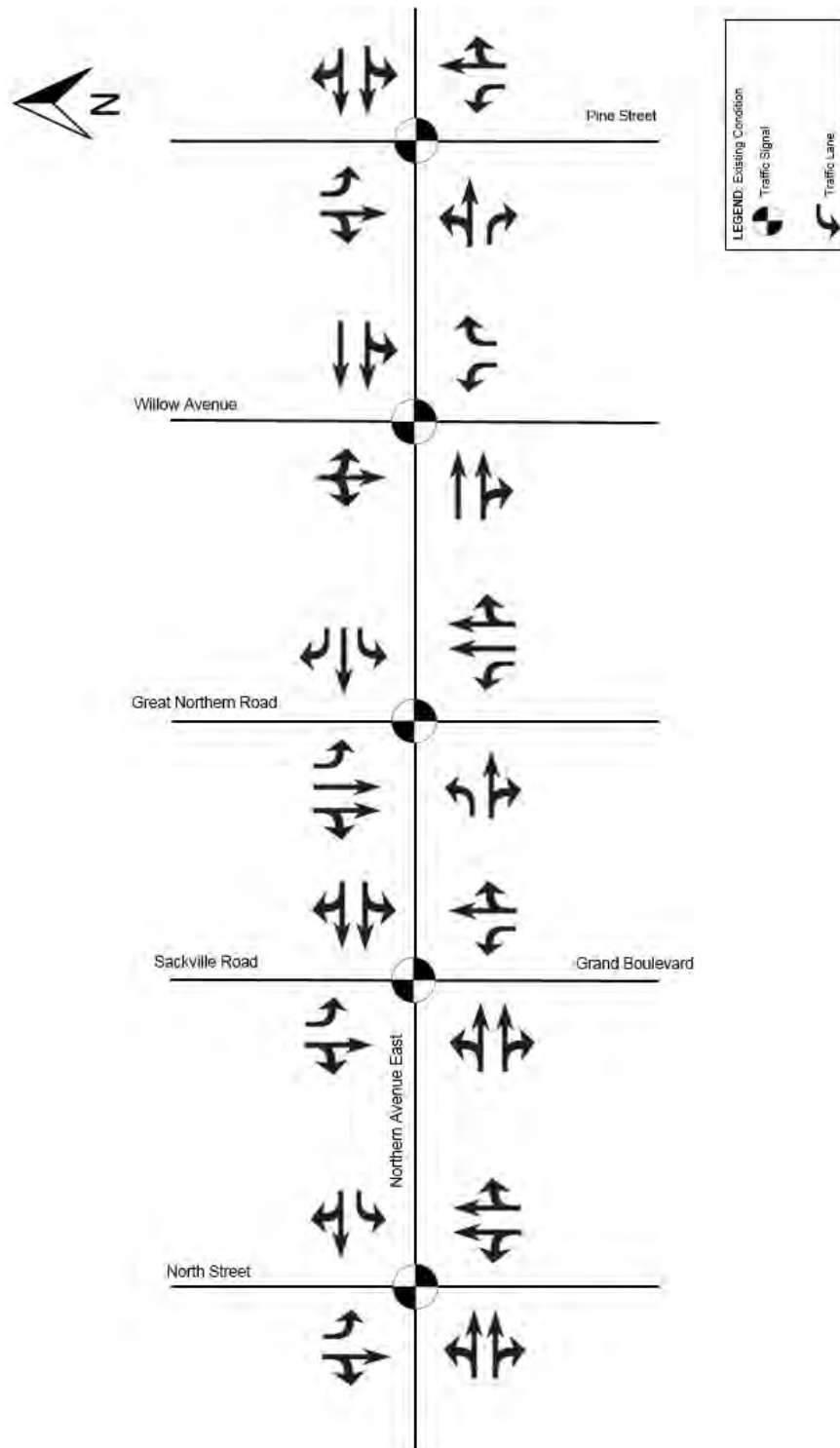


Figure 12: Northern Avenue Lane Configurations

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2.8.2 Existing Intersection Operations

An intersection operational analysis was undertaken for signalized intersections along the Northern Avenue corridor to determine the existing conditions. The results of the analysis for signalized intersections are summarized in **Table 5** below. Synchro reports are provided in **Appendix C** for further reference.

Table 5: Existing Conditions Operational Analysis

Direction	Mov.	Storage Length	AM Peak Hour				PM Peak Hour			
			V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Northern Ave E & North St										
EB	LTR	-	0.25	16.6	B	38	0.17	17.2	B	36
WB	L	-	0.16	16.3	B	23	0.17	9.4	A	17
	TR	-	0.21	16.5	B	31	0.51	11.6	B	35
NB	LTR	-	0.18	16.6	B	43	0.21	18.2	B	48
SB	L	16	0.20	17.4	B	27	0.15	18.1	B	22
	TR	-	0.34	18.9	B	44	0.20	18.5	B	37
Overall		-	0.29	17.1	B	-	0.36	15.3	B	-
Northern Ave E & Grand Blvd/Sackville										
EB	LTR	-	0.22	15.6	B	30	0.34	18.5	B	44
WB	LTR	-	0.15	15.0	B	26	0.41	20.8	C	61
NB	L	21	0.03	13.5	B	8	0.07	16.4	B	15
	TR	-	0.13	14.4	B	22	0.13	17.0	B	23
SB	L	30	0.20	15.3	B	23	0.33	19.9	B	37
	TR	-	0.10	14.1	B	21	0.20	17.8	B	36
Overall		-	0.21	15.0	B	-	0.37	19.3	B	-
Northern Ave E & Great Northern Rd										
EB	L	-	0.26	17.6	B	36	0.44	24.7	C	52
	TR	-	0.44	26.1	C	52	0.78	46.3	D	124
WB	L	26	0.06	23.7	C	7	0.18	19.2	B	21
	T	-	0.23	28.4	C	30	0.45	29.8	C	60
	R	-	0.10	26.7	C	26	0.12	25.4	C	24
NB	L	80	0.47	27.8	C	29	0.79	43.7	D	57
	TR	-	0.55	38.4	D	56	0.67	38.0	D	77
SB	L	80	0.49	23.6	C	45	0.65	27.5	C	63
	TR	-	0.84	46.2	D	82	0.90	50.9	D	98
Overall		-	0.59	34.8	C	-	0.82	40.6	D	-

B000699

Northern Ave E & Willow Ave										
EB	TR	-	0.26	16.0	B	55	0.29	9.5	A	42
WB	LT	-	0.20	15.4	B	32	0.27	16.3	B	42
NB	L	23	0.29	28.4	C	36	0.74	42.7	D	63
	R	-	0.03	24.5	C	20	0.04	24.6	C	93
SB	LTR	-	-	-	-	-	0.00	24.1	C	-
Overall		-	0.27	17.9	B	-	0.47	20.9	C	-
Northern Ave E & Pine St										
EB	LT	-	0.07	23.7	C	17	0.11	24.4	C	22
	R	-	0.09	24.0	C	25	0.21	25.7	C	47
WB	LTR	-	0.01	23.1	C	9	0.06	23.5	C	18
NB	L	42	0.43	18.2	B	44	0.37	17.5	B	40
	TR	-	0.47	17.5	B	71	0.37	15.9	B	55
SB	L	30	0.02	12.0	B	8	0.04	12.3	B	12
	TR	-	0.37	15.8	B	57	0.45	17.1	B	75
Overall		-	0.32	18.0	B	-	0.36	19.3	B	-

Queues highlighted in red exceed available storage length

The results indicate that all movements, approaches and intersections are operating at a LOS D or better under existing conditions, with most operating at LOS B. All v/c ratios are within acceptable target values set in the City's Transportation Master Plan and HCM Guidelines. 95th percentile queues range between 7 and 124 metres for the through movements. The eastbound through movement on Northern Avenue at Great Northern Road yields the 124-metre queue during the PM Peak Hour and the intersection operates at an overall LOS D. 95th percentile queues range between 9 and 63 metres for the left turn movements. No queues along Northern Avenue exceed available storage or interfere with upstream signalized intersections. However, some approaches along the minor side streets present queues that exceed available storage (most notably Willow Avenue northbound, where the 95th percentile queue reaches 63 metres, 40 metres in excess of available storage).

3. Proposed Road Diet Cross Section

A typical road diet involves the removal of one travel lane in each direction and the introduction of a centre two-way left-turn lane (where needed, in areas of multiple accesses with regular usage). The remaining pavement width is then reallocated for other uses and travel modes such as bicycle lanes, parking lanes, pedestrians or transit users. However, without incurring excessive reconstruction costs, any proposed roadway configuration is limited to the available width between the curbs of the existing roadway. As noted previously in **Section 2.1**, the existing width available along the North Park Street corridor is approximately 12.4 to 13.2 metres (curb-to-curb),

The initial intention for the Northern Avenue Road Diet was to provide a cross-section including:

- + Two through travel lanes, one in each direction;
- + A centre two-way left-turn lane median; and

- + Two exclusive bicycle lanes, one in each direction.

Using minimum lane widths from various industry standards and guidelines, including the Geometric Design Standards for Ontario Highways (GDSOH), TAC Geometric Design Guide for Canadian Roads, and Ontario Traffic Manual (OTM) Book 18 – Cycling Facilities, the cross-sections illustrated in **Figure 13** and **Figure 14** would require a roadway width of at least 12.65 metres (with gutters) and 13.25 metres (without gutters), respectively. These requirements exceed the width currently available on some sections of Northern Avenue.

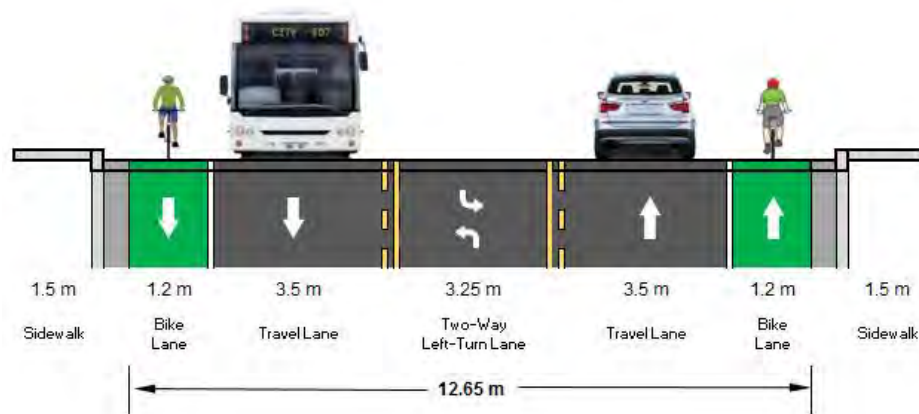


Figure 13: Cross-Section with Minimum Lane Widths per Standards and Guidelines (with gutters)

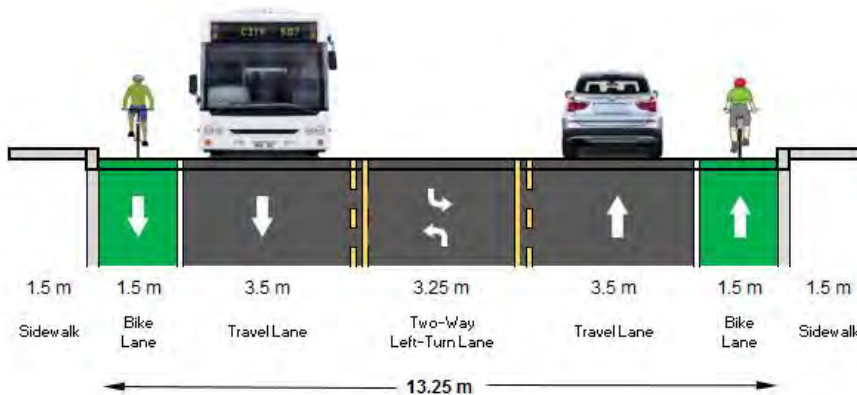


Figure 14: Cross-Section with Minimum Lane Widths per Standards and Guidelines (without gutters)

As discussed in Section 2.1, the cross-section for Northern Avenue between North Street and Sackville Road/Grand Boulevard (Section A) includes gutters on the north and south sides of the road. To the east, the cross-sections do not include gutters on both sides of the roadway. Between Sackville Road and Great Northern Road (Section B) gutters are present on the south side of the road. Between Great Northern Road and Pine Street (Section C and D), gutters are not provided on either side of the roadway and the available roadway width is measured from curb-to-curb. Therefore, three different

B0000699

cross-sections are proposed along Northern Avenue (as discussed in the following sections), all of which include two travel lanes, a two-way left-turn lane and bicycle lanes.

3.1 North Street to Sackville Road/ Grand Boulevard

The reduced cross-section available to traffic between North Street and Sackville Road (Section A) provides a total roadway width of 12.4 metres (**Figure 15**). In order to accommodate this narrow roadway, the travel lanes and two-way left-turn lane have been slightly reduced from the minimum dimensions. Given that the roadway is adjacent to 30 cm gutters, OTM Book 18 indicates that 1.2 metre wide bicycle lanes are sufficient as the gutters can be utilized by cyclists.¹⁸

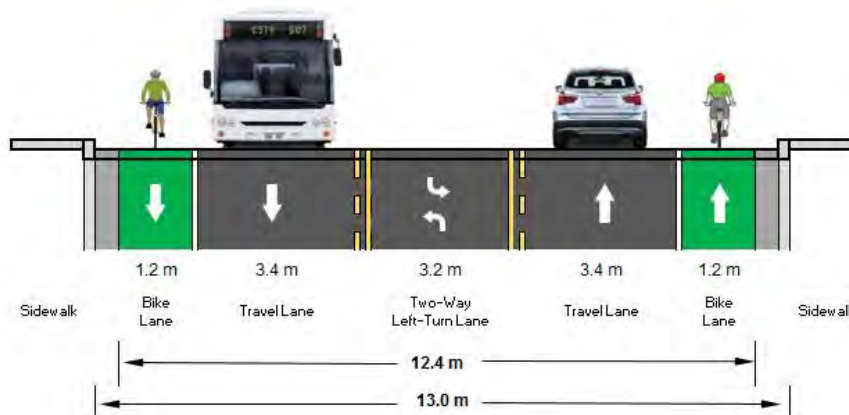


Figure 15: Proposed Road Diet Configuration between North Street and Sackville Road (Section A)

3.2 Sackville Road to Great Northern Road

Between Sackville Road and Great Northern Road (Section B), the total roadway width is 12.9 metres (**Figure 16**). This section includes 3.5 metre through lanes which meet the standards outlined in GDSOH¹⁹ and TAC²⁰. On the south side of the roadway, 30-cm gutter are provided allowing for a 1.2 metre wide bicycle lane. On the north side of the roadway, a 1.5 metre wide bicycle lane is included as adjacent gutters are not present.

¹⁸ OTM Book 18 (Figure 4.19)

¹⁹ Geometric Design Standards for Ontario Highways (Table D2-4 and D2-5, p. D2-3)

²⁰ TAC Geometric Design Guide (Table 2.2.2.3, p. 2.2.2.2)



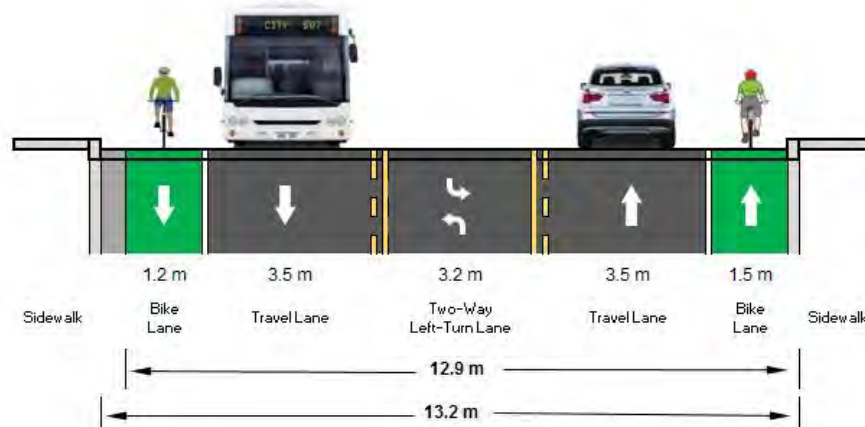


Figure 16: Proposed Configuration between Sackville Road and Great Northern Road (Section B)

3.3 Great Northern Road to Pine Street

Between Great Northern Road and Pine Street (Sections C and D), the available curb-to-curb roadway width is 12.4 metres (Figure 17). Sufficient roadway width is not provided to accommodate the minimum lanes widths outlined in Figure 14. As such, the existing lane widths of 3.1 metres will be maintained with 1.5 metre wide bicycle lanes and a 3.2-metre two-way left-turn lane.

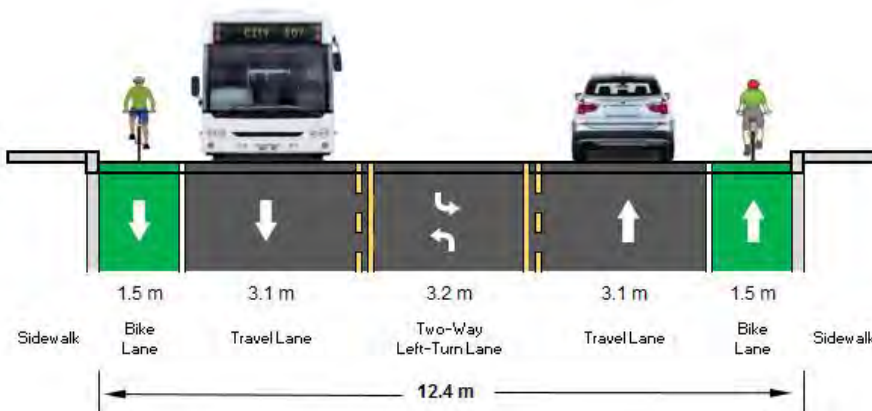


Figure 17: Proposed Road Diet Configuration between Great Northern Road and Pine Street (Section C and D)

3.4 Intersections

OTM Book 11, Figure 34 – Two-way Left-turn Lane, provides guidance for most signalized intersections along Northern Avenue where the two-way left-turn lane turns into an exclusive left-turn lane. The exception is the intersection with Great Northern Road, where the lane configuration is to remain as existing, due to expected operational shortcomings resulting from a similar configuration, and to limited right-of-way available for widening.

As illustrated in Figure 18, OTM Book 18 provides guidance for bicycle treatments at intersections in order to safely guide cyclists through the intersections. At the intersection of Great Northern Road and

B0000699

Northern Avenue, however, bicycle lanes cannot be carried through the intersection due to the need to maintain the existing lane configuration. Therefore, **Figure 19** provides guidance for bicycle lanes that are interrupted upstream of the intersection and re-introduced downstream of the intersection.

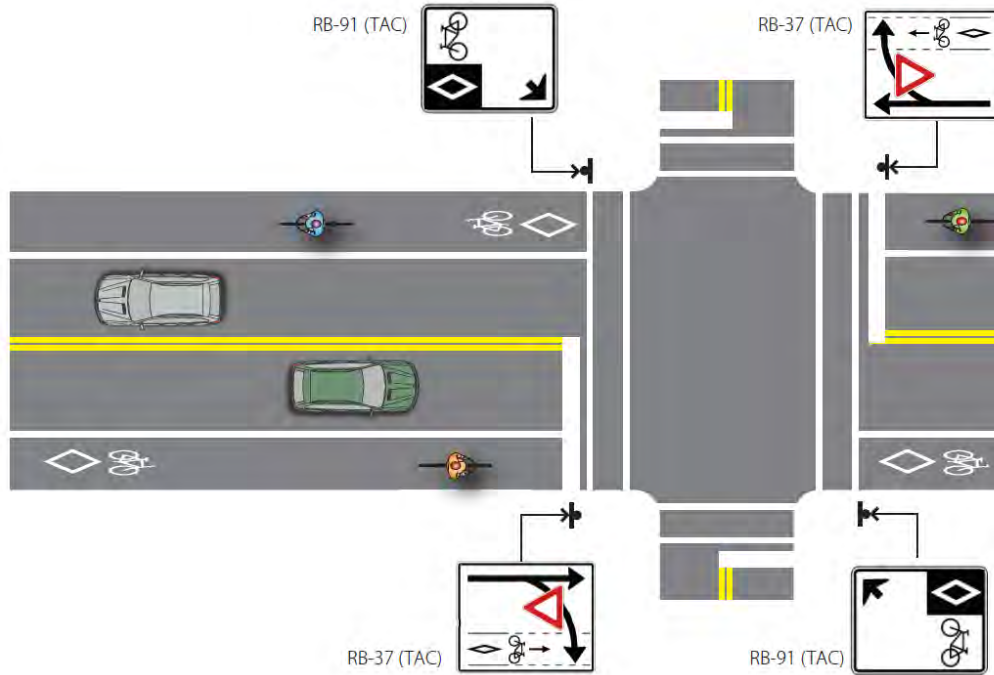


Figure 18: Bicycle Lanes Adjacent to Combined Through/ Right-Turn Lane²¹

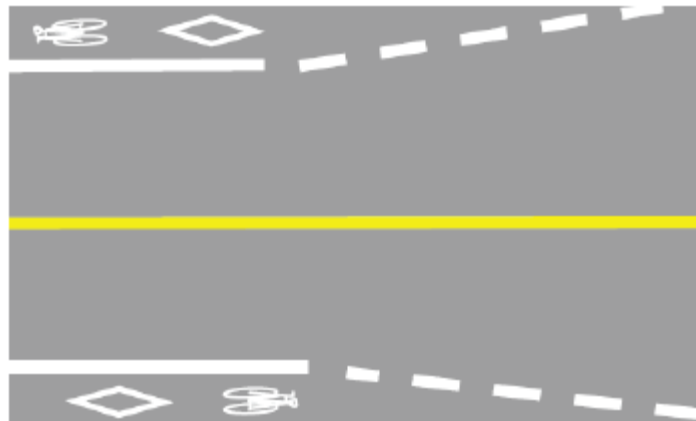


Figure 19: Taper for Introduced and Discontinued Bicycle Lanes²²

²¹ OTM Book 18 (Figure 4.40)

²² OTM Book 18 (Figure 4.32)

B000699



4. Expected Benefits and Disbenefits of Proposed Road Diet

4.1 Safety

According to the FHWA Road Diet Informational Guide, road diets can improve the safety of a roadway and reduce the amount of vehicle-to-vehicle conflicts that contribute to rear-end, left-turn, and sideswipe collisions. Because collision data for Northern Avenue was not provided for review, the potential safety benefits of a road diet are evaluated qualitatively only.

As previously discussed, the proposed road diet for Northern Avenue will consist of two lanes with a two-way left-turn lane (TWLTL). Without the TWLTL, the potential risk for rear-end collisions could be increased as vehicles need to wait behind the stopped vehicle. On a four-lane roadway, this may not be a significant issue as motorists can bypass the left-turning vehicles using the curb travel lane, although the risk of sideswipe collisions still exists due to the bypassing manoeuvres. The TWLTL provides a space for motorists to wait in order to safely perform a left-turn and thereby reduces the risk of rear end or sideswipe collisions associated with left-turn manoeuvres.

A reduction in travel speed is also expected with only two travel lanes. By reducing the number of travel lanes, it eliminates the opportunity for drivers to weave in and out of traffic at high speeds to pass slower or stopped vehicles. The proposed bicycle lanes along Northern Avenue are also expected to reduce the risk of collisions involving cyclists as they no longer need to share space with motor vehicles, and can avoid cycling on sidewalks, reducing conflicts with pedestrians. Reduced speeds and the separation of the bicycle lanes also create a perceived sense of increased safety and a more comfortable environment for other users such as bicyclists and pedestrians.

4.2 Bicycle Lanes

Exclusive bicycle lanes are often an essential element of a road diet. They are an important element of multi-modal, livable streets and have a tremendous impact on the mobility and safety of bicyclists. Providing bicycle lanes on Northern Avenue will improve the cycling environment, and could potentially improve safety for pedestrians as well by reducing the likelihood of cyclists riding on the sidewalk. Since there will only be one travel lane per direction, bicycle lanes will also provide space for vehicles to temporarily stop to allow emergency vehicles to pass (although the current configuration with four lanes provides more space for emergency vehicles to manoeuvre). By providing an exclusive bicycle lane on Northern Avenue and enhancing the comfort level of the corridor, more active transportation users would be encouraged to use the roadway.

Catch basin drainage grates, which may potentially be a safety hazard, will be located within the path of bicyclists in the proposed cross-section for Northern Avenue. According to OTM Book 18, the use of curbside inlets is ideally preferred as it completely eliminates a bicyclist's exposure to grate inlets. However, if grates are to be placed within a bicyclist's path, only bicycle-safe grates with perpendicular or diagonal openings to the line of travel should be used. Current existing drainage grates were determined to be curbside inlets or square flat grates with herring bone opening. This is acceptable as per OTM Book 18 guidance, however, the potential for slipping during wet conditions is still a possibility for bicyclists, although this can be mitigated by texturing.

4.3 Parking

Because parking is prohibited from North Street to Pine Street, the road diet will have no impact on parking availability or operations.

4.4 Transit

After the implementation of a road diet, buses servicing Northern Avenue will need to stop on the bicycle lane and partially on the traffic lane, potentially causing delays to cyclists and motorists and the risk of rear end or sideswipe collisions. However, these delays and collision risks are expected to be insignificant due to the low frequency of buses operating along the corridor. Bus routes 7 and 8 operate on a 30 minute frequency during peak periods and hourly during off-peak periods and weekends. Another potential issue may occur when stopped buses completely or partially block the only available through travel lane, which may encourage motorists to perform unsafe manoeuvres by passing buses on the two-way left-turn lane.

5. Traffic Operations – Future Conditions with Road Diet

This section presents the results of the intersection operations analysis for future scenarios with the implementation of a road diet. Future operations were reviewed for a 10-year horizon (2026) in order to evaluate long term effects of the proposed road diet.

5.1 Future Intersection Lane Configurations

As part of the analysis for future conditions, the changes to the existing lane configurations of Northern Avenue were included in the Synchro model, as illustrated in **Figure 20**. With the exception of Great Northern Road, eastbound and westbound lanes at signalized intersections were reconfigured as a shared through/right lane and an exclusive left-turn lane (an extension of the TWLTL). Great Northern Road will maintain the existing lane configuration.

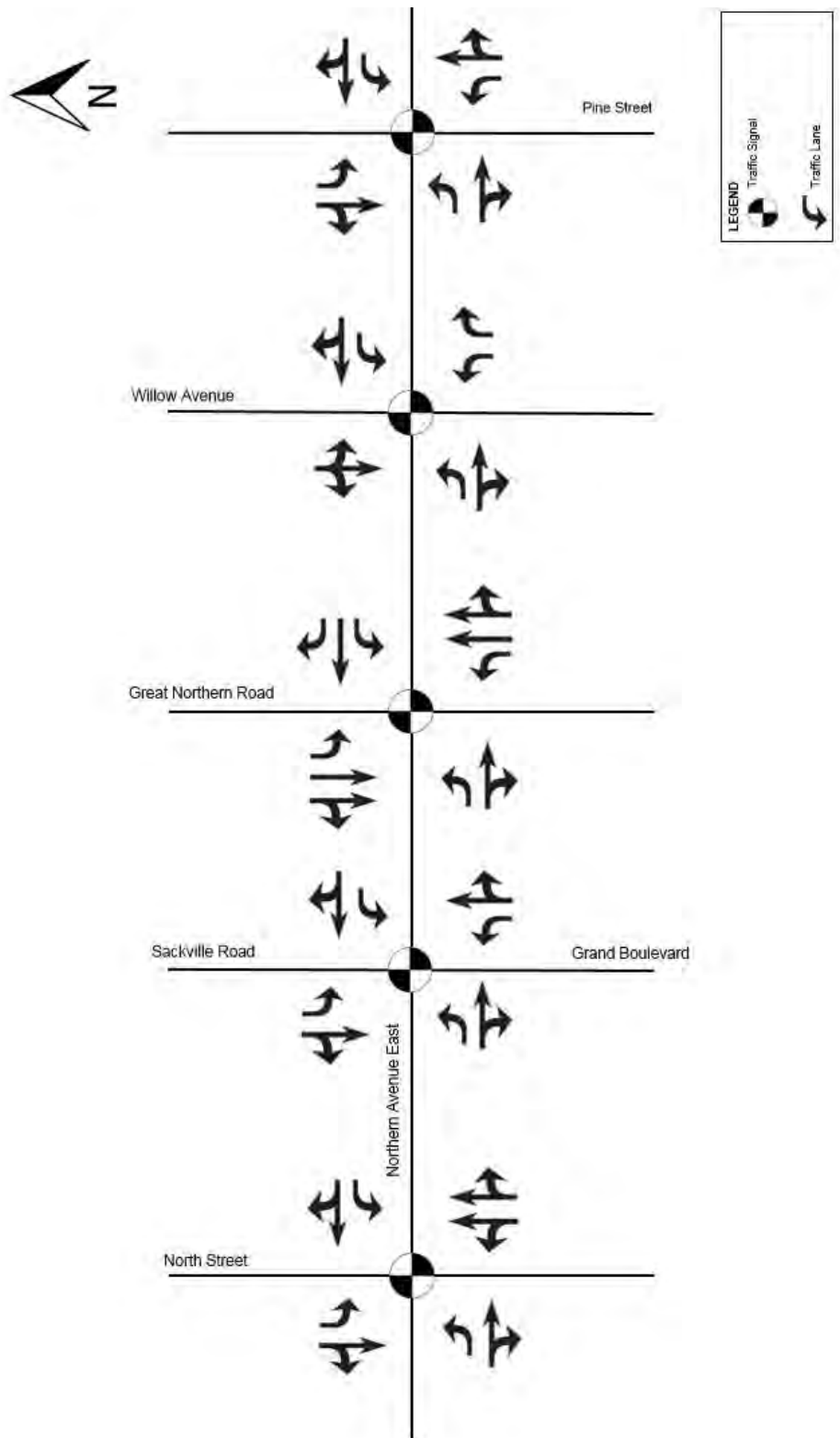


Figure 20: Northern Avenue - Intersection Lane Configurations with Road Diet

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5.2 Traffic Forecasting

A 1% annual growth rate, in accordance with the City's Transportation Master Plan, was applied to the 2015 and 2016 TMC volumes to project future volumes (2026 horizon year) as illustrated in **Figure 21**.

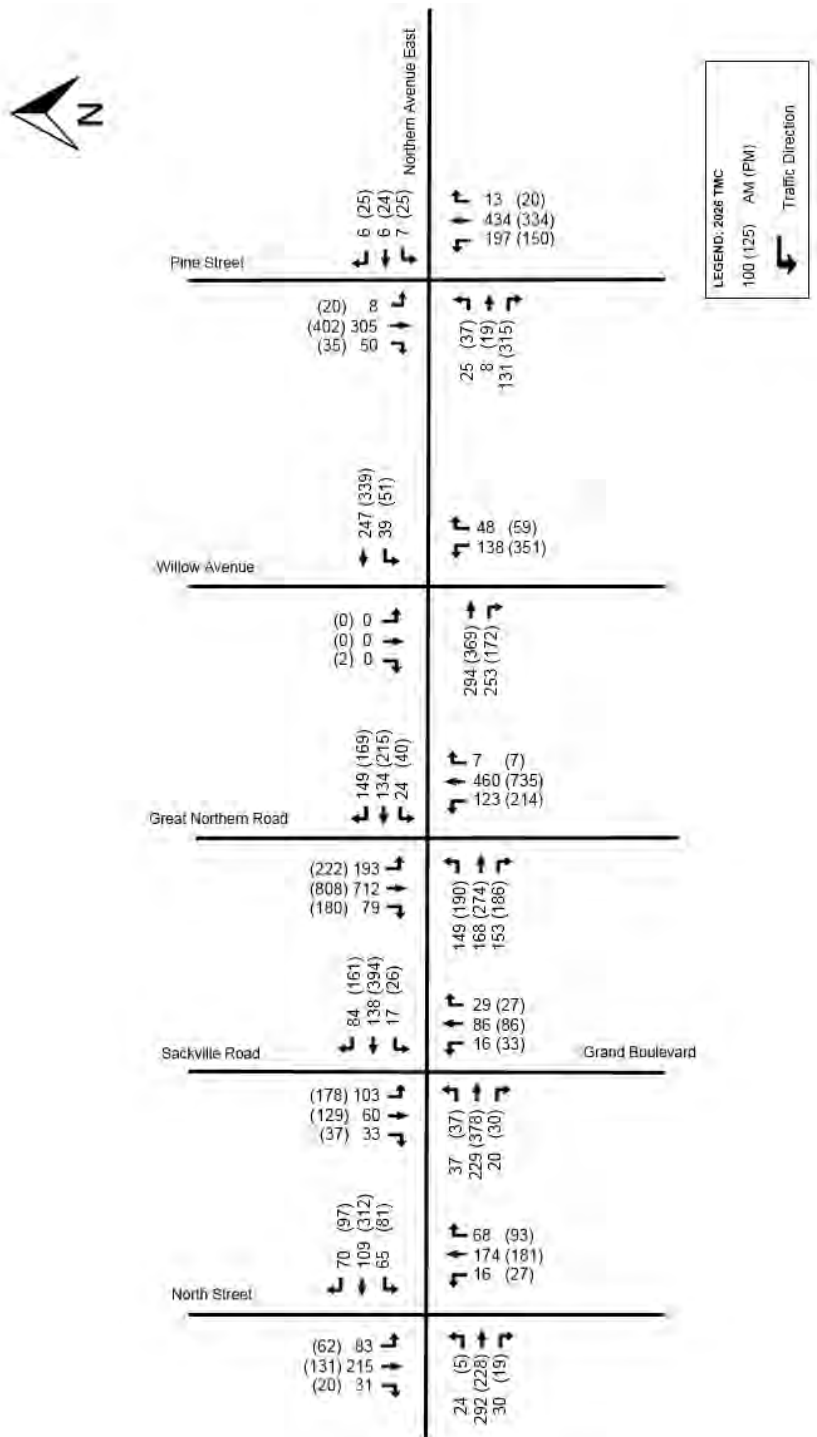


Figure 21: Northern Avenue – Future Volumes

B000699

5.3 Future Intersection Traffic Operations

Table 6 summarizes the traffic operations for signalized intersections in 2026, during the AM and PM peak hours, with the changes to intersection configurations. Synchro reports are provided in **Appendix C** for further reference.

Table 6: 2026 Future Intersection Operations with Road Diet

Direction	Mov.	Storage Length	AM Peak Hour				PM Peak Hour			
			V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Northern Ave E & North St										
EB	L	20	0.05	15.0	B	17	0.01	15.9	B	8
	TR	-	0.46	20.0	C	61	0.35	19.7	B	54
WB	L	40	0.21	17.2	B	27	0.21	9.2	A	24
	TR	-	0.23	16.8	B	35	0.57	10.4	B	43
NB	LTR	-	0.20	16.8	B	38	0.24	18.5	B	47
SB	L	16	0.22	17.9	B	31	0.17	18.5	B	25
	TR	-	0.38	19.4	B	52	0.22	18.7	B	39
Overall		-	0.42	18.3	B	-	0.40	15.5	B	-
Northern Ave E & Grand Blvd/Sackville										
EB	L	40	0.09	14.7	B	19	0.23	18.7	B	32
	TR	-	0.37	17.7	B	48	0.58	22.3	C	88
WB	L	40	0.04	14.2	B	9	0.09	17.6	B	31
	TR	-	0.31	17.0	B	37	0.80	33.8	C	114
NB	L	21	0.03	13.5	B	9	0.07	16.5	B	14
	TR	-	0.15	14.5	B	21	0.14	17.1	B	25
SB	L	30	0.22	15.6	B	30	0.36	20.6	C	44
	TR	-	0.11	14.2	B	23	0.22	18.0	B	40
Overall		-	0.29	16.2	B	-	0.58	25.2	C	-
Northern Ave E & Great Northern Rd*										
EB	L	40	0.36	18.7	B	40	0.54	21.4	C	48
	TR	-	0.47	22.4	C	60	0.71	28.9	C	136
WB	L	26	0.09	24.7	C	9	0.21	27.3	C	14
	T	-	0.29	27.0	C	33	0.47	30.1	C	51
	R	50	0.11	24.8	C	27	0.13	25.0	C	35
NB	L	80	0.53	22.1	C	28	1.00	82.8	F	74
	TR	-	0.52	28.5	C	53	0.84	38.4	D	92
SB	L	80	0.52	17.9	B	42	0.81	34.1	C	81
	TR	-	0.80	33.9	C	65	1.01	59.7	E	132
Overall		-	0.66	27.3	C	-	0.92	43.8	D	-

B000699

Northern Ave E & Willow Ave										
EB	L	Emergency Vehicles Only								
	TR	-	0.66	24.7	C	107	0.65	13.1	B	104
WB	L	40	0.16	16.1	B	29	0.20	16.9	B	31
	TR	-	0.30	16.9	B	79	0.41	18.6	B	82
NB	L	23	0.32	29.0	C	39	0.81	48.7	D	60
	R	-	0.04	24.6	C	23	0.05	24.7	C	119
SB	LTR	-	-	-	-	-	0.00	24.1	C	-
Overall		-	0.52	23.1	C	-	0.72	24.5	C	-
Northern Ave E & Pine St										
EB	L	40	0.06	23.7	C	15	0.10	24.2	C	33
	TR	-	0.11	24.3	C	31	0.27	26.6	C	73
WB	L	40	0.02	23.2	C	9	0.11	24.7	C	16
	TR	-	0.02	23.1	C	8	0.06	23.6	C	19
NB	L	42	0.50	20.4	C	59	0.45	19.6	B	45
	TR	-	0.52	18.4	B	82	0.41	16.5	B	64
SB	L	30	0.02	12.1	B	8	0.05	12.4	B	19
	TR	-	0.41	16.4	B	61	0.50	18.0	B	77
Overall		-	0.36	19.0	B	-	0.41	20.2	C	-

Notes:

Queues highlighted in red exceed available storage length.

The road diet does not result in operational issues to Northern Avenue E and Great Northern Road. The movements reaching capacity are a result of background traffic growth.

The results indicate that most movements, approaches and intersections, with the exception of the northbound and southbound approaches at Great Northern Road, are expected to operate at a LOS C or better and acceptable v/c ratios. The overall intersection delay for Great Northern Road in the PM Peak hour increases by approximately 3 seconds compared to the existing condition. The northbound left-turn and southbound through/right movements at Northern Avenue & Great Northern Road are expected to reach capacity by 2026, with LOS F and E, respectively. However, this is a result of background growth only.

95th percentile queues range between 8 and 136 metres for through movements, and no interference between adjacent signalized intersections is expected. Similar to existing conditions, some queues along the minor cross streets present queues that exceed available storage (most notably Willow Avenue northbound). Along Northern Avenue, the eastbound left-turn may occasionally exceed the available storage (based on minimum dimensions shown in OTM Book 11, Figure 34), however only by 1 vehicle, which does not raise concern, since the left-turn lane is an extension of the two-way left-turn lane.

B000699

6. Review of Proposed P-Patch Access

In response to public comments regarding poor performance at the intersection of Pine Street & Pleasant Drive, a review of a new access to the P-Patch subdivision via Northern Avenue was conducted. The proposed new access is expected to redirect some trips made by the residents from the intersection of Pine Street & Pleasant Drive and from the south approach of the intersection of Northern Avenue & Pine Street to the east approach of the latter. Under existing conditions, there are four points of access into the P-Patch subdivision, via the intersections of Pine Street & Pleasant Drive, Pine Street & Passmore Road, McNabb Street & Pentagon Boulevard, and McNabb Street & Lake Street. The existing traffic patterns of the study area were examined based on midblock (ATR) and intersection (TMC) counts at these access points, provided by the City (**Appendix A**).

Future traffic operations under the ‘do-nothing’ option are summarized in **Table 7**. All movements at both intersections are expected to operate with acceptable v/c ratios (0.52 or better), and most at acceptable levels of service (C or better, with the exception of the westbound left-turn at Pleasant Drive). 95th percentile queues at Pine Street & Northern Avenue are expected to exceed available storage.

Table 7: 2026 Future Intersection Operations ('Do Nothing' Option)

Direction	Mov.	Storage Length	AM Peak Hour				PM Peak Hour			
			V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Northern Ave E & Pine St										
EB	L	40	0.06	23.7	C	15	0.10	24.2	C	33
	TR	-	0.11	24.3	C	31	0.27	26.6	C	73
WB	L	40	0.02	23.2	C	9	0.11	24.7	C	16
	TR	-	0.02	23.1	C	8	0.06	23.6	C	19
NB	L	42	0.50	20.4	C	59	0.45	19.6	B	45
	TR	-	0.52	18.4	B	82	0.41	16.5	B	64
SB	L	30	0.02	12.1	B	8	0.05	12.4	B	19
	TR	-	0.41	16.4	B	61	0.50	18.0	B	77
Overall		-	0.36	19.0	B	-	0.41	20.2	C	-
Pine Street & Pleasant Drive										
WB	L	15	0.32	33.2	D	15.8	0.34	47.6	E	15.3
	R	-	0.43	17.1	C	22.7	0.20	12.7	B	33.8
NB	TR	Free Flow								
SB	L	20	0.28	9.0	A	16.4	0.19	9.3	A	34.0
	T	Free Flow								
Overall		-	-	4.5	A	-	-	3.8	A	-

Notes:

Queues highlighted in red exceed available storage length.

B000699

6.1 Current Trip Generation and Distribution

The first step of this review consisted of determining trip generation rates based on the number of residential units in the subdivision and ATR volumes provided by the City. The resulting trip generation rates are the following:

- + AM peak hour: 0.64 trips per unit, 27% in, 73% out
- + PM peak hour: 0.76 trips per unit, 60% in, 40% out

The existing volumes were compared with trip generation using equations from the ITE Trip Generation Manual (9th Edition) and it was concluded that the difference was less than 10% for both AM and PM peak hours, indicating good quality of the available data. Therefore, the trip generation rates calculated from the traffic counts were used, since they are expected to represent local conditions.

Table 8: Existing Volumes and Trip Generation Comparison

Location	ATR Volumes		ITE Trips		% Difference	
	AM	PM	AM	PM	AM	PM
Pleasant Dr & Pine St	291	402	-	-	-	-
Passmore Rd & Pine St	197	192	-	-	-	-
Pentagon Blvd & McNabb St	93	79	-	-	-	-
Lake St & McNabb St	219	283	-	-	-	-
Total	800	956	873	1,012	9%	6%

The next step was to estimate existing trip distribution, based on TMCs at Pine Street & Northern Avenue, Pine Street & Pleasant Drive, Pine Street & Passmore Road, McNabb Street & Pentagon Boulevard, and McNabb Street & Lake Street. The results are illustrated in **Figure 22** (the directions represented by the blue arrows are the ones expected to be affected by the proposed P-Patch access via Northern Avenue).

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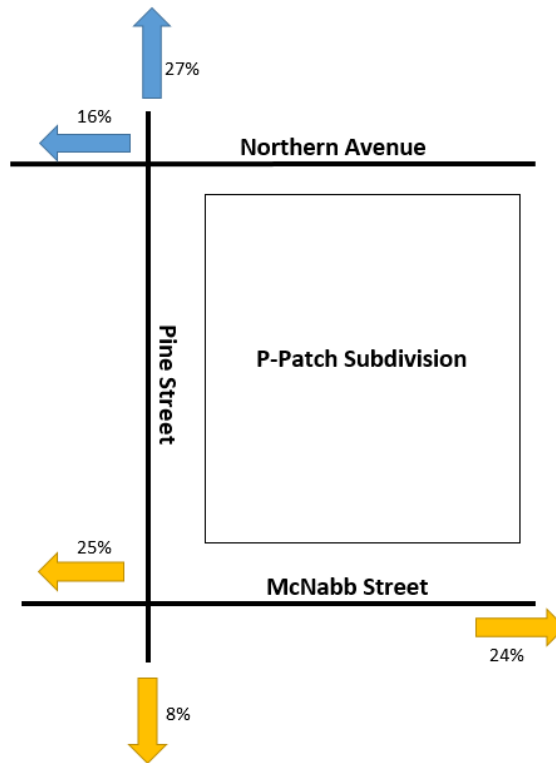


Figure 22: Existing Trip Distribution

6.2 Estimation of Redirected Trips

In order to estimate the number of trips affected by the new access, the “travel impedance” to the intersection of Northern Avenue & Pine Street from was evaluated, from twelve different points throughout the P-Patch subdivision (**Figure 23**).

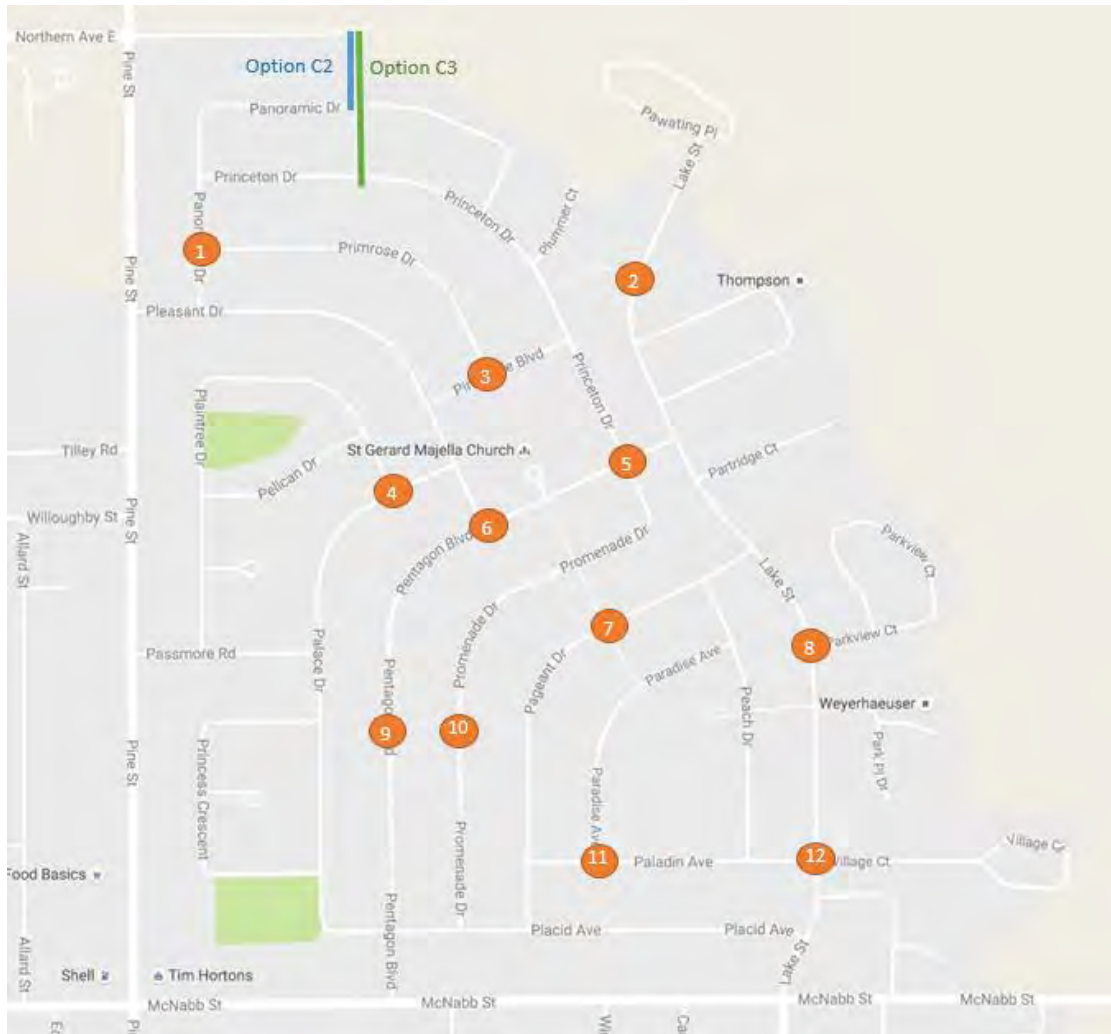


Figure 23: P Patch Travel Time Analysis Points

The “travel impedance”, consisting of travel time (obtained using the “directions” feature from Google Maps), number of stops, and number of turns, was assessed for the following routes:

- + Existing configuration;
- + Option C2 (new road to Panoramic Drive); and
- + Option C3 (new road to Princeton Drive).

Table 9 summarizes the expected chosen route between each of the twelve points within the subdivision and the intersection of Northern Avenue & Pine Street, for each scenario (i.e. Existing vs. C2 and Existing vs. C3).

B0000699

Table 9: P-Patch “Travel Impedances” to Northern Avenue & Pine Street

Origin Point	Existing Routing		Routing Via C2		Preferred Route (Existing vs. C2)		Routing Via C3		Preferred Route (Existing vs. C3)	
	In	Out	In	Out	In	Out	In	Out	In	Out
1	1-1-2	2-2-2	2-0-3	2-1-3	Existing	C2	2-2-3	2-0-3	Existing	Existing
2	3-3-3	3-1-3	4-3-6	4-1-6	Existing	Existing	4-3-4	3-0-4	Existing	Existing
3	2-1-2	2-2-2	3-1-5	3-2-5	Existing	Existing	3-1-3	3-1-3	Existing	Existing
4	2-1-2	2-2-2	4-1-5	4-2-5	Existing	Existing	4-2-5	4-2-5	Existing	Existing
5	3-2-2	3-1-2	3-1-4	3-0-4	Existing	C2	3-1-2	3-0-2	C3	C3
6	2-1-1	2-1-1	4-1-4	4-1-4	Existing	Existing	3-2-3	3-0-3	Existing	Existing
7	4-4-4	4-2-4	4-2-7	4-2-7	Existing	Existing	4-2-5	4-1-5	C3	C3
8	4-3-3	4-1-3	4-2-6	4-1-6	Existing	Existing	4-2-4	4-0-4	C3	C3
9	3-2-2	3-1-2	4-2-5	4-1-5	Existing	Existing	4-2-3	4-0-3	Existing	Existing
10	4-2-4	4-2-4	4-2-5	4-2-5	Existing	Existing	4-2-3	4-1-3	C3	C3
11	4-2-4	4-3-4	5-2-7	5-2-7	Existing	Existing	5-2-5	5-1-5	Existing	Existing
12	4-3-3	4-1-3	5-2-6	5-1-6	Existing	Existing	4-2-4	4-1-4	C3	Existing

Legend: 3-1-4 = 3 minutes, 1 stop, 4 turns

In order to determine the chosen routes, travel time was the primary factor considered, meaning that, if a route has shorter travel time than another, it is more likely to be chosen. Where two alternative routes present the same travel times, the combined number of stops and turns was considered, with the number of stops bearing more weight in the choice of route (for example, if the combined stops and turns slightly increases, but the number of stops considerably decreases, the reduced number of stops determines the choice of route).

6.3 Trip Reassignment

The results of the analysis indicated that Option C2 is expected to redirect traffic from approximately 245 residences and reroute 157 trips in the AM peak hour and 186 trips in the PM peak hour. Option C3 is expected to redirect traffic from approximately 617 residences and reroute 395 trips in the AM peak hour and 469 trips in the PM peak hour. The trip reassignment is illustrated in **Figure 24**.

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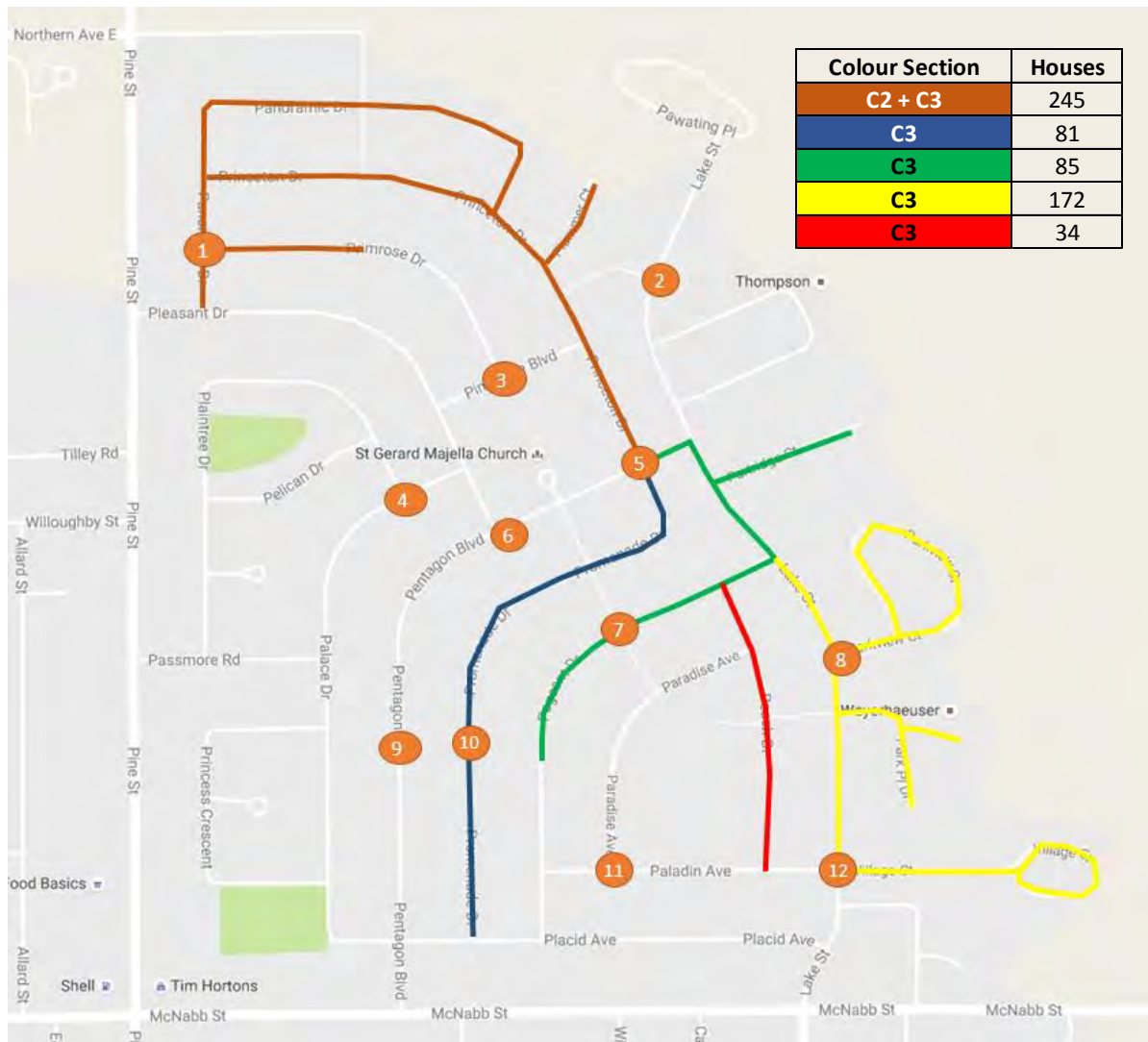


Figure 24: P-Patch Residences Affected by Options C2 and C3

The future volumes resulting from background growth under the 'do nothing' option are illustrated in **Figure 25**. The trip generation and distribution previously determined were applied to the affected residences, resulting in the future volumes illustrated in **Figure 26** and **Figure 27** (in these figures, the volumes highlighted in red indicate an increase, and the volumes highlighted in green indicate a decrease, compared to the 'do nothing' option). The introduction of either option C2 or C3 is expected to reduce volumes at Pine Street & Pleasant Drive, and to shift part of the volumes at Northern Avenue & Pine Street to the east leg of the intersection.

B0000699

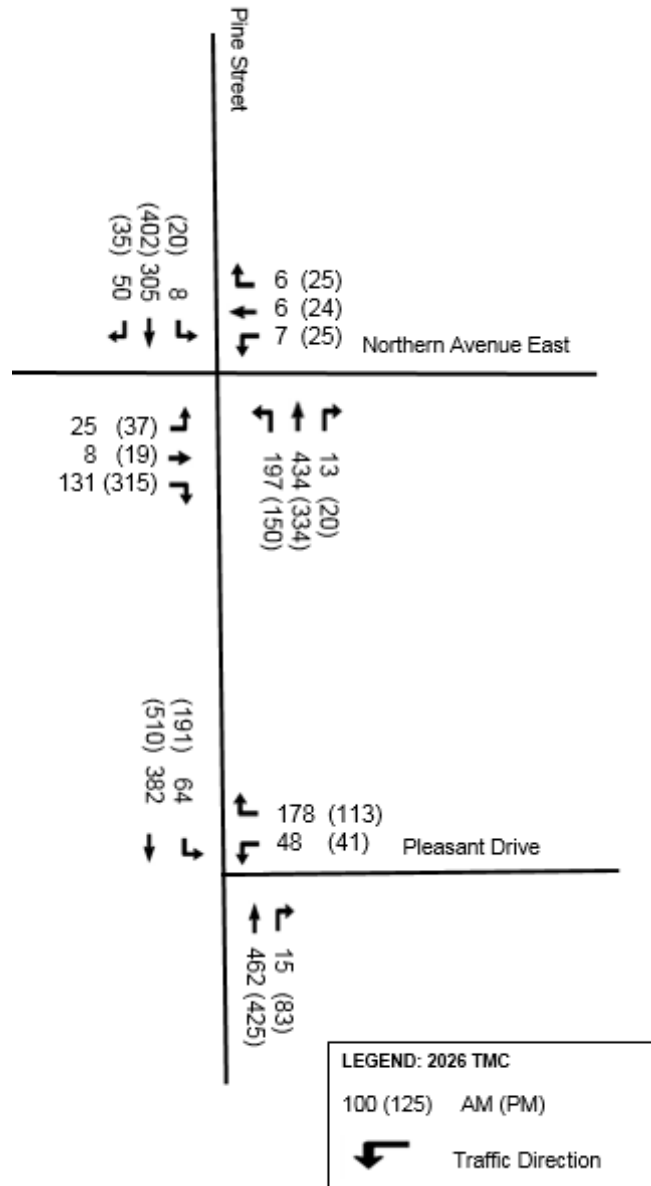


Figure 25: 2026 Future Volumes Without C2 or C3 ('Do Nothing')

B000099

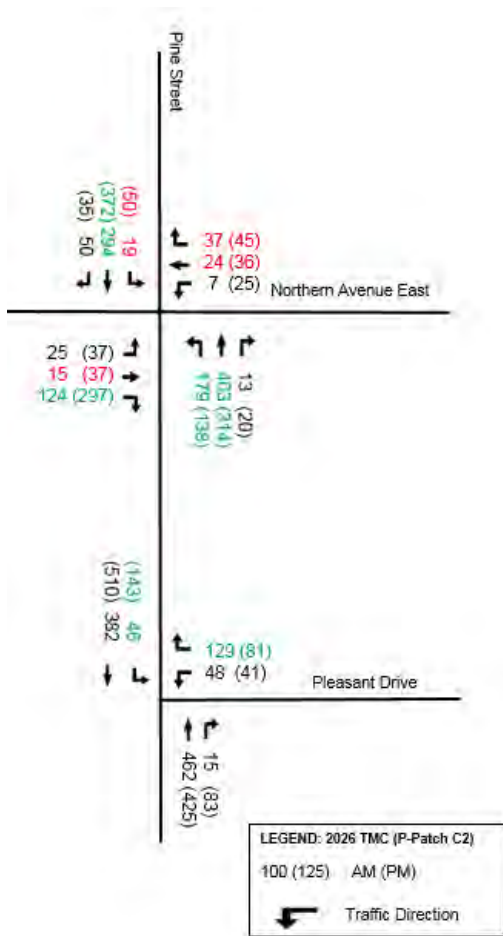


Figure 26: 2026 Future Volumes (Option C2)

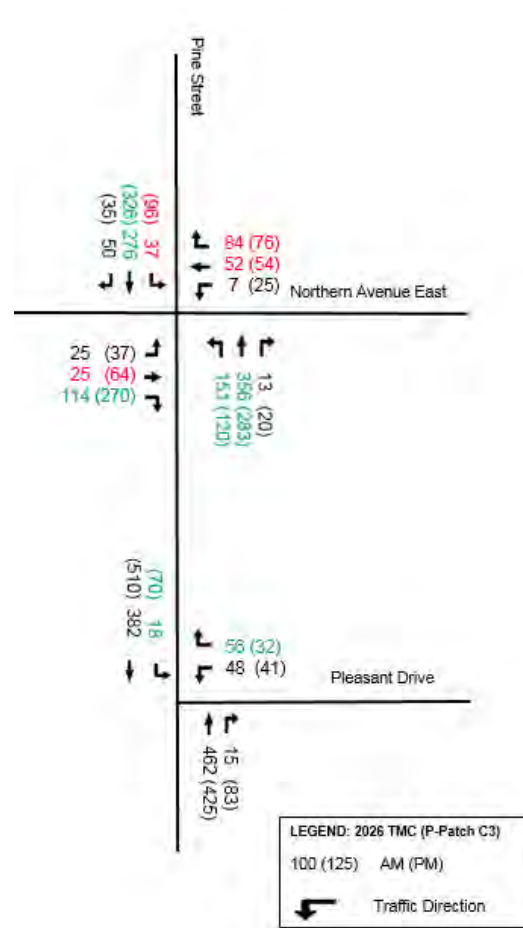


Figure 27: 2026 Future Volumes (Option C3)

B0000699

6.4 Intersection Operations

Table 11 summarizes the traffic operations for the intersection of Pine Street & Pleasant Drive resulting from traffic redirection expected for option C2 and C3, as well as for the Do Nothing option. Based on the results, all individual movements show a reduction in v/c ratio and average delay due to the reduced volumes at the intersection. In particular, the westbound left-turn shows a 10-second reduction for Option C2, and a 20-second reduction (which improves LOS from E to D) for Option C3 in the PM peak hour.

Table 10: 2026 Intersection Operations (Pine Street & Pleasant Drive)

Direction	Mov.	Storage Length	AM Peak Hour				PM Peak Hour			
			V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Do Nothing Option										
WB	L	15	0.32	33.2	D	15.8	0.34	47.6	E	15.3
	R	-	0.43	17.1	C	22.7	0.20	12.7	B	33.8
NB	TR	Free Flow								
SB	L	20	0.28	9.0	A	16.4	0.19	9.3	A	34.0
	T	Free Flow								
Overall		-	-	4.5	A	-	-	3.8	A	-
Option C2										
WB	L	15	0.29	30.0	D	23.7	0.28	37.3	E	15.0
	R	-	0.31	15.1	C	21.7	0.14	12.2	B	23.2
NB	TR	Free Flow								
SB	L	20	0.06	8.9	A	9.3	0.14	9.0	A	27.6
	T	Free Flow								
Overall		-	-	3.5	A	-	-	3.0	A	-
Option C3										
WB	L	15	0.26	25.8	D	16.4	0.21	27.2	D	20.9
	R	-	0.13	13.1	B	15.7	0.06	11.5	B	15.1
NB	TR	Free Flow								
SB	L	20	0.02	8.7	A	9.2	0.07	8.7	A	16.5
	T	Free Flow								
Overall		-	-	2.2	A	-	-	1.8	A	-

Table 11 summarizes the traffic operations resulting from traffic redirection expected for option C2 and C3, as well as for the Do Nothing option. Under the Do nothing option, the maximum v/c ratio for any individual movement is 0.52. Under options C2 and C3, the maximum v/c ratio for any individual movement is reduced to 0.48 and 0.43, respectively. There are virtually no changes to Level of Service with all movements operating at LOS B or C under any of the three options.

B000699

Table 11: 2026 Intersection Operations (Northern Avenue & Pine Street)

Direction	Mov.	Storage Length	AM Peak Hour				PM Peak Hour			
			V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Do Nothing Option										
EB	L	40	0.06	23.7	C	15	0.10	24.2	C	33
	TR	-	0.11	24.3	C	31	0.27	26.6	C	73
WB	L	40	0.02	23.2	C	9	0.11	24.7	C	16
	TR	-	0.02	23.1	C	8	0.06	23.6	C	19
NB	L	42	0.50	20.4	C	59	0.45	19.6	B	45
	TR	-	0.52	18.4	B	82	0.41	16.5	B	64
SB	L	30	0.02	12.1	B	8	0.05	12.4	B	19
	TR	-	0.41	16.4	B	61	0.50	18.0	B	77
Overall		-	0.36	19.0	B	-	0.41	20.2	C	-
Option C2										
EB	L	40	0.07	23.8	C	15	0.10	24.3	C	32
	TR	-	0.12	24.4	C	24	0.29	27.0	C	65
WB	L	40	0.02	23.2	C	17	0.11	24.8	C	19
	TR	-	0.07	23.8	C	26	0.10	24.2	C	26
NB	L	42	0.45	18.8	B	53	0.39	17.9	B	47
	TR	-	0.48	17.7	B	73	0.39	16.1	B	74
SB	L	30	0.05	12.4	B	10	0.12	13.1	B	18
	TR	-	0.39	16.2	B	67	0.46	17.4	B	69
Overall		-	0.34	18.6	B	-	0.40	20.0	B	-
Option C3										
EB	L	40	0.07	23.9	C	22	0.11	24.4	C	28
	TR	-	0.13	24.6	C	30	0.42	29.4	C	75
WB	L	40	0.02	23.2	C	3	0.11	24.8	C	13
	TR	-	0.18	25.1	C	31	0.18	25.1	C	30
NB	L	42	0.36	16.9	B	50	0.31	16.0	B	35
	TR	-	0.43	16.7	B	65	0.35	15.6	B	56
SB	L	30	0.09	12.9	B	17	0.21	14.3	B	29
	TR	-	0.37	15.9	B	57	0.41	16.5	B	61
Overall		-	0.33	18.5	B	-	0.42	20.3	C	-

Notes:

Queues highlighted in red exceed available storage length. Queues can be further reduced with signal timing adjustments.

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7. Conclusions

The purpose of this study was to evaluate how a road diet may impact traffic operations along the Northern Avenue corridor between North Street and Pine Street, as well as safety and convenience for different users, including cyclists and residents. This study also examined improvements to the access/egress of the P Patch subdivision.

Proposed Road Diet

Based on our review, a typical road diet configuration incorporating a TWLTL median along with providing bicycle lanes is feasible given the variable roadway widths along Northern Avenue. Three different cross-sections are proposed in for midblock sections, as illustrated **Figure 28**, **Figure 29**, and **Figure 30**. Although lane widths are generally narrower than minimum standards and guidelines, the recommended cross sections have lane widths that are the same or wider than existing conditions.

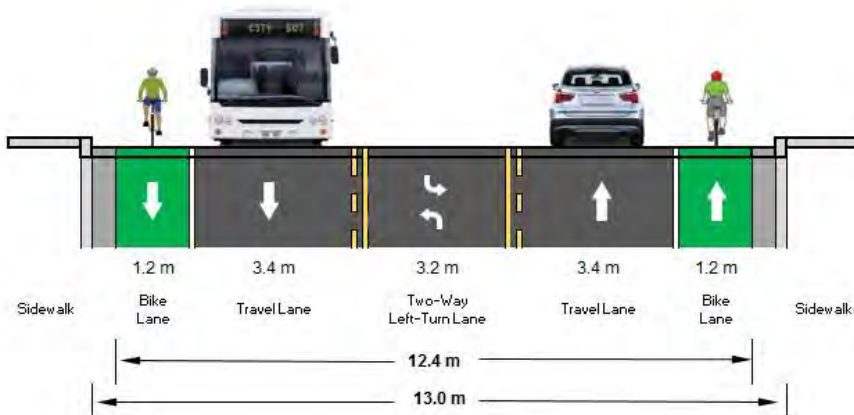


Figure 28: Proposed Road Diet Configuration between North Street and Sackville Road

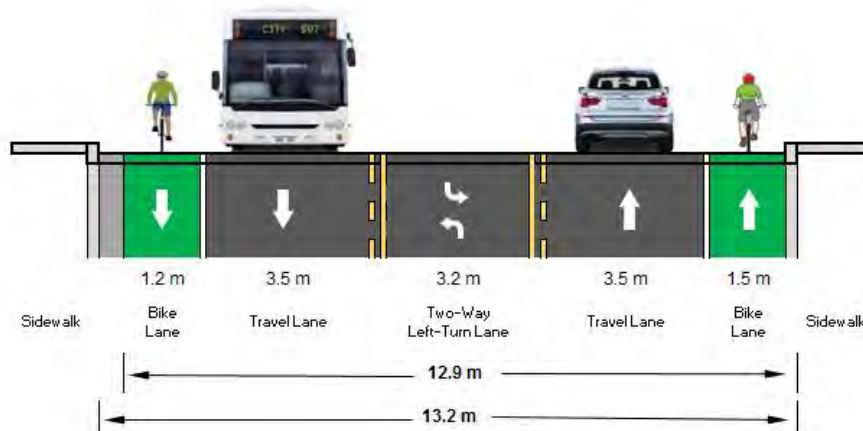


Figure 29: Proposed Configuration between Sackville Road and Great Northern Road

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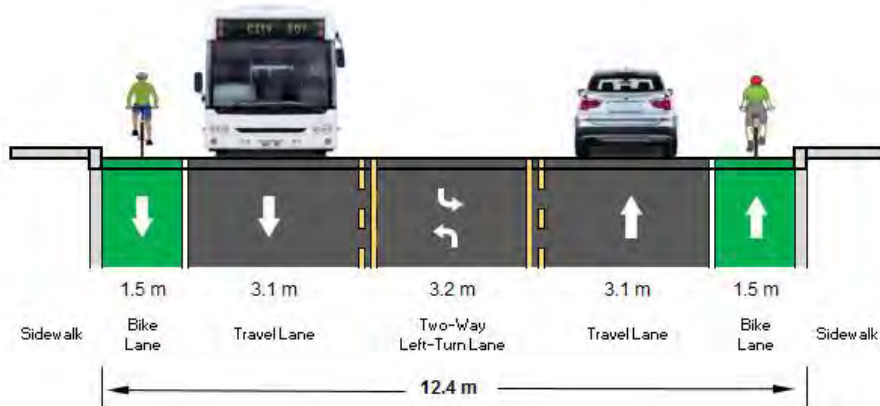


Figure 30: Proposed Road Diet Configuration between Great Northern Road and Pine Street

Based on our review, the following observations are noted:

- + OTM Book 11, Figure 34 – Two-way Left-turn Lane, provides guidance for most signalized intersections along Northern Avenue where the two-way left-turn lane turns into an exclusive left-turn lane.
- + At the intersection with Great Northern Road the lane configuration is to remain as existing due to expected operational shortcomings resulting from a similar configuration, and to limited right-of-way available for widening.
- + As illustrated in **Figure 31**, OTM Book 18 provides guidance for bicycle treatments at intersections in order to safely guide cyclists through the intersections.
- + At the intersection of Great Northern Road and Northern Avenue, bicycle lanes cannot be carried through the intersection due to the need to maintain the existing lane configuration. Therefore, **Figure 32** provides guidance for bicycle lanes that are interrupted upstream of the intersection and re-introduced downstream of the intersection.

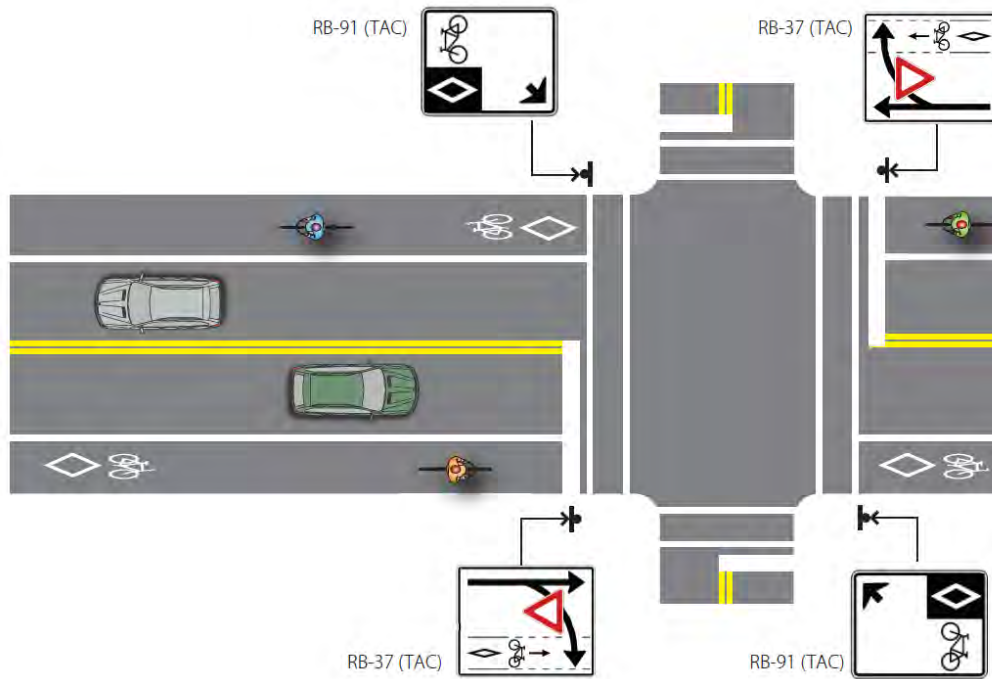


Figure 31: Bicycle Lanes Adjacent to Combined Through/ Right-Turn Lane²³

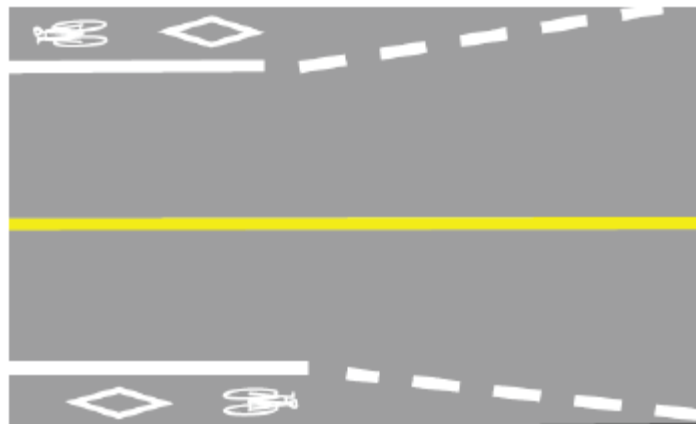


Figure 32: Taper for Introduced and Discontinued Bicycle Lanes²⁴

The potential benefits and disbenefits for the proposed cross-sections were evaluated qualitatively and are summarized below:

Potential benefits:

- + Reduced risk of rear-end and sideswipe collisions with vehicles waiting to turn left by providing a two-way left-turn lane;
- + Reduced travel speed;

²³ OTM Book 18 (Figure 4.40)

²⁴ OTM Book 18 (Figure 4.32)

E000699



- + Improved cycling environment and the overall cycling network, potentially attracting more users;
- + Increased safety for cyclists and pedestrians (by providing a designated space for cyclists, they are less likely to ride on sidewalks); and
- + No significant operational impacts are expected as a result of the proposed road diet.

Potential Disbenefits:

- + Existing catch basins drainage grates may present a safety risk (slippery when wet) for cyclists, however this can be mitigated by using textured grate inlets to increase friction; and
- + Operation of transit buses at bus stops may briefly block the only travel lane available, as well as the bicycle lane, although this is expected to occur only on occasion due to the low frequency of buses along Northern Avenue. This can be mitigated by relocating some bus stops to the near side of signalized intersections (where possible) so that some of these operations coincide with a red light.

P-Patch Subdivision

Traffic operations at the intersection of Northern Avenue & Pine Street were reviewed in order to evaluate potential impacts caused by expected traffic redirection created by a proposed new access to the P-Patch subdivision via Northern Avenue. Travel patterns associated with the subdivision were reviewed, including trip generation and distribution, and the expected number of redirected trips were estimated based on travel time, number of stops, and number of turns between various points within the subdivision and the intersection of Northern Avenue & Pine Street.

The conclusions of the P Patch review are as follows:

- + Option C2, connecting Northern Avenue to Panoramic Drive, is expected to redirect traffic from approximately 245 residences and reroute 157 trips in the AM peak hour and 186 trips in the PM peak hour;
- + Option C3, connecting Northern Avenue to Princeton Drive, is expected to redirect traffic from approximately 617 residences and reroute 395 trips in the AM peak hour and 469 trips in the PM peak hour;
- + Option C2 is expected to reduce average delay for the westbound left-turn at Pine Street & Pleasant Drive by approximately 3 seconds in the AM peak hour, and approximately 10 seconds in the PM peak hour, with no change to the level of service (D in the AM peak, E in the PM peak);
- + Option C3 is expected to reduce average delay for the westbound left-turn at Pine Street & Pleasant Drive by approximately 7 seconds in the AM peak hour (although the level of service remains unchanged), and approximately 20 seconds in the PM peak hour, improving the level of service from E to D; and
- + Both option C2 and C3 are expected to have a neutral impact on traffic operations at the intersection of Northern Avenue and Pine Street; this is a result of the intersection operating well under capacity under both existing and future conditions.

APPENDIX A – TRAFFIC VOLUMES

B000699





Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W SAK EB
 Station ID: 17498
 Northern Ave
 West of Sackville Rd (EB)

Start Time	20-May-14 Tue	Curb Lane	Center Lan	Total						
12:00 AM		*	*	*						
12:15		*	*	*						
12:30		*	*	*						
12:45		*	*	*						
01:00		*	*	*						
01:15		*	*	*						
01:30		*	*	*						
01:45		*	*	*						
02:00		*	*	*						
02:15		*	*	*						
02:30		*	*	*						
02:45		*	*	*						
03:00		*	*	*						
03:15		*	*	*						
03:30		*	*	*						
03:45		*	*	*						
04:00		*	*	*						
04:15		*	*	*						
04:30		*	*	*						
04:45		*	*	*						
05:00		*	*	*						
05:15		*	*	*						
05:30		*	*	*						
05:45		*	*	*						
06:00		*	*	*						
06:15		*	*	*						
06:30		*	*	*						
06:45		*	*	*						
07:00		*	*	*						
07:15		*	*	*						
07:30		*	*	*						
07:45		*	*	*						
08:00		*	*	*						
08:15		*	*	*						
08:30		*	*	*						
08:45		*	*	*						
09:00		*	*	*						
09:15		*	*	*						
09:30		*	*	*						
09:45		*	*	*						
10:00		*	*	*						
10:15		66	38	104						
10:30		61	31	92						
10:45		55	33	88						
11:00		57	46	103						
11:15		64	42	106						
11:30		64	42	106						
11:45		62	35	97						
Total		429	267	696						
Percent		61.6%	38.4%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	247	165	-	-	-	-	-	-	412
P.H.F.		0.965	0.897							0.972



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W SAK EB
 Station ID: 17498
 Northern Ave
 West of Sackville Rd (EB)

Start Time	20-May-14 Tue	Curb Lane	Center Lan	Total
12:00 PM		62	41	103
12:15		60	19	79
12:30		82	39	121
12:45		77	40	117
01:00		78	33	111
01:15		91	32	123
01:30		62	37	99
01:45		60	45	105
02:00		77	44	121
02:15		75	44	119
02:30		53	42	95
02:45		63	44	107
03:00		89	43	132
03:15		79	51	130
03:30		47	78	125
03:45		5	103	108
04:00		3	79	82
04:15		4	104	108
04:30		76	51	127
04:45		82	42	124
05:00		71	38	109
05:15		81	42	123
05:30		66	37	103
05:45		54	36	90
06:00		48	25	73
06:15		36	27	63
06:30		55	31	86
06:45		56	33	89
07:00		52	28	80
07:15		46	23	69
07:30		32	18	50
07:45		60	22	82
08:00		37	22	59
08:15		24	16	40
08:30		34	19	53
08:45		34	14	48
09:00		35	28	63
09:15		31	16	47
09:30		18	6	24
09:45		9	10	19
10:00		20	12	32
10:15		14	4	18
10:30		9	7	16
10:45		5	5	10
11:00		4	8	12
11:15		18	8	26
11:30		9	3	12
11:45		3	1	4
Total		2186	1550	3736
Percent		58.5%	41.5%	
Peak	-	12:30	15:30	15:00
Vol.	-	328	364	495
P.H.F.		0.901	0.875	0.938



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W SAK EB
 Station ID: 17498
 Northern Ave
 West of Sackville Rd (EB)

Start Time	21-May-14 Wed	Curb Lane	Center Lan	Total						
12:00 AM		1	1	2						
12:15		9	5	14						
12:30		4	2	6						
12:45		0	2	2						
01:00		4	2	6						
01:15		4	2	6						
01:30		0	2	2						
01:45		2	1	3						
02:00		0	1	1						
02:15		0	0	0						
02:30		0	2	2						
02:45		0	0	0						
03:00		0	2	2						
03:15		0	0	0						
03:30		2	1	3						
03:45		0	0	0						
04:00		0	2	2						
04:15		0	0	0						
04:30		0	1	1						
04:45		2	0	2						
05:00		0	1	1						
05:15		4	3	7						
05:30		2	5	7						
05:45		6	2	8						
06:00		6	3	9						
06:15		10	9	19						
06:30		9	13	22						
06:45		23	18	41						
07:00		15	8	23						
07:15		20	17	37						
07:30		38	21	59						
07:45		74	38	112						
08:00		53	46	99						
08:15		89	40	129						
08:30		94	51	145						
08:45		110	54	164						
09:00		62	30	92						
09:15		70	32	102						
09:30		68	31	99						
09:45		71	43	114						
10:00		70	28	98						
10:15		51	37	88						
10:30		50	30	80						
10:45		77	38	115						
11:00		58	33	91						
11:15		61	43	104						
11:30		78	37	115						
11:45		79	52	131						
Total		1376	789	2165						
Percent		63.6%	36.4%							
Peak	-	08:15	08:00	-	-	-	-	-	-	08:00
Vol.	-	355	191	-	-	-	-	-	-	537
P.H.F.		0.807	0.884							0.819



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W SAK EB
 Station ID: 17498
 Northern Ave
 West of Sackville Rd (EB)

Start Time	21-May-14 Wed	Curb Lane	Center Lan	Total						
12:00 PM		76	39	115						
12:15		78	50	128						
12:30		78	40	118						
12:45		83	42	125						
01:00		84	37	121						
01:15		59	41	100						
01:30		75	44	119						
01:45		69	41	110						
02:00		83	40	123						
02:15		75	48	123						
02:30		101	50	151						
02:45		64	33	97						
03:00		87	52	139						
03:15		94	57	151						
03:30		79	45	124						
03:45		85	47	132						
04:00		86	44	130						
04:15		73	44	117						
04:30		103	40	143						
04:45		100	54	154						
05:00		90	44	134						
05:15		91	42	133						
05:30		76	42	118						
05:45		64	28	92						
06:00		57	34	91						
06:15		40	30	70						
06:30		66	40	106						
06:45		62	38	100						
07:00		63	34	97						
07:15		57	25	82						
07:30		48	22	70						
07:45		50	27	77						
08:00		43	22	65						
08:15		31	17	48						
08:30		47	14	61						
08:45		27	14	41						
09:00		32	18	50						
09:15		7	10	17						
09:30		28	19	47						
09:45		32	9	41						
10:00		24	9	33						
10:15		12	11	23						
10:30		18	12	30						
10:45		11	5	16						
11:00		9	13	22						
11:15		4	3	7						
11:30		2	4	6						
11:45		8	5	13						
Total		2731	1479	4210						
Percent		64.9%	35.1%							
Peak	-	16:30	15:00	-	-	-	-	-	-	16:30
Vol.	-	384	201	-	-	-	-	-	-	564
P.H.F.		0.932	0.882							0.916



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W SAK EB
 Station ID: 17498
 Northern Ave
 West of Sackville Rd (EB)

Start Time	22-May-14		Total	
	Thu	Curb Lane		Center Lan
12:00 AM		1	2	3
12:15		0	0	0
12:30		1	0	1
12:45		1	3	4
01:00		0	1	1
01:15		1	1	2
01:30		0	1	1
01:45		3	4	7
02:00		0	0	0
02:15		1	3	4
02:30		0	0	0
02:45		0	0	0
03:00		0	0	0
03:15		0	0	0
03:30		2	2	4
03:45		2	0	2
04:00		0	1	1
04:15		0	3	3
04:30		0	2	2
04:45		1	1	2
05:00		1	3	4
05:15		1	1	2
05:30		3	4	7
05:45		3	6	9
06:00		14	5	19
06:15		6	6	12
06:30		12	11	23
06:45		29	20	49
07:00		13	10	23
07:15		38	19	57
07:30		39	28	67
07:45		63	38	101
08:00		66	50	116
08:15		81	42	123
08:30		79	47	126
08:45		50	57	107
09:00		24	58	82
09:15		18	59	77
09:30		18	46	64
09:45		15	52	67
10:00		20	52	72
10:15		23	60	83
10:30		23	44	67
10:45		*	*	*
11:00		*	*	*
11:15		*	*	*
11:30		*	*	*
11:45		*	*	*
Total		652	742	1394
Percent		46.8%	53.2%	
Peak	-	07:45	08:30	08:00
Vol.	-	289	221	472
P.H.F.		0.892	0.936	0.937
Grand Total		7374	4827	12201
Percent		60.4%	39.6%	
ADT		ADT 6,015	AADT 6,015	



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Wilson Street & Grand Boulevard / Sackville Road
Municipality..... Sault Ste. Marie
Count Station.....
Direction..... Eastbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, July 23, 2015				
	12:00 AM 01:00 AM	37		<input type="checkbox"/>
	01:00 AM 02:00 AM	19		<input type="checkbox"/>
	02:00 AM 03:00 AM	11		<input type="checkbox"/>
	03:00 AM 04:00 AM	8		<input type="checkbox"/>
	04:00 AM 05:00 AM	12		<input type="checkbox"/>
	05:00 AM 06:00 AM	29		<input type="checkbox"/>
	06:00 AM 07:00 AM	87		<input type="checkbox"/>
	07:00 AM 08:00 AM	247		<input type="checkbox"/>
	08:00 AM 09:00 AM	407		<input type="checkbox"/>
	09:00 AM 10:00 AM	299		<input type="checkbox"/>
	10:00 AM 11:00 AM	335		<input type="checkbox"/>
	11:00 AM 12:00 PM	410		<input type="checkbox"/>
	12:00 PM 01:00 PM	462		<input type="checkbox"/>
	01:00 PM 02:00 PM	399		<input type="checkbox"/>
	02:00 PM 03:00 PM	460		<input type="checkbox"/>
	03:00 PM 04:00 PM	449		<input type="checkbox"/>
	04:00 PM 05:00 PM	485		<input checked="" type="checkbox"/>
	05:00 PM 06:00 PM	390		<input type="checkbox"/>
	06:00 PM 07:00 PM	294		<input type="checkbox"/>
	07:00 PM 08:00 PM	277		<input type="checkbox"/>
	08:00 PM 09:00 PM	219		<input type="checkbox"/>
	09:00 PM 10:00 PM	157		<input type="checkbox"/>
	10:00 PM 11:00 PM	103		<input type="checkbox"/>
	11:00 PM 12:00 AM	86		<input type="checkbox"/>
Total		5,682		



Volume Hourly Summary Report

Location..... Northern Avenue East btwn Kitchener Road & Wilson Street

Municipality..... Sault Ste. Marie

Date	StartTime	Eastbound	Westbound	Grand Total
day, September 26, 2016	13	55	68	123
	14	288	300	588
	15	367	361	728
	16	395	421	816
	17	299	340	639
	18	216	221	437
	19	186	195	381
	20	135	164	299
	21	64	99	163
	22	64	70	134
23	39	52	91	
Monday, September 26, 2016		2108	2291	4399
day, September 27, 2016	0	19	19	38
	1	5	14	19
	2	5	4	9
	3	2	1	3

	4	3	4	7
	5	57	16	73
	6	63	30	93
	7	184	101	285
	8	399	211	610
	9	298	208	506
	10	279	204	483
	11	305	285	590
	12	316	342	658
	13	334	334	668
	14	481	515	996
	15	382	382	764
	16	363	436	799
	17	305	320	625
	18	250	255	505
	19	176	211	387
	20	95	161	256
	21	94	118	212
	22	48	68	116
	23	28	37	65
Tuesday, September 27, 2016		4491	4276	8767
Wednesday, September 28	0	9	27	36
	1	7	12	19

2	4	10	14
3	3	4	7
4	4	3	7
5	26	21	47
6	70	38	108
7	172	112	284
8	433	200	633
9	295	211	506
10	261	220	481
11	292	323	615
12	328	374	702
13	318	365	683
14	312	355	667
15	315	352	667
16	362	359	721
17	346	413	759
18	368	390	758
19	283	280	563
20	227	255	482
21	193	221	414
22	127	136	263
23	89	109	198
Wednesday, September 28, 2016	4844	4790	9634

sday, September 29,	0	64	82	146
	1	4	22	26
	2	3	5	8
	3	2	3	5
	4	5	4	9
	5	23	20	43
	6	59	42	101
	7	184	105	289
	8	409	203	612
	9	303	218	521
	10	270	208	478
	11	281	280	561
	12	359	330	689
	13	341	289	630
	14	284	289	573
	15	378	362	740
	16	398	421	819
	17	335	377	712
	18	276	268	544
	19	242	255	497
	20	196	213	409
	21	105	178	283
	22	62	86	148

	23	38	61	99
Thursday, September 29, 2016		4621	4321	8942
ay, September 30, 2016	0	29	49	78
	1	14	21	35
	2	9	12	21
	3	4	2	6
	4	5	7	12
	5	19	17	36
	6	60	37	97
	7	183	95	278
	8	346	169	515
	9	235	183	418
	10	303	246	549
	11	337	274	611
	12	353	388	741
	13	350	322	672
	14	376	336	712
	15	366	356	722
	16	373	426	799
	17	293	323	616
	18	254	286	540
	19	235	264	499
20	176	208	384	

	21	123	129	252
	22	96	112	208
	23	57	103	160
Friday, September 30, 2016		4596	4365	8961
Saturday, October 01, 2016	0	48	66	114
	1	17	27	44
	2	15	13	28
	3	12	10	22
	4	8	5	13
	5	13	4	17
	6	44	24	68
	7	70	45	115
	8	122	64	186
	9	210	139	349
	10	263	223	486
	11	290	285	575
	12	305	284	589
	13	297	311	608
	14	307	335	642
	15	268	271	539
	16	264	296	560
	17	239	296	535
18	208	207	415	

	19	183	168	351
	20	140	179	319
	21	108	131	239
	22	73	94	167
	23	72	89	161
Saturday, October 01, 2016		3576	3566	7142
unday, October 02, 20	0	56	77	133
	1	37	60	97
	2	14	25	39
	3	8	4	12
	4	9	6	15
	5	14	8	22
	6	21	13	34
	7	39	27	66
	8	77	77	154
	9	117	78	195
	10	195	151	346
	11	210	180	390
	12	205	215	420
	13	272	237	509
	14	236	260	496
	15	217	237	454
	16	191	244	435

	17	188	215	403
	18	134	179	313
	19	132	164	296
	20	122	108	230
	21	63	96	159
	22	51	49	100
	23	30	50	80
Sunday, October 02, 2016		2638	2760	5398
Monday, October 03, 2016	0	13	29	42
	1	6	13	19
	2	10	4	14
	3	3	7	10
	4	6	6	12
	5	22	20	42
	6	64	38	102
	7	182	95	277
	8	406	206	612
	9	272	206	478
	10	312	235	547
	11	73	64	137
Monday, October 03, 2016		1369	923	2292
Grand Total		28243	27292	55535



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E NOR WB
 Station ID: 17511
 Northern Avenue
 East of North Street (WB)

Start Time	14-Jul-14 Mon	Curb Lane	Center Lan							Total
12:00 AM		*	*							*
12:15		*	*							*
12:30		*	*							*
12:45		*	*							*
01:00		*	*							*
01:15		*	*							*
01:30		*	*							*
01:45		*	*							*
02:00		*	*							*
02:15		*	*							*
02:30		*	*							*
02:45		*	*							*
03:00		*	*							*
03:15		*	*							*
03:30		*	*							*
03:45		*	*							*
04:00		*	*							*
04:15		*	*							*
04:30		*	*							*
04:45		*	*							*
05:00		*	*							*
05:15		*	*							*
05:30		*	*							*
05:45		*	*							*
06:00		*	*							*
06:15		*	*							*
06:30		*	*							*
06:45		*	*							*
07:00		*	*							*
07:15		*	*							*
07:30		*	*							*
07:45		*	*							*
08:00		*	*							*
08:15		*	*							*
08:30		*	*							*
08:45		*	*							*
09:00		*	*							*
09:15		*	*							*
09:30		*	*							*
09:45		29	50							79
10:00		32	43							75
10:15		30	42							72
10:30		32	44							76
10:45		35	48							83
11:00		28	50							78
11:15		33	49							82
11:30		50	54							104
11:45		51	73							124
Total		320	453							773
Percent		41.4%	58.6%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	162	226	-	-	-	-	-	-	388
P.H.F.		0.794	0.774							0.782



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
128 Sackville Road
Traffic Division

Site Code: NOR E NOR WB
Station ID: 17511
Northern Avenue
East of North Street (WB)

Start Time	14-Jul-14 Mon	Curb Lane	Center Lan	Total						
12:00 PM		54	73	127						
12:15		45	58	103						
12:30		55	66	121						
12:45		50	67	117						
01:00		73	90	163						
01:15		44	64	108						
01:30		43	62	105						
01:45		42	53	95						
02:00		55	77	132						
02:15		37	62	99						
02:30		53	75	128						
02:45		41	56	97						
03:00		51	67	118						
03:15		60	75	135						
03:30		51	77	128						
03:45		55	77	132						
04:00		75	99	174						
04:15		72	91	163						
04:30		65	87	152						
04:45		69	88	157						
05:00		71	91	162						
05:15		67	93	160						
05:30		52	70	122						
05:45		44	61	105						
06:00		39	52	91						
06:15		35	50	85						
06:30		36	53	89						
06:45		34	48	82						
07:00		38	54	92						
07:15		25	40	65						
07:30		35	46	81						
07:45		39	48	87						
08:00		40	49	89						
08:15		33	43	76						
08:30		37	59	96						
08:45		25	33	58						
09:00		40	49	89						
09:15		22	38	60						
09:30		16	28	44						
09:45		16	26	42						
10:00		12	26	38						
10:15		26	34	60						
10:30		4	11	15						
10:45		7	11	18						
11:00		8	17	25						
11:15		6	10	16						
11:30		5	13	18						
11:45		5	8	13						
Total		1907	2625	4532						
Percent		42.1%	57.9%							
Peak	-	16:00	16:00	-	-	-	-	-	-	16:00
Vol.	-	281	365	-	-	-	-	-	-	646
P.H.F.		0.937	0.922							0.928



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E NOR WB
 Station ID: 17511
 Northern Avenue
 East of North Street (WB)

Start Time	15-Jul-14 Tue	Curb Lane	Center Lan	Total						
12:00 AM		4	6	10						
12:15		5	6	11						
12:30		5	8	13						
12:45		4	5	9						
01:00		2	4	6						
01:15		3	4	7						
01:30		1	4	5						
01:45		1	3	4						
02:00		0	1	1						
02:15		1	2	3						
02:30		0	1	1						
02:45		1	2	3						
03:00		0	1	1						
03:15		0	0	0						
03:30		0	0	0						
03:45		0	0	0						
04:00		0	2	2						
04:15		0	0	0						
04:30		0	1	1						
04:45		0	1	1						
05:00		0	1	1						
05:15		0	2	2						
05:30		5	7	12						
05:45		3	4	7						
06:00		2	5	7						
06:15		9	12	21						
06:30		8	9	17						
06:45		7	13	20						
07:00		7	9	16						
07:15		13	19	32						
07:30		13	18	31						
07:45		26	34	60						
08:00		22	31	53						
08:15		23	31	54						
08:30		20	34	54						
08:45		15	27	42						
09:00		23	35	58						
09:15		31	42	73						
09:30		26	37	63						
09:45		33	48	81						
10:00		26	40	66						
10:15		37	53	90						
10:30		26	39	65						
10:45		38	51	89						
11:00		43	60	103						
11:15		50	72	122						
11:30		42	55	97						
11:45		51	70	121						
Total		626	909	1535						
Percent		40.8%	59.2%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	186	257	-	-	-	-	-	-	443
P.H.F.		0.912	0.892							0.908



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E NOR WB
 Station ID: 17511
 Northern Avenue
 East of North Street (WB)

Start Time	15-Jul-14 Tue	Curb Lane	Center Lan	Total						
12:00 PM		48	65	113						
12:15		43	61	104						
12:30		49	68	117						
12:45		59	84	143						
01:00		69	93	162						
01:15		47	71	118						
01:30		56	82	138						
01:45		49	54	103						
02:00		52	72	124						
02:15		49	67	116						
02:30		70	88	158						
02:45		44	62	106						
03:00		59	80	139						
03:15		57	75	132						
03:30		56	77	133						
03:45		60	73	133						
04:00		74	101	175						
04:15		70	94	164						
04:30		80	111	191						
04:45		84	107	191						
05:00		91	110	201						
05:15		71	99	170						
05:30		66	81	147						
05:45		36	49	85						
06:00		45	58	103						
06:15		37	43	80						
06:30		41	51	92						
06:45		50	63	113						
07:00		43	56	99						
07:15		34	57	91						
07:30		40	52	92						
07:45		27	40	67						
08:00		35	42	77						
08:15		28	39	67						
08:30		33	44	77						
08:45		36	47	83						
09:00		34	43	77						
09:15		28	45	73						
09:30		24	34	58						
09:45		16	22	38						
10:00		12	22	34						
10:15		13	25	38						
10:30		11	21	32						
10:45		5	13	18						
11:00		14	19	33						
11:15		8	12	20						
11:30		6	12	18						
11:45		8	13	21						
Total		2067	2797	4864						
Percent		42.5%	57.5%							
Peak	-	16:30	16:30	-	-	-	-	-	-	16:30
Vol.	-	326	427	-	-	-	-	-	-	753
P.H.F.		0.896	0.962							0.937



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E NOR WB
 Station ID: 17511
 Northern Avenue
 East of North Street (WB)

Start Time	16-Jul-14 Wed	Curb Lane	Center Lan	Total
12:00 AM		2	7	9
12:15		2	3	5
12:30		1	3	4
12:45		5	9	14
01:00		5	9	14
01:15		2	5	7
01:30		1	4	5
01:45		2	2	4
02:00		0	1	1
02:15		0	0	0
02:30		0	0	0
02:45		1	2	3
03:00		1	3	4
03:15		3	4	7
03:30		0	1	1
03:45		1	1	2
04:00		2	3	5
04:15		0	2	2
04:30		0	1	1
04:45		2	2	4
05:00		1	1	2
05:15		1	3	4
05:30		5	7	12
05:45		2	3	5
06:00		2	2	4
06:15		3	7	10
06:30		7	15	22
06:45		8	15	23
07:00		11	14	25
07:15		14	19	33
07:30		15	19	34
07:45		23	28	51
08:00		27	38	65
08:15		23	30	53
08:30		29	43	72
08:45		28	38	66
09:00		3	9	12
09:15		*	*	*
09:30		*	*	*
09:45		*	*	*
10:00		*	*	*
10:15		*	*	*
10:30		*	*	*
10:45		*	*	*
11:00		*	*	*
11:15		*	*	*
11:30		*	*	*
11:45		*	*	*
Total		232	353	585
Percent		39.7%	60.3%	
Peak	-	08:00	08:00	08:00
Vol.	-	107	149	256
P.H.F.		0.922	0.866	0.889
Grand Total		5152	7137	12289
Percent		41.9%	58.1%	
ADT		ADT 6,212	AADT 6,212	



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PEE EB
 Station ID: 17514
 Northern Ave
 West of PeeWee Arena

Start Time	11-Aug-14 Mon	Curb Lane	Center Lan	Total						
12:00 AM		*	*	*						
12:15		*	*	*						
12:30		*	*	*						
12:45		*	*	*						
01:00		*	*	*						
01:15		*	*	*						
01:30		*	*	*						
01:45		*	*	*						
02:00		*	*	*						
02:15		*	*	*						
02:30		*	*	*						
02:45		*	*	*						
03:00		*	*	*						
03:15		*	*	*						
03:30		*	*	*						
03:45		*	*	*						
04:00		*	*	*						
04:15		*	*	*						
04:30		*	*	*						
04:45		*	*	*						
05:00		*	*	*						
05:15		*	*	*						
05:30		*	*	*						
05:45		*	*	*						
06:00		*	*	*						
06:15		*	*	*						
06:30		*	*	*						
06:45		*	*	*						
07:00		*	*	*						
07:15		*	*	*						
07:30		*	*	*						
07:45		*	*	*						
08:00		*	*	*						
08:15		*	*	*						
08:30		*	*	*						
08:45		*	*	*						
09:00		*	*	*						
09:15		*	*	*						
09:30		*	*	*						
09:45		51	76	127						
10:00		57	81	138						
10:15		58	81	139						
10:30		43	71	114						
10:45		59	90	149						
11:00		64	99	163						
11:15		75	113	188						
11:30		70	111	181						
11:45		76	127	203						
Total		553	849	1402						
Percent		39.4%	60.6%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	285	450	-	-	-	-	-	-	735
P.H.F.		0.938	0.886							0.905



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PEE EB
 Station ID: 17514
 Northern Ave
 West of PeeWee Arena

Start Time	11-Aug-14 Mon	Curb Lane	Center Lan	Total						
12:00 PM		84	108	192						
12:15		58	87	145						
12:30		69	103	172						
12:45		83	118	201						
01:00		80	120	200						
01:15		64	100	164						
01:30		71	89	160						
01:45		65	95	160						
02:00		70	98	168						
02:15		66	100	166						
02:30		79	116	195						
02:45		65	98	163						
03:00		73	112	185						
03:15		74	100	174						
03:30		72	118	190						
03:45		55	92	147						
04:00		82	121	203						
04:15		75	110	185						
04:30		72	113	185						
04:45		70	115	185						
05:00		68	113	181						
05:15		55	87	142						
05:30		58	90	148						
05:45		47	91	138						
06:00		46	60	106						
06:15		32	65	97						
06:30		40	58	98						
06:45		40	60	100						
07:00		52	79	131						
07:15		34	54	88						
07:30		28	48	76						
07:45		30	51	81						
08:00		29	52	81						
08:15		23	46	69						
08:30		18	30	48						
08:45		21	37	58						
09:00		18	28	46						
09:15		13	20	33						
09:30		16	29	45						
09:45		18	24	42						
10:00		18	24	42						
10:15		15	19	34						
10:30		15	20	35						
10:45		7	7	14						
11:00		24	18	42						
11:15		4	7	11						
11:30		8	12	20						
11:45		7	9	16						
Total		2211	3351	5562						
Percent		39.8%	60.2%							
Peak	-	16:00	16:00	-	-	-	-	-	-	16:00
Vol.	-	299	459	-	-	-	-	-	-	758
P.H.F.		0.912	0.948							0.933



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PEE EB
 Station ID: 17514
 Northern Ave
 West of PeeWee Arena

Start Time	12-Aug-14 Tue	Curb Lane	Center Lan	Total						
12:00 AM		2	4	6						
12:15		3	5	8						
12:30		1	3	4						
12:45		2	4	6						
01:00		2	2	4						
01:15		0	0	0						
01:30		0	1	1						
01:45		2	4	6						
02:00		0	2	2						
02:15		0	0	0						
02:30		0	1	1						
02:45		1	4	5						
03:00		1	1	2						
03:15		0	0	0						
03:30		0	0	0						
03:45		0	0	0						
04:00		1	1	2						
04:15		0	0	0						
04:30		1	1	2						
04:45		1	1	2						
05:00		1	1	2						
05:15		6	9	15						
05:30		2	5	7						
05:45		9	12	21						
06:00		3	7	10						
06:15		19	23	42						
06:30		10	20	30						
06:45		12	24	36						
07:00		12	25	37						
07:15		21	39	60						
07:30		34	61	95						
07:45		54	97	151						
08:00		53	82	135						
08:15		65	84	149						
08:30		70	91	161						
08:45		73	101	174						
09:00		42	62	104						
09:15		46	67	113						
09:30		47	65	112						
09:45		61	86	147						
10:00		46	70	116						
10:15		46	71	117						
10:30		53	84	137						
10:45		46	84	130						
11:00		45	59	104						
11:15		58	82	140						
11:30		38	69	107						
11:45		61	97	158						
Total		1050	1611	2661						
Percent		39.5%	60.5%							
Peak	-	08:00	08:00	-	-	-	-	-	-	08:00
Vol.	-	261	358	-	-	-	-	-	-	619
P.H.F.		0.894	0.886							0.889



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PEE EB
 Station ID: 17514
 Northern Ave
 West of PeeWee Arena

Start Time	12-Aug-14 Tue	Curb Lane	Center Lan	Total						
12:00 PM		79	125	204						
12:15		57	97	154						
12:30		75	108	183						
12:45		80	122	202						
01:00		69	104	173						
01:15		64	99	163						
01:30		67	109	176						
01:45		79	116	195						
02:00		60	92	152						
02:15		65	90	155						
02:30		63	78	141						
02:45		62	61	123						
03:00		62	77	139						
03:15		65	64	129						
03:30		57	39	96						
03:45		60	32	92						
04:00		62	40	102						
04:15		65	39	104						
04:30		87	40	127						
04:45		76	50	126						
05:00		73	37	110						
05:15		61	35	96						
05:30		55	29	84						
05:45		41	24	65						
06:00		37	29	66						
06:15		45	26	71						
06:30		42	29	71						
06:45		45	29	74						
07:00		48	19	67						
07:15		30	22	52						
07:30		32	22	54						
07:45		30	20	50						
08:00		27	14	41						
08:15		24	19	43						
08:30		23	7	30						
08:45		19	12	31						
09:00		19	6	25						
09:15		20	11	31						
09:30		20	14	34						
09:45		10	7	17						
10:00		11	4	15						
10:15		12	6	18						
10:30		11	3	14						
10:45		12	4	16						
11:00		7	5	12						
11:15		11	8	19						
11:30		4	2	6						
11:45		11	5	16						
Total		2134	2030	4164						
Percent		51.2%	48.8%							
Peak	-	16:15	12:00	-	-	-	-	-	-	12:00
Vol.	-	301	452	-	-	-	-	-	-	743
P.H.F.		0.865	0.904							0.911



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PEE EB
 Station ID: 17514
 Northern Ave
 West of PeeWee Arena

Start Time	13-Aug-14 Wed	Curb Lane	Center Lan							Total
12:00 AM		5	3							8
12:15		6	3							9
12:30		0	4							4
12:45		4	0							4
01:00		2	2							4
01:15		1	1							2
01:30		3	1							4
01:45		1	0							1
02:00		0	2							2
02:15		2	2							4
02:30		1	1							2
02:45		1	3							4
03:00		0	1							1
03:15		0	0							0
03:30		0	0							0
03:45		0	1							1
04:00		0	0							0
04:15		0	3							3
04:30		0	0							0
04:45		1	0							1
05:00		1	3							4
05:15		1	4							5
05:30		2	3							5
05:45		4	7							11
06:00		6	2							8
06:15		4	8							12
06:30		20	11							31
06:45		16	5							21
07:00		19	11							30
07:15		16	20							36
07:30		27	25							52
07:45		59	39							98
08:00		47	14							61
08:15		60	27							87
08:30		83	36							119
08:45		65	22							87
09:00		48	30							78
09:15		46	34							80
09:30		54	34							88
09:45		50	34							84
10:00		13	16							29
10:15		*	*							*
10:30		*	*							*
10:45		*	*							*
11:00		*	*							*
11:15		*	*							*
11:30		*	*							*
11:45		*	*							*
Total		668	412							1080
Percent		61.9%	38.1%							
Peak	-	08:15	09:00	-	-	-	-	-	-	08:15
Vol.	-	256	132	-	-	-	-	-	-	371
P.H.F.		0.771	0.971							0.779
Grand Total		6616	8253							14869
Percent		44.5%	55.5%							
ADT		ADT 7,329	AADT 7,329							



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Metro / Soo Pee Wee Entrance & Reid Street

Municipality..... Sault Ste. Marie

Count Station.....

Direction..... Eastbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, August 06, 2015				
	12:00 AM 01:00 AM	40		<input type="checkbox"/>
	01:00 AM 02:00 AM	16		<input type="checkbox"/>
	02:00 AM 03:00 AM	3		<input type="checkbox"/>
	03:00 AM 04:00 AM	1		<input type="checkbox"/>
	04:00 AM 05:00 AM	16		<input type="checkbox"/>
	05:00 AM 06:00 AM	31		<input type="checkbox"/>
	06:00 AM 07:00 AM	100		<input type="checkbox"/>
	07:00 AM 08:00 AM	290		<input type="checkbox"/>
	08:00 AM 09:00 AM	492		<input type="checkbox"/>
	09:00 AM 10:00 AM	485		<input type="checkbox"/>
	10:00 AM 11:00 AM	571		<input type="checkbox"/>
	11:00 AM 12:00 PM	603		<input type="checkbox"/>
	12:00 PM 01:00 PM	662		<input type="checkbox"/>
	01:00 PM 02:00 PM	608		<input type="checkbox"/>
	02:00 PM 03:00 PM	569		<input type="checkbox"/>
	03:00 PM 04:00 PM	636		<input type="checkbox"/>
	04:00 PM 05:00 PM	696		<input checked="" type="checkbox"/>
	05:00 PM 06:00 PM	627		<input type="checkbox"/>
	06:00 PM 07:00 PM	466		<input type="checkbox"/>
	07:00 PM 08:00 PM	384		<input type="checkbox"/>
	08:00 PM 09:00 PM	308		<input type="checkbox"/>
	09:00 PM 10:00 PM	200		<input type="checkbox"/>
	10:00 PM 11:00 PM	126		<input type="checkbox"/>
	11:00 PM 12:00 AM	70		<input type="checkbox"/>
Total		8,000		



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E SAK WB
 Station ID: 17514
 Northern Ave
 East of Sackville (WB)

Start Time	26-May-14 Mon	Curb Lane	Center Lan							Total
12:00 AM		*	*							*
12:15		*	*							*
12:30		*	*							*
12:45		*	*							*
01:00		*	*							*
01:15		*	*							*
01:30		*	*							*
01:45		*	*							*
02:00		*	*							*
02:15		*	*							*
02:30		*	*							*
02:45		*	*							*
03:00		*	*							*
03:15		*	*							*
03:30		*	*							*
03:45		*	*							*
04:00		*	*							*
04:15		*	*							*
04:30		*	*							*
04:45		*	*							*
05:00		*	*							*
05:15		*	*							*
05:30		*	*							*
05:45		*	*							*
06:00		*	*							*
06:15		*	*							*
06:30		*	*							*
06:45		*	*							*
07:00		*	*							*
07:15		*	*							*
07:30		*	*							*
07:45		*	*							*
08:00		*	*							*
08:15		*	*							*
08:30		*	*							*
08:45		*	*							*
09:00		*	*							*
09:15		*	*							*
09:30			42	65						107
09:45			52	70						122
10:00			42	63						105
10:15			41	74						115
10:30			46	66						112
10:45			45	81						126
11:00			49	67						116
11:15			54	74						128
11:30			52	83						135
11:45			66	95						161
Total			489	738						1227
Percent			39.9%	60.1%						
Peak	-		11:00	11:00	-	-	-	-	-	11:00
Vol.	-		221	319	-	-	-	-	-	540
P.H.F.			0.837	0.839						0.839



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E SAK WB
 Station ID: 17514
 Northern Ave
 East of Sackville (WB)

Start Time	27-May-14 Tue	Curb Lane	Center Lan	Total						
12:00 AM		6	10	16						
12:15		4	8	12						
12:30		3	8	11						
12:45		0	1	1						
01:00		3	9	12						
01:15		1	6	7						
01:30		2	4	6						
01:45		0	1	1						
02:00		0	2	2						
02:15		0	1	1						
02:30		1	1	2						
02:45		2	4	6						
03:00		0	2	2						
03:15		0	1	1						
03:30		0	0	0						
03:45		2	3	5						
04:00		0	1	1						
04:15		0	0	0						
04:30		0	3	3						
04:45		1	3	4						
05:00		0	1	1						
05:15		2	6	8						
05:30		1	8	9						
05:45		4	6	10						
06:00		5	8	13						
06:15		4	13	17						
06:30		6	15	21						
06:45		16	21	37						
07:00		8	20	28						
07:15		11	24	35						
07:30		27	37	64						
07:45		34	51	85						
08:00		39	68	107						
08:15		41	72	113						
08:30		30	63	93						
08:45		63	92	155						
09:00		33	70	103						
09:15		36	64	100						
09:30		40	58	98						
09:45		44	63	107						
10:00		43	70	113						
10:15		61	91	152						
10:30		59	83	142						
10:45		41	71	112						
11:00		57	91	148						
11:15		46	82	128						
11:30		65	95	160						
11:45		53	77	130						
Total		894	1488	2382						
Percent		37.5%	62.5%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	221	345	-	-	-	-	-	-	566
P.H.F.		0.850	0.908							0.884



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E SAK WB
 Station ID: 17514
 Northern Ave
 East of Sackville (WB)

Start Time	27-May-14 Tue	Curb Lane	Center Lan	Total						
12:00 PM		79	113	192						
12:15		66	95	161						
12:30		70	109	179						
12:45		58	102	160						
01:00		59	101	160						
01:15		61	101	162						
01:30		56	89	145						
01:45		57	96	153						
02:00		62	98	160						
02:15		47	80	127						
02:30		75	107	182						
02:45		63	112	175						
03:00		67	106	173						
03:15		83	124	207						
03:30		59	89	148						
03:45		74	103	177						
04:00		71	111	182						
04:15		80	121	201						
04:30		76	123	199						
04:45		79	121	200						
05:00		74	122	196						
05:15		88	141	229						
05:30		62	98	160						
05:45		54	85	139						
06:00		54	89	143						
06:15		33	63	96						
06:30		46	70	116						
06:45		58	99	157						
07:00		48	80	128						
07:15		37	66	103						
07:30		28	61	89						
07:45		33	62	95						
08:00		24	44	68						
08:15		35	55	90						
08:30		41	61	102						
08:45		29	57	86						
09:00		31	59	90						
09:15		22	39	61						
09:30		11	24	35						
09:45		8	22	30						
10:00		14	30	44						
10:15		13	22	35						
10:30		6	13	19						
10:45		7	21	28						
11:00		14	26	40						
11:15		11	17	28						
11:30		3	11	14						
11:45		5	7	12						
Total		2231	3645	5876						
Percent		38.0%	62.0%							
Peak	-	16:30	16:30	-	-	-	-	-	-	16:30
Vol.	-	317	507	-	-	-	-	-	-	824
P.H.F.		0.901	0.899							0.900



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E SAK WB
 Station ID: 17514
 Northern Ave
 East of Sackville (WB)

Start Time	28-May-14 Wed	Curb Lane	Center Lan	Total
12:00 AM		7	13	20
12:15		5	9	14
12:30		4	3	7
12:45		1	3	4
01:00		1	2	3
01:15		0	2	2
01:30		0	2	2
01:45		0	3	3
02:00		0	0	0
02:15		0	2	2
02:30		0	0	0
02:45		1	5	6
03:00		1	1	2
03:15		0	0	0
03:30		0	2	2
03:45		1	1	2
04:00		0	2	2
04:15		1	2	3
04:30		0	1	1
04:45		0	0	0
05:00		0	1	1
05:15		4	4	8
05:30		1	7	8
05:45		3	6	9
06:00		4	8	12
06:15		7	12	19
06:30		5	7	12
06:45		16	26	42
07:00		12	22	34
07:15		23	29	52
07:30		21	33	54
07:45		46	64	110
08:00		32	58	90
08:15		46	80	126
08:30		35	65	100
08:45		53	75	128
09:00		42	58	100
09:15		50	73	123
09:30		12	42	54
09:45		*	*	*
10:00		*	*	*
10:15		*	*	*
10:30		*	*	*
10:45		*	*	*
11:00		*	*	*
11:15		*	*	*
11:30		*	*	*
11:45		*	*	*
Total		434	723	1157
Percent		37.5%	62.5%	
Peak	-	08:30	08:00	08:15
Vol.	-	180	278	454
P.H.F.		0.849	0.869	0.887
Grand Total		6394	10292	16686
Percent		38.3%	61.7%	
ADT		ADT 8,302	AADT 8,302	



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Grand Boulevard / Sackville Road & Reid Street
Municipality..... Sault Ste. Marie
Count Station.....
Direction..... Westbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, July 23, 2015				
	12:00 AM 01:00 AM	274		<input type="checkbox"/>
	01:00 AM 02:00 AM	263		<input type="checkbox"/>
	02:00 AM 03:00 AM	223		<input type="checkbox"/>
	03:00 AM 04:00 AM	214		<input type="checkbox"/>
	04:00 AM 05:00 AM	127		<input type="checkbox"/>
	05:00 AM 06:00 AM	62		<input type="checkbox"/>
	06:00 AM 07:00 AM	51		<input type="checkbox"/>
	07:00 AM 08:00 AM	13		<input type="checkbox"/>
	08:00 AM 09:00 AM	16		<input type="checkbox"/>
	09:00 AM 10:00 AM	9		<input type="checkbox"/>
	10:00 AM 11:00 AM	46		<input type="checkbox"/>
	11:00 AM 12:00 PM	104		<input type="checkbox"/>
	12:00 PM 01:00 PM	183		<input type="checkbox"/>
	01:00 PM 02:00 PM	256		<input type="checkbox"/>
	02:00 PM 03:00 PM	268		<input type="checkbox"/>
	03:00 PM 04:00 PM	329		<input type="checkbox"/>
	04:00 PM 05:00 PM	341		<input type="checkbox"/>
	05:00 PM 06:00 PM	358		<input type="checkbox"/>
	06:00 PM 07:00 PM	427		<input type="checkbox"/>
	07:00 PM 08:00 PM	411		<input type="checkbox"/>
	08:00 PM 09:00 PM	423		<input type="checkbox"/>
	09:00 PM 10:00 PM	436		<input type="checkbox"/>
	10:00 PM 11:00 PM	591		<input checked="" type="checkbox"/>
	11:00 PM 12:00 AM	472		<input type="checkbox"/>
Total		5,897		



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W WIL EB
 Station ID: 18254
 Northern Ave.
 West of Willow Ave. (EB)

Start Time	23-May-13 Thu	Curb	Center	Total						
12:00 AM		*	*	*						
12:15		*	*	*						
12:30		*	*	*						
12:45		*	*	*						
01:00		*	*	*						
01:15		*	*	*						
01:30		*	*	*						
01:45		*	*	*						
02:00		*	*	*						
02:15		*	*	*						
02:30		*	*	*						
02:45		*	*	*						
03:00		*	*	*						
03:15		*	*	*						
03:30		*	*	*						
03:45		*	*	*						
04:00		*	*	*						
04:15		*	*	*						
04:30		*	*	*						
04:45		*	*	*						
05:00		*	*	*						
05:15		*	*	*						
05:30		*	*	*						
05:45		*	*	*						
06:00		*	*	*						
06:15		*	*	*						
06:30		*	*	*						
06:45		*	*	*						
07:00		*	*	*						
07:15		*	*	*						
07:30		*	*	*						
07:45		*	*	*						
08:00		*	*	*						
08:15		*	*	*						
08:30		*	*	*						
08:45		*	*	*						
09:00		*	*	*						
09:15		*	*	*						
09:30		*	*	*						
09:45		104	114	218						
10:00		75	78	153						
10:15		60	70	130						
10:30		76	95	171						
10:45		92	108	200						
11:00		75	72	147						
11:15		67	82	149						
11:30		90	95	185						
11:45		101	104	205						
Total		740	818	1558						
Percent		47.5%	52.5%							
Peak	-	11:00	09:45	-	-	-	-	-	-	11:00
Vol.	-	333	357	-	-	-	-	-	-	686
P.H.F.		0.824	0.783							0.837



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
128 Sackville Road
Traffic Division

Site Code: NOR W WIL EB
Station ID: 18254
Northern Ave.
West of Willow Ave. (EB)

Start Time	23-May-13 Thu	Curb	Center	Total						
12:00 PM		108	123	231						
12:15		108	112	220						
12:30		83	89	172						
12:45		108	126	234						
01:00		91	108	199						
01:15		88	98	186						
01:30		73	80	153						
01:45		98	108	206						
02:00		94	104	198						
02:15		83	96	179						
02:30		91	102	193						
02:45		89	99	188						
03:00		91	95	186						
03:15		117	125	242						
03:30		101	105	206						
03:45		88	99	187						
04:00		120	114	234						
04:15		126	113	239						
04:30		92	111	203						
04:45		113	126	239						
05:00		125	144	269						
05:15		112	118	230						
05:30		101	108	209						
05:45		67	79	146						
06:00		88	100	188						
06:15		73	81	154						
06:30		61	72	133						
06:45		78	81	159						
07:00		72	81	153						
07:15		58	69	127						
07:30		70	72	142						
07:45		65	81	146						
08:00		59	71	130						
08:15		62	65	127						
08:30		40	45	85						
08:45		47	57	104						
09:00		53	60	113						
09:15		43	49	92						
09:30		39	47	86						
09:45		31	40	71						
10:00		38	47	85						
10:15		19	20	39						
10:30		28	32	60						
10:45		13	18	31						
11:00		19	24	43						
11:15		11	16	27						
11:30		10	13	23						
11:45		11	14	25						
Total		3455	3837	7292						
Percent		47.4%	52.6%							
Peak	-	16:15	16:30	-	-	-	-	-	-	16:15
Vol.	-	456	499	-	-	-	-	-	-	950
P.H.F.		0.905	0.866							0.883



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W WIL EB
 Station ID: 18254
 Northern Ave.
 West of Willow Ave. (EB)

Start Time	24-May-13 Fri	Curb	Center							Total
12:00 AM		3	4							7
12:15		10	10							20
12:30		10	7							17
12:45		6	6							12
01:00		5	5							10
01:15		0	1							1
01:30		3	1							4
01:45		4	4							8
02:00		3	4							7
02:15		0	0							0
02:30		1	1							2
02:45		4	4							8
03:00		0	0							0
03:15		2	2							4
03:30		0	0							0
03:45		2	2							4
04:00		1	1							2
04:15		1	1							2
04:30		1	1							2
04:45		1	1							2
05:00		1	1							2
05:15		0	0							0
05:30		2	2							4
05:45		3	4							7
06:00		4	5							9
06:15		10	11							21
06:30		11	19							30
06:45		19	23							42
07:00		20	25							45
07:15		25	25							50
07:30		29	36							65
07:45		55	60							115
08:00		71	73							144
08:15		82	87							169
08:30		86	95							181
08:45		113	115							228
09:00		83	86							169
09:15		66	64							130
09:30		62	63							125
09:45		55	60							115
10:00		72	84							156
10:15		58	59							117
10:30		75	80							155
10:45		76	91							167
11:00		1	35							36
11:15		*	*							*
11:30		*	*							*
11:45		*	*							*
Total		1136	1258							2394
Percent		47.5%	52.5%							
Peak	-	08:15	08:15	-	-	-	-	-	-	08:15
Vol.	-	364	383	-	-	-	-	-	-	747
P.H.F.		0.805	0.833							0.819
Grand Total		5331	5913							11244
Percent		47.4%	52.6%							
ADT		ADT 10,362	AADT 10,362							



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Great Northern Road & Willow Avenue

Municipality..... Sault Ste. Marie

Count Station.....

Direction..... Eastbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, December 03, 2015				
	12:00 AM 01:00 AM	31		<input type="checkbox"/>
	01:00 AM 02:00 AM	14		<input type="checkbox"/>
	02:00 AM 03:00 AM	10		<input type="checkbox"/>
	03:00 AM 04:00 AM	5		<input type="checkbox"/>
	04:00 AM 05:00 AM	3		<input type="checkbox"/>
	05:00 AM 06:00 AM	15		<input type="checkbox"/>
	06:00 AM 07:00 AM	57		<input type="checkbox"/>
	07:00 AM 08:00 AM	133		<input type="checkbox"/>
	08:00 AM 09:00 AM	497		<input type="checkbox"/>
	09:00 AM 10:00 AM	407		<input type="checkbox"/>
	10:00 AM 11:00 AM	334		<input type="checkbox"/>
	11:00 AM 12:00 PM	344		<input type="checkbox"/>
	12:00 PM 01:00 PM	455		<input type="checkbox"/>
	01:00 PM 02:00 PM	472		<input type="checkbox"/>
	02:00 PM 03:00 PM	436		<input type="checkbox"/>
	03:00 PM 04:00 PM	502		<input checked="" type="checkbox"/>
	04:00 PM 05:00 PM	491		<input type="checkbox"/>
	05:00 PM 06:00 PM	392		<input type="checkbox"/>
	06:00 PM 07:00 PM	326		<input type="checkbox"/>
	07:00 PM 08:00 PM	296		<input type="checkbox"/>
	08:00 PM 09:00 PM	263		<input type="checkbox"/>
	09:00 PM 10:00 PM	288		<input type="checkbox"/>
	10:00 PM 11:00 PM	189		<input type="checkbox"/>
	11:00 PM 12:00 AM	109		<input type="checkbox"/>
Total		6,069		



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E GRT WB
 Station ID: 18254
 Northern Ave.
 East of Great Northern Rd. (WB)

Start Time	06-Jun-13 Thu	Curb	Center	Total						
12:00 AM		*	*	*						
12:15		*	*	*						
12:30		*	*	*						
12:45		*	*	*						
01:00		*	*	*						
01:15		*	*	*						
01:30		*	*	*						
01:45		*	*	*						
02:00		*	*	*						
02:15		*	*	*						
02:30		*	*	*						
02:45		*	*	*						
03:00		*	*	*						
03:15		*	*	*						
03:30		*	*	*						
03:45		*	*	*						
04:00		*	*	*						
04:15		*	*	*						
04:30		*	*	*						
04:45		*	*	*						
05:00		*	*	*						
05:15		*	*	*						
05:30		*	*	*						
05:45		*	*	*						
06:00		*	*	*						
06:15		*	*	*						
06:30		*	*	*						
06:45		*	*	*						
07:00		*	*	*						
07:15		*	*	*						
07:30		*	*	*						
07:45		*	*	*						
08:00		*	*	*						
08:15		*	*	*						
08:30		*	*	*						
08:45		46	110	156						
09:00		54	90	144						
09:15		52	74	126						
09:30		51	71	122						
09:45		47	79	126						
10:00		43	70	113						
10:15		44	75	119						
10:30		46	82	128						
10:45		45	77	122						
11:00		53	81	134						
11:15		54	85	139						
11:30		56	102	158						
11:45		61	108	169						
Total		652	1104	1756						
Percent		37.1%	62.9%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	224	376	-	-	-	-	-	-	600
P.H.F.		0.918	0.870							0.888



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E GRT WB
 Station ID: 18254
 Northern Ave.
 East of Great Northern Rd. (WB)

Start Time	06-Jun-13 Thu	Curb	Center	Total						
12:00 PM		78	113	191						
12:15		60	101	161						
12:30		67	105	172						
12:45		54	94	148						
01:00		53	105	158						
01:15		51	89	140						
01:30		46	88	134						
01:45		53	86	139						
02:00		55	91	146						
02:15		49	80	129						
02:30		65	99	164						
02:45		57	88	145						
03:00		54	99	153						
03:15		76	111	187						
03:30		49	94	143						
03:45		58	119	177						
04:00		71	120	191						
04:15		65	117	182						
04:30		64	108	172						
04:45		58	88	146						
05:00		46	92	138						
05:15		46	86	132						
05:30		54	94	148						
05:45		39	81	120						
06:00		43	70	113						
06:15		46	86	132						
06:30		30	69	99						
06:45		34	65	99						
07:00		30	55	85						
07:15		40	53	93						
07:30		32	57	89						
07:45		26	52	78						
08:00		26	42	68						
08:15		29	49	78						
08:30		24	39	63						
08:45		36	48	84						
09:00		25	40	65						
09:15		20	40	60						
09:30		13	27	40						
09:45		12	28	40						
10:00		13	22	35						
10:15		7	11	18						
10:30		9	20	29						
10:45		6	16	22						
11:00		16	25	41						
11:15		4	8	12						
11:30		4	7	11						
11:45		2	7	9						
Total		1895	3284	5179						
Percent		36.6%	63.4%							
Peak	-	12:00	15:45	-	-	-	-	-	-	15:45
Vol.	-	259	464	-	-	-	-	-	-	722
P.H.F.		0.830	0.967							0.945



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E GRT WB
 Station ID: 18254
 Northern Ave.
 East of Great Northern Rd. (WB)

Start Time	07-Jun-13 Fri	Curb	Center	Total
12:00 AM		4	6	10
12:15		1	5	6
12:30		2	5	7
12:45		0	0	0
01:00		0	1	1
01:15		3	5	8
01:30		1	3	4
01:45		1	3	4
02:00		0	1	1
02:15		1	2	3
02:30		1	2	3
02:45		0	0	0
03:00		0	0	0
03:15		1	3	4
03:30		0	1	1
03:45		1	1	2
04:00		0	1	1
04:15		0	1	1
04:30		1	5	6
04:45		3	3	6
05:00		1	5	6
05:15		6	7	13
05:30		6	7	13
05:45		12	14	26
06:00		12	18	30
06:15		16	26	42
06:30		21	28	49
06:45		28	33	61
07:00		19	28	47
07:15		29	41	70
07:30		29	48	77
07:45		51	95	146
08:00		34	72	106
08:15		34	72	106
08:30		65	95	160
08:45		57	98	155
09:00		44	81	125
09:15		48	77	125
09:30		55	90	145
09:45		50	83	133
10:00		2	35	37
10:15		*	*	*
10:30		*	*	*
10:45		*	*	*
11:00		*	*	*
11:15		*	*	*
11:30		*	*	*
11:45		*	*	*
Total		639	1101	1740
Percent		36.7%	63.3%	
Peak	-	08:30	08:30	08:30
Vol.	-	214	351	565
P.H.F.		0.823	0.895	0.883
Grand Total		3186	5489	8675
Percent		36.7%	63.3%	
ADT		ADT 7,922	AADT 7,922	



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Great Northern Road & Willow Avenue

Municipality..... Sault Ste. Marie

Count Station.....

Direction..... Westbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, August 06, 2015				
	12:00 AM 01:00 AM	35		<input type="checkbox"/>
	01:00 AM 02:00 AM	17		<input type="checkbox"/>
	02:00 AM 03:00 AM	14		<input type="checkbox"/>
	03:00 AM 04:00 AM	16		<input type="checkbox"/>
	04:00 AM 05:00 AM	7		<input type="checkbox"/>
	05:00 AM 06:00 AM	36		<input type="checkbox"/>
	06:00 AM 07:00 AM	127		<input type="checkbox"/>
	07:00 AM 08:00 AM	216		<input type="checkbox"/>
	08:00 AM 09:00 AM	385		<input type="checkbox"/>
	09:00 AM 10:00 AM	361		<input type="checkbox"/>
	10:00 AM 11:00 AM	353		<input type="checkbox"/>
	11:00 AM 12:00 PM	491		<input type="checkbox"/>
	12:00 PM 01:00 PM	541		<input type="checkbox"/>
	01:00 PM 02:00 PM	504		<input type="checkbox"/>
	02:00 PM 03:00 PM	486		<input type="checkbox"/>
	03:00 PM 04:00 PM	488		<input type="checkbox"/>
	04:00 PM 05:00 PM	631		<input checked="" type="checkbox"/>
	05:00 PM 06:00 PM	463		<input type="checkbox"/>
	06:00 PM 07:00 PM	289		<input type="checkbox"/>
	07:00 PM 08:00 PM	276		<input type="checkbox"/>
	08:00 PM 09:00 PM	255		<input type="checkbox"/>
	09:00 PM 10:00 PM	155		<input type="checkbox"/>
	10:00 PM 11:00 PM	107		<input type="checkbox"/>
	11:00 PM 12:00 AM	57		<input type="checkbox"/>
Total		6,310		



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Tadcaster Place & Pine Street

Municipality..... Sault Ste. Marie

Count Station.....

Direction..... Eastbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, June 11, 2015				
	12:00 AM 01:00 AM	27		<input type="checkbox"/>
	01:00 AM 02:00 AM	27		<input type="checkbox"/>
	02:00 AM 03:00 AM	8		<input type="checkbox"/>
	03:00 AM 04:00 AM	8		<input type="checkbox"/>
	04:00 AM 05:00 AM	4		<input type="checkbox"/>
	05:00 AM 06:00 AM	9		<input type="checkbox"/>
	06:00 AM 07:00 AM	46		<input type="checkbox"/>
	07:00 AM 08:00 AM	129		<input type="checkbox"/>
	08:00 AM 09:00 AM	294		<input type="checkbox"/>
	09:00 AM 10:00 AM	308		<input type="checkbox"/>
	10:00 AM 11:00 AM	266		<input type="checkbox"/>
	11:00 AM 12:00 PM	384		<input type="checkbox"/>
	12:00 PM 01:00 PM	455		<input type="checkbox"/>
	01:00 PM 02:00 PM	258		<input type="checkbox"/>
	02:00 PM 03:00 PM	471		<input type="checkbox"/>
	03:00 PM 04:00 PM	574		<input type="checkbox"/>
	04:00 PM 05:00 PM	654		<input checked="" type="checkbox"/>
	05:00 PM 06:00 PM	520		<input type="checkbox"/>
	06:00 PM 07:00 PM	378		<input type="checkbox"/>
	07:00 PM 08:00 PM	286		<input type="checkbox"/>
	08:00 PM 09:00 PM	272		<input type="checkbox"/>
	09:00 PM 10:00 PM	196		<input type="checkbox"/>
	10:00 PM 11:00 PM	127		<input type="checkbox"/>
	11:00 PM 12:00 AM	73		<input type="checkbox"/>
Total		5,774		



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PIN EB
 Station ID: 17249
 Northern Ave.
 West of Pine St. (EB)

Start Time	16-May-13 Thu	Curb	Center	Total						
12:00 AM		*	*	*						
12:15		*	*	*						
12:30		*	*	*						
12:45		*	*	*						
01:00		*	*	*						
01:15		*	*	*						
01:30		*	*	*						
01:45		*	*	*						
02:00		*	*	*						
02:15		*	*	*						
02:30		*	*	*						
02:45		*	*	*						
03:00		*	*	*						
03:15		*	*	*						
03:30		*	*	*						
03:45		*	*	*						
04:00		*	*	*						
04:15		*	*	*						
04:30		*	*	*						
04:45		*	*	*						
05:00		*	*	*						
05:15		*	*	*						
05:30		*	*	*						
05:45		*	*	*						
06:00		*	*	*						
06:15		*	*	*						
06:30		*	*	*						
06:45		*	*	*						
07:00		*	*	*						
07:15		*	*	*						
07:30		*	*	*						
07:45		*	*	*						
08:00		*	*	*						
08:15		*	*	*						
08:30		*	*	*						
08:45		*	*	*						
09:00		*	*	*						
09:15		*	*	*						
09:30		*	*	*						
09:45		*	*	*						
10:00		*	*	*						
10:15		*	*	*						
10:30		*	*	*						
10:45		*	*	*						
11:00		34	43	77						
11:15		54	62	116						
11:30		55	62	117						
11:45		54	61	115						
Total		197	228	425						
Percent		46.4%	53.6%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	197	228	-	-	-	-	-	-	425
P.H.F.		0.895	0.919							0.908



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PIN EB
 Station ID: 17249
 Northern Ave.
 West of Pine St. (EB)

Start Time	16-May-13 Thu	Curb	Center	Total						
12:00 PM		72	83	155						
12:15		65	76	141						
12:30		56	62	118						
12:45		54	75	129						
01:00		63	72	135						
01:15		57	64	121						
01:30		49	61	110						
01:45		46	53	99						
02:00		53	59	112						
02:15		59	66	125						
02:30		83	95	178						
02:45		64	73	137						
03:00		65	76	141						
03:15		85	99	184						
03:30		83	92	175						
03:45		82	91	173						
04:00		88	93	181						
04:15		74	75	149						
04:30		86	95	181						
04:45		92	102	194						
05:00		80	97	177						
05:15		82	89	171						
05:30		78	83	161						
05:45		55	71	126						
06:00		57	60	117						
06:15		48	52	100						
06:30		53	58	111						
06:45		55	57	112						
07:00		61	66	127						
07:15		47	50	97						
07:30		48	56	104						
07:45		46	52	98						
08:00		38	43	81						
08:15		43	46	89						
08:30		41	47	88						
08:45		43	50	93						
09:00		38	39	77						
09:15		29	31	60						
09:30		29	30	59						
09:45		31	32	63						
10:00		21	23	44						
10:15		17	18	35						
10:30		14	18	32						
10:45		10	11	21						
11:00		17	17	34						
11:15		12	12	24						
11:30		6	6	12						
11:45		8	9	17						
Total		2483	2785	5268						
Percent		47.1%	52.9%							
Peak	-	16:00	16:30	-	-	-	-	-	-	16:30
Vol.	-	340	383	-	-	-	-	-	-	723
P.H.F.		0.924	0.939							0.932



Corporation of the City of Sault Ste. Marie

Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PIN EB
 Station ID: 17249
 Northern Ave.
 West of Pine St. (EB)

Start Time	17-May-13 Fri	Curb	Center	Total						
12:00 AM		3	3	6						
12:15		8	9	17						
12:30		3	3	6						
12:45		5	5	10						
01:00		4	4	8						
01:15		3	3	6						
01:30		0	0	0						
01:45		2	2	4						
02:00		1	1	2						
02:15		1	2	3						
02:30		1	1	2						
02:45		2	2	4						
03:00		2	3	5						
03:15		2	2	4						
03:30		1	1	2						
03:45		2	2	4						
04:00		1	1	2						
04:15		0	0	0						
04:30		0	0	0						
04:45		0	0	0						
05:00		1	1	2						
05:15		2	3	5						
05:30		0	1	1						
05:45		4	4	8						
06:00		6	7	13						
06:15		8	12	20						
06:30		8	13	21						
06:45		11	15	26						
07:00		17	19	36						
07:15		10	11	21						
07:30		20	27	47						
07:45		31	31	62						
08:00		28	32	60						
08:15		38	43	81						
08:30		37	40	77						
08:45		39	49	88						
09:00		30	38	68						
09:15		38	40	78						
09:30		33	41	74						
09:45		34	43	77						
10:00		45	49	94						
10:15		40	48	88						
10:30		47	55	102						
10:45		39	43	82						
11:00		48	56	104						
11:15		54	60	114						
11:30		69	71	140						
11:45		52	64	116						
Total		830	960	1790						
Percent		46.4%	53.6%							
Peak	-	11:00	11:00	-	-	-	-	-	-	11:00
Vol.	-	223	251	-	-	-	-	-	-	474
P.H.F.		0.808	0.884							0.846



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR W PIN EB
 Station ID: 17249
 Northern Ave.
 West of Pine St. (EB)

Start Time	17-May-13 Fri	Curb	Center	Total
12:00 PM		65	76	141
12:15		57	65	122
12:30		*	*	*
12:45		*	*	*
01:00		*	*	*
01:15		*	*	*
01:30		*	*	*
01:45		*	*	*
02:00		*	*	*
02:15		*	*	*
02:30		*	*	*
02:45		*	*	*
03:00		*	*	*
03:15		*	*	*
03:30		*	*	*
03:45		*	*	*
04:00		*	*	*
04:15		*	*	*
04:30		*	*	*
04:45		*	*	*
05:00		*	*	*
05:15		*	*	*
05:30		*	*	*
05:45		*	*	*
06:00		*	*	*
06:15		*	*	*
06:30		*	*	*
06:45		*	*	*
07:00		*	*	*
07:15		*	*	*
07:30		*	*	*
07:45		*	*	*
08:00		*	*	*
08:15		*	*	*
08:30		*	*	*
08:45		*	*	*
09:00		*	*	*
09:15		*	*	*
09:30		*	*	*
09:45		*	*	*
10:00		*	*	*
10:15		*	*	*
10:30		*	*	*
10:45		*	*	*
11:00		*	*	*
11:15		*	*	*
11:30		*	*	*
11:45		*	*	*
Total		122	141	263
Percent		46.4%	53.6%	
Peak Vol.	-	-	-	-
P.H.F.	-	-	-	-
Grand Total		3632	4114	7746
Percent		46.9%	53.1%	
ADT		ADT 7,017	AADT 7,017	



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E WIL WB
 Station ID: 17517
 Northern Ave.
 East of Willow Ave. (WB)

Start Time	22-May-13 Wed	Curb	Center	Total
12:00 AM		*	*	*
12:15		*	*	*
12:30		*	*	*
12:45		*	*	*
01:00		*	*	*
01:15		*	*	*
01:30		*	*	*
01:45		*	*	*
02:00		*	*	*
02:15		*	*	*
02:30		*	*	*
02:45		*	*	*
03:00		*	*	*
03:15		*	*	*
03:30		*	*	*
03:45		*	*	*
04:00		*	*	*
04:15		*	*	*
04:30		*	*	*
04:45		*	*	*
05:00		*	*	*
05:15		*	*	*
05:30		*	*	*
05:45		*	*	*
06:00		*	*	*
06:15		*	*	*
06:30		*	*	*
06:45		*	*	*
07:00		*	*	*
07:15		*	*	*
07:30		*	*	*
07:45		*	*	*
08:00		*	*	*
08:15		*	*	*
08:30		*	*	*
08:45		*	*	*
09:00		*	*	*
09:15		*	*	*
09:30		*	*	*
09:45		*	*	*
10:00		*	*	*
10:15		*	*	*
10:30		*	*	*
10:45		*	*	*
11:00		*	*	*
11:15		21	44	65
11:30		16	37	53
11:45		25	43	68
Total		62	124	186
Percent		33.3%	66.7%	
Peak Vol.	-	-	-	-
P.H.F.	-	-	-	-



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E WIL WB
 Station ID: 17517
 Northern Ave.
 East of Willow Ave. (WB)

Start Time	22-May-13 Wed	Curb	Center	Total						
12:00 PM		25	47	72						
12:15		26	51	77						
12:30		14	44	58						
12:45		28	61	89						
01:00		25	35	60						
01:15		20	43	63						
01:30		11	30	41						
01:45		27	58	85						
02:00		21	51	72						
02:15		19	49	68						
02:30		14	45	59						
02:45		21	44	65						
03:00		17	46	63						
03:15		18	45	63						
03:30		13	47	60						
03:45		25	64	89						
04:00		36	65	101						
04:15		23	38	61						
04:30		18	67	85						
04:45		17	51	68						
05:00		21	39	60						
05:15		17	41	58						
05:30		12	29	41						
05:45		31	54	85						
06:00		20	38	58						
06:15		14	33	47						
06:30		29	53	82						
06:45		21	30	51						
07:00		18	32	50						
07:15		19	51	70						
07:30		12	25	37						
07:45		13	27	40						
08:00		9	20	29						
08:15		14	27	41						
08:30		20	36	56						
08:45		16	23	39						
09:00		11	37	48						
09:15		8	19	27						
09:30		11	24	35						
09:45		4	16	20						
10:00		9	17	26						
10:15		4	8	12						
10:30		6	12	18						
10:45		5	14	19						
11:00		4	12	16						
11:15		5	12	17						
11:30		1	1	2						
11:45		0	3	3						
Total		772	1714	2486						
Percent		31.1%	68.9%							
Peak	-	15:45	15:45	-	-	-	-	-	-	15:45
Vol.	-	102	234	-	-	-	-	-	-	336
P.H.F.		0.708	0.873							0.832



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E WIL WB
 Station ID: 17517
 Northern Ave.
 East of Willow Ave. (WB)

Start Time	23-May-13 Thu	Curb	Center	Total						
12:00 AM		5	8	13						
12:15		2	3	5						
12:30		3	6	9						
12:45		2	3	5						
01:00		1	1	2						
01:15		1	1	2						
01:30		2	2	4						
01:45		1	1	2						
02:00		0	1	1						
02:15		0	2	2						
02:30		1	2	3						
02:45		0	2	2						
03:00		2	2	4						
03:15		0	1	1						
03:30		0	1	1						
03:45		1	2	3						
04:00		1	1	2						
04:15		0	1	1						
04:30		0	0	0						
04:45		1	2	3						
05:00		2	3	5						
05:15		1	6	7						
05:30		1	9	10						
05:45		7	10	17						
06:00		7	13	20						
06:15		8	13	21						
06:30		13	16	29						
06:45		14	19	33						
07:00		12	27	39						
07:15		9	20	29						
07:30		20	45	65						
07:45		33	65	98						
08:00		23	50	73						
08:15		30	58	88						
08:30		38	64	102						
08:45		27	53	80						
09:00		19	43	62						
09:15		28	45	73						
09:30		13	21	34						
09:45		25	37	62						
10:00		17	39	56						
10:15		15	29	44						
10:30		25	33	58						
10:45		27	45	72						
11:00		28	44	72						
11:15		20	44	64						
11:30		26	47	73						
11:45		31	58	89						
Total		542	998	1540						
Percent		35.2%	64.8%							
Peak	-	07:45	07:45	-	-	-	-	-	-	07:45
Vol.	-	124	237	-	-	-	-	-	-	361
P.H.F.		0.816	0.912							0.885



Corporation of the City of Sault Ste. Marie
 Public Works & Transportation
 128 Sackville Road
 Traffic Division

Site Code: NOR E WIL WB
 Station ID: 17517
 Northern Ave.
 East of Willow Ave. (WB)

Start Time	23-May-13 Thu	Curb	Center							Total
12:00 PM		25	51							76
12:15		22	47							69
12:30		21	56							77
12:45		16	45							61
01:00		3	1							4
01:15		*	*							*
01:30		*	*							*
01:45		*	*							*
02:00		*	*							*
02:15		*	*							*
02:30		*	*							*
02:45		*	*							*
03:00		*	*							*
03:15		*	*							*
03:30		*	*							*
03:45		*	*							*
04:00		*	*							*
04:15		*	*							*
04:30		*	*							*
04:45		*	*							*
05:00		*	*							*
05:15		*	*							*
05:30		*	*							*
05:45		*	*							*
06:00		*	*							*
06:15		*	*							*
06:30		*	*							*
06:45		*	*							*
07:00		*	*							*
07:15		*	*							*
07:30		*	*							*
07:45		*	*							*
08:00		*	*							*
08:15		*	*							*
08:30		*	*							*
08:45		*	*							*
09:00		*	*							*
09:15		*	*							*
09:30		*	*							*
09:45		*	*							*
10:00		*	*							*
10:15		*	*							*
10:30		*	*							*
10:45		*	*							*
11:00		*	*							*
11:15		*	*							*
11:30		*	*							*
11:45		*	*							*
Total		87	200							287
Percent		30.3%	69.7%							
Peak	-	12:00	12:00	-	-	-	-	-	-	12:00
Vol.	-	84	199	-	-	-	-	-	-	283
P.H.F.		0.840	0.888							0.919
Grand Total		1463	3036							4499
Percent		32.5%	67.5%							
ADT		ADT 3,972	AADT 3,972							



Volume Result Details by Hour Report

Location..... Northern Avenue East btwn Willow Avenue & Tadcaster Place

Municipality..... Sault Ste. Marie

Count Station.....

Direction..... Westbound

Date	Time Period	Count	Adjusted Count	Peak Hour
Thursday, December 03, 2015				
	12:00 AM 01:00 AM	14		<input type="checkbox"/>
	01:00 AM 02:00 AM	6		<input type="checkbox"/>
	02:00 AM 03:00 AM	5		<input type="checkbox"/>
	03:00 AM 04:00 AM	5		<input type="checkbox"/>
	04:00 AM 05:00 AM	8		<input type="checkbox"/>
	05:00 AM 06:00 AM	28		<input type="checkbox"/>
	06:00 AM 07:00 AM	68		<input type="checkbox"/>
	07:00 AM 08:00 AM	136		<input type="checkbox"/>
	08:00 AM 09:00 AM	259		<input type="checkbox"/>
	09:00 AM 10:00 AM	240		<input type="checkbox"/>
	10:00 AM 11:00 AM	200		<input type="checkbox"/>
	11:00 AM 12:00 PM	228		<input type="checkbox"/>
	12:00 PM 01:00 PM	302		<input type="checkbox"/>
	01:00 PM 02:00 PM	276		<input type="checkbox"/>
	02:00 PM 03:00 PM	270		<input type="checkbox"/>
	03:00 PM 04:00 PM	327		<input type="checkbox"/>
	04:00 PM 05:00 PM	354		<input checked="" type="checkbox"/>
	05:00 PM 06:00 PM	246		<input type="checkbox"/>
	06:00 PM 07:00 PM	227		<input type="checkbox"/>
	07:00 PM 08:00 PM	169		<input type="checkbox"/>
	08:00 PM 09:00 PM	166		<input type="checkbox"/>
	09:00 PM 10:00 PM	121		<input type="checkbox"/>
	10:00 PM 11:00 PM	72		<input type="checkbox"/>
	11:00 PM 12:00 AM	39		<input type="checkbox"/>
Total		3,766		



Turning Movement Count - Details Report

Location..... North Street @ Northern Avenue East/Northern Avenue West

Municipality..... Sault Ste. Marie

Count Date..... Tuesday, September 27, 2016

North Street

Northern Avenue East/Northern Avenue West

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	23	42	6	0	71	4	30	14	0	48	14	27	12	0	53	3	57	5	0	65
08:15 08:30	12	50	7	0	69	5	35	13	0	53	17	26	12	0	55	5	87	7	0	99
08:30 08:45	14	52	7	0	73	4	51	20	0	75	14	18	17	0	49	7	59	8	0	74
08:45 09:00	26	51	8	0	85	1	42	14	0	57	14	28	22	0	64	6	62	7	0	75
Hourly Total	75	195	28	0	298	14	158	61	0	233	59	99	63	0	221	21	265	27	0	313
11:00 11:15	21	30	4	0	55	2	28	7	0	37	5	39	11	0	55	3	47	4	0	54
11:15 11:30	23	27	9	0	59	4	33	15	0	52	11	31	16	0	58	3	45	3	0	51
11:30 11:45	13	24	3	0	40	2	31	15	0	48	19	57	20	0	96	6	49	4	0	59
11:45 12:00	22	30	5	0	57	4	34	13	0	51	16	32	16	0	64	5	37	2	0	44
Hourly Total	79	111	21	0	211	12	126	50	0	188	51	159	63	0	273	17	178	13	0	208
12:00 12:15	21	33	6	0	60	4	50	17	0	71	12	55	26	0	93	3	62	4	0	69
12:15 12:30	16	22	6	0	44	3	39	12	0	54	12	54	20	0	86	3	42	2	0	47
12:30 12:45	26	19	2	0	47	3	32	12	0	47	16	59	10	0	85	6	46	4	0	56
12:45 13:00	17	38	2	0	57	2	36	26	0	64	12	41	11	0	64	3	45	3	0	51
Hourly Total	80	112	16	0	208	12	157	67	0	236	52	209	67	0	328	15	195	13	0	223
13:00 13:15	21	28	7	0	56	2	36	13	0	51	21	54	14	0	89	2	55	10	0	67
13:15 13:30	15	31	1	0	47	2	43	15	0	60	11	49	15	0	75	3	44	6	0	53
13:30 13:45	21	35	5	0	61	2	39	17	0	58	11	45	13	0	69	4	56	3	0	63
13:45 14:00	11	30	3	0	44	5	33	19	0	57	19	54	14	0	87	4	45	3	0	52
Hourly Total	68	124	16	0	208	11	151	64	0	226	62	202	56	0	320	13	200	22	0	235
14:00 14:15	18	24	2	0	44	8	30	9	0	47	19	46	14	0	79	2	51	3	0	56
14:15 14:30	15	16	5	0	36	0	37	15	0	52	17	45	23	0	85	5	43	4	0	52
14:30 14:45	19	31	5	0	55	5	34	20	0	59	11	43	19	0	73	3	52	5	0	60
14:45 15:00	13	33	2	0	48	6	33	14	0	53	20	48	24	0	92	5	38	4	0	47
Hourly Total	65	104	14	0	183	19	134	58	0	211	67	182	80	0	329	15	184	16	0	215
15:00 15:15	11	45	6	0	62	2	47	15	0	64	21	53	19	0	93	6	40	13	0	59
15:15 15:30	20	34	5	0	59	6	58	19	0	83	14	66	27	0	107	6	49	3	0	58
15:30 15:45	24	21	11	0	56	3	33	14	0	50	22	68	23	0	113	0	63	2	0	65
15:45 16:00	16	41	3	0	60	9	42	11	0	62	15	60	20	0	95	3	71	6	0	80
Hourly Total	71	141	25	0	237	20	180	59	0	259	72	247	89	0	408	15	223	24	0	262

North Street

Northern Avenue East/Northern Avenue West

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	
16:00	16:15	8	34	5	0	47	5	27	14	0	46	15	74	18	0	107	2	53	5	0	60
16:15	16:30	18	33	5	0	56	4	31	20	0	55	19	74	24	0	117	0	52	4	0	56
16:30	16:45	21	29	5	0	55	9	58	23	0	90	16	71	21	0	108	2	58	5	0	65
16:45	17:00	9	23	3	0	35	6	48	27	0	81	23	64	25	0	112	0	44	3	0	47
Hourly Total		56	119	18	0	193	24	164	84	0	272	73	283	88	0	444	4	207	17	0	228
17:00	17:15	10	30	3	0	43	8	46	14	0	68	18	74	14	0	106	2	54	3	0	59
17:15	17:30	17	44	8	0	69	3	50	22	0	75	12	57	17	0	86	1	51	2	0	54
17:30	17:45	8	21	2	0	31	3	33	7	0	43	11	45	21	0	77	3	44	0	0	47
17:45	18:00	14	18	6	0	38	5	28	17	0	50	13	42	18	0	73	2	46	4	0	52
Hourly Total		49	113	19	0	181	19	157	60	0	236	54	218	70	0	342	8	195	9	0	212
Grand Total		543	1019	157	0	1719	131	1227	503	0	1861	490	1599	576	0	2665	108	1647	141	0	1896
Truck %		6%	4%	3%	0%	5%	3%	7%	4%	0%	6%	3%	1%	1%	0%	1%	4%	2%	4%	0%	2%



Turning Movement Count - Details Report

Location..... Grand Boulevard @ Northern Avenue East/Sackville Road

Municipality..... Sault Ste. Marie

Count Date..... Tuesday, July 07, 2015

Grand Boulevard

Northern Avenue East/Sackville Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	9	22	11	0	42	5	26	3	0	34	2	20	14	0	36	12	21	6	0	39
08:15 08:30	24	13	5	0	42	2	18	6	0	26	7	30	16	0	53	5	48	4	0	57
08:30 08:45	23	12	4	0	39	5	20	11	0	36	1	34	20	0	55	10	62	4	0	76
08:45 09:00	37	7	10	0	54	2	14	6	0	22	5	41	26	0	72	6	77	4	0	87
Hourly Total	93	54	30	0	177	14	78	26	0	118	15	125	76	0	216	33	208	18	0	259
11:00 11:15	31	14	8	0	53	8	22	4	0	34	3	68	19	0	90	8	58	8	0	74
11:15 11:30	31	15	7	0	53	5	13	1	0	19	2	50	26	0	78	3	56	4	0	63
11:30 11:45	36	8	5	0	49	3	19	6	0	28	6	48	21	0	75	6	69	3	0	78
11:45 12:00	42	21	14	0	77	5	26	7	0	38	10	70	36	0	116	9	63	6	0	78
Hourly Total	140	58	34	0	232	21	80	18	0	119	21	236	102	0	359	26	246	21	0	293
12:00 12:15	41	30	11	0	82	5	21	12	0	38	8	76	35	0	119	2	63	8	0	73
12:15 12:30	26	22	11	0	59	6	18	5	0	29	6	64	36	0	106	7	62	9	0	78
12:30 12:45	31	17	2	0	50	2	16	11	0	29	6	63	30	0	99	8	62	5	0	75
12:45 13:00	37	19	4	0	60	11	30	7	0	48	5	85	31	0	121	2	79	9	0	90
Hourly Total	135	88	28	0	251	24	85	35	0	144	25	288	132	0	445	19	266	31	0	316
13:00 13:15	25	17	8	0	50	6	22	6	0	34	9	63	33	0	105	5	65	12	0	82
13:15 13:30	24	15	3	0	42	3	22	5	0	30	4	60	26	0	90	8	81	3	0	92
13:30 13:45	24	16	3	0	43	8	13	12	0	33	5	64	34	0	103	3	70	8	0	81
13:45 14:00	29	11	6	0	46	5	19	4	0	28	4	58	27	0	89	8	67	8	0	83
Hourly Total	102	59	20	0	181	22	76	27	0	125	22	245	120	0	387	24	283	31	0	338
14:00 14:15	28	22	3	0	53	5	20	6	0	31	7	63	33	0	103	11	65	6	0	82
14:15 14:30	35	19	4	0	58	6	20	8	0	34	2	65	34	0	101	1	70	6	0	77
14:30 14:45	27	12	8	0	47	8	17	5	0	30	10	67	29	0	106	3	83	4	0	90
14:45 15:00	34	30	6	0	70	9	25	3	0	37	6	74	29	0	109	7	75	4	0	86
Hourly Total	124	83	21	0	228	28	82	22	0	132	25	269	125	0	419	22	293	20	0	335
15:00 15:15	37	19	10	0	66	10	16	9	0	35	10	85	33	0	128	8	67	4	0	79
15:15 15:30	28	14	6	0	48	8	19	9	0	36	7	60	33	0	100	5	72	6	0	83
15:30 15:45	34	16	6	0	56	4	16	3	0	23	9	93	23	0	125	4	81	3	0	88
15:45 16:00	34	17	9	0	60	5	23	9	0	37	2	78	27	0	107	6	68	9	0	83
Hourly Total	133	66	31	0	230	27	74	30	0	131	28	316	116	0	460	23	288	22	0	333

Grand Boulevard

Northern Avenue East/Sackville Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	
16:00	16:15	49	29	7	0	85	7	11	7	0	25	3	92	32	0	127	10	76	8	0	94
16:15	16:30	29	27	8	0	64	8	17	7	0	32	4	92	49	0	145	3	87	7	0	97
16:30	16:45	43	37	10	0	90	10	34	3	0	47	7	90	31	0	128	12	94	7	0	113
16:45	17:00	40	24	8	0	72	5	16	7	0	28	9	84	34	0	127	8	86	5	0	99
Hourly Total		161	117	33	0	311	30	78	24	0	132	23	358	146	0	527	33	343	27	0	403
17:00	17:15	38	31	9	0	78	11	11	7	0	29	9	93	27	0	129	3	70	3	0	76
17:15	17:30	29	20	5	0	54	5	20	12	0	37	3	67	28	0	98	2	82	4	0	88
17:30	17:45	23	15	3	0	41	10	13	6	0	29	10	61	15	0	86	3	73	6	0	82
17:45	18:00	19	14	1	0	34	6	16	7	0	29	6	58	20	0	84	4	77	6	0	87
Hourly Total		109	80	18	0	207	32	60	32	0	124	28	279	90	0	397	12	302	19	0	333
Grand Total		997	605	215	0	1817	198	613	214	0	1025	187	2116	907	0	3210	192	2229	189	0	2610
Truck %		4%	1%	2%	0%	3%	1%	3%	0%	0%	2%	1%	1%	4%	0%	2%	2%	1%	1%	0%	1%



Turning Movement Count - Details Report

Location..... Great Northern Road @ Northern Avenue East

Municipality..... Sault Ste. Marie

Count Date..... Tuesday, May 26, 2015

Great Northern Road

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	34	148	13	0	195	33	78	1	0	112	5	33	26	0	64	26	26	21	0	73
08:15 08:30	56	170	18	0	244	17	111	1	0	129	4	22	30	0	56	26	41	36	0	103
08:30 08:45	37	153	18	0	208	28	102	3	0	133	5	37	45	0	87	39	44	36	0	119
08:45 09:00	48	176	22	0	246	33	127	1	0	161	7	29	34	0	70	44	41	46	0	131
Hourly Total	175	647	71	0	893	111	418	6	0	535	21	121	135	0	277	135	152	139	0	426
11:00 11:15	34	170	22	0	226	31	143	2	0	176	9	27	16	0	52	40	35	31	0	106
11:15 11:30	47	182	35	0	264	42	148	6	0	196	6	27	25	0	58	26	30	32	0	88
11:30 11:45	40	133	27	0	200	42	155	4	0	201	6	34	37	0	77	54	45	32	0	131
11:45 12:00	52	164	31	0	247	43	159	4	0	206	6	38	37	0	81	33	47	45	0	125
Hourly Total	173	649	115	0	937	158	605	16	0	779	27	126	115	0	268	153	157	140	0	450
12:00 12:15	40	193	36	0	269	36	195	5	0	236	3	47	50	0	100	64	39	43	0	146
12:15 12:30	56	191	33	0	280	51	157	2	0	210	7	37	29	0	73	39	29	53	0	121
12:30 12:45	53	157	32	0	242	43	154	2	0	199	15	47	29	0	91	43	51	36	0	130
12:45 13:00	52	184	22	0	258	48	178	4	0	230	11	42	23	0	76	43	49	46	0	138
Hourly Total	201	725	123	0	1049	178	684	13	0	875	36	173	131	0	340	189	168	178	0	535
13:00 13:15	38	191	24	0	253	41	166	3	0	210	13	54	34	0	101	43	45	50	0	138
13:15 13:30	55	168	33	0	256	39	168	5	0	212	4	31	38	0	73	38	42	42	0	122
13:30 13:45	36	186	24	0	246	58	180	4	0	242	6	32	41	0	79	38	39	38	0	115
13:45 14:00	43	177	22	0	242	39	142	1	0	182	4	32	23	0	59	32	43	39	0	114
Hourly Total	172	722	103	0	997	177	656	13	0	846	27	149	136	0	312	151	169	169	0	489
14:00 14:15	37	187	32	0	256	38	162	0	0	200	4	35	29	0	68	42	57	34	0	133
14:15 14:30	35	182	37	0	254	54	138	1	0	193	2	33	37	0	72	38	48	31	0	117
14:30 14:45	25	200	39	0	264	37	183	6	0	226	7	40	25	0	72	58	31	36	0	125
14:45 15:00	38	206	37	0	281	41	154	3	0	198	8	40	25	0	73	42	42	38	0	122
Hourly Total	135	775	145	0	1055	170	637	10	0	817	21	148	116	0	285	180	178	139	0	497
15:00 15:15	34	158	27	0	219	43	142	7	0	192	13	46	24	0	83	39	50	45	0	134
15:15 15:30	35	171	28	0	234	46	134	3	0	183	8	38	33	0	79	50	60	38	0	148
15:30 15:45	47	172	36	0	255	31	138	5	0	174	8	42	31	0	81	38	49	44	0	131
15:45 16:00	40	156	28	0	224	47	143	5	0	195	12	42	41	0	95	49	56	48	0	153
Hourly Total	156	657	119	0	932	167	557	20	0	744	41	168	129	0	338	176	215	175	0	566

Great Northern Road

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	44	160	32	0	236	42	143	3	0	188	11	52	36	0	99	34	65	43	0	142
16:15 16:30	44	182	44	0	270	50	157	0	0	207	9	44	40	0	93	47	47	37	0	131
16:30 16:45	51	190	47	0	288	42	170	1	0	213	10	58	41	0	109	51	66	43	0	160
16:45 17:00	62	202	40	0	304	60	198	2	0	260	6	41	36	0	83	40	71	46	0	157
Hourly Total	201	734	163	0	1098	194	668	6	0	868	36	195	153	0	384	172	249	169	0	590
17:00 17:15	49	184	37	0	270	50	171	2	0	223	6	59	30	0	95	63	79	43	0	185
17:15 17:30	51	201	43	0	295	34	148	3	0	185	3	46	30	0	79	58	44	51	0	153
17:30 17:45	33	152	41	0	226	39	147	2	0	188	5	37	32	0	74	39	48	47	0	134
17:45 18:00	28	137	33	0	198	32	144	5	0	181	9	40	37	0	86	38	50	44	0	132
Hourly Total	161	674	154	0	989	155	610	12	0	777	23	182	129	0	334	198	221	185	0	604
Grand Total	1374	5583	993	0	7950	1310	4835	96	0	6241	232	1262	1044	0	2538	1354	1509	1294	0	4157
Truck %	2%	3%	5%	0%	3%	1%	3%	3%	0%	3%	3%	1%	3%	0%	2%	5%	2%	2%	0%	3%



Turning Movement Count - Details Report

Location..... Northern Avenue East @ Willow Avenue

Municipality..... Sault Ste. Marie

Count Date..... Thursday, December 03, 2015

Willow Avenue

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	0	0	0	0	0	20	0	13	0	33	7	49	0	0	56	0	96	54	0	150
08:15 08:30	0	0	0	0	0	29	0	18	0	47	9	67	0	0	76	0	82	58	0	140
08:30 08:45	0	0	0	0	0	37	0	5	0	42	11	54	0	0	65	0	45	50	0	95
08:45 09:00	0	0	0	0	0	39	0	7	0	46	8	54	0	0	62	0	44	68	0	112
Hourly Total	0	0	0	0	0	125	0	43	0	168	35	224	0	0	259	0	267	230	0	497
09:00 09:15	0	1	0	0	1	37	0	7	0	44	7	66	0	0	73	0	77	46	0	123
09:15 09:30	1	1	0	0	2	24	0	8	0	32	9	49	0	0	58	0	79	46	0	125
09:30 09:45	0	0	0	0	0	43	1	9	0	53	10	49	0	0	59	0	38	36	0	74
09:45 10:00	0	0	0	0	0	39	0	6	0	45	8	42	0	0	50	0	53	32	0	85
Hourly Total	1	2	0	0	3	143	1	30	0	174	34	206	0	0	240	0	247	160	0	407
12:00 12:15	0	0	0	0	0	75	0	9	0	84	13	72	0	0	85	0	74	50	0	124
12:15 12:30	0	0	0	0	0	51	0	17	0	68	4	60	0	0	64	0	71	46	0	117
12:30 12:45	0	0	0	0	0	44	0	6	0	50	12	69	0	0	81	0	60	39	0	99
12:45 13:00	0	0	0	0	0	52	0	13	0	65	8	64	0	0	72	0	58	57	0	115
Hourly Total	0	0	0	0	0	222	0	45	0	267	37	265	0	0	302	0	263	192	0	455
13:00 13:15	0	0	0	0	0	65	0	15	0	80	5	57	0	0	62	0	71	61	0	132
13:15 13:30	0	0	0	0	0	49	0	16	0	65	13	69	0	0	82	0	76	57	0	133
13:30 13:45	0	0	0	0	0	35	0	11	0	46	13	51	0	0	64	0	64	52	0	116
13:45 14:00	1	0	0	0	1	49	0	12	0	61	13	55	0	0	68	0	57	34	0	91
Hourly Total	1	0	0	0	1	198	0	54	0	252	44	232	0	0	276	0	268	204	0	472
14:00 14:15	0	0	0	0	0	53	0	9	0	62	8	50	1	0	59	0	74	34	0	108
14:15 14:30	0	0	0	0	0	56	0	12	0	68	7	65	0	0	72	0	81	35	0	116
14:30 14:45	0	0	0	0	0	48	0	14	0	62	10	55	0	0	65	0	62	34	0	96
14:45 15:00	0	0	0	0	0	53	0	9	0	62	16	58	0	0	74	0	82	34	0	116
Hourly Total	0	0	0	0	0	210	0	44	0	254	41	228	1	0	270	0	299	137	0	436
15:00 15:15	0	0	0	0	0	62	0	9	0	71	10	68	0	0	78	0	73	38	0	111
15:15 15:30	0	0	0	0	0	51	0	10	0	61	10	82	0	0	92	0	74	50	0	124
15:30 15:45	0	0	0	0	0	65	0	7	0	72	7	71	0	0	78	0	79	60	0	139
15:45 16:00	0	0	0	0	0	50	0	4	0	54	13	66	0	0	79	0	84	44	0	128
Hourly Total	0	0	0	0	0	228	0	30	0	258	40	287	0	0	327	0	310	192	0	502

Willow Avenue

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	0	0	0	0	0	93	0	18	0	111	8	73	0	0	81	0	81	38	0	119
16:15 16:30	0	0	0	0	0	71	0	11	0	82	16	84	0	0	100	0	89	42	0	131
16:30 16:45	0	0	0	0	0	96	0	13	0	109	16	81	0	0	97	0	78	42	0	120
16:45 17:00	0	0	1	0	1	59	0	11	0	70	6	70	0	0	76	0	87	34	0	121
Hourly Total	0	0	1	0	1	319	0	53	0	372	46	308	0	0	354	0	335	156	0	491
17:00 17:15	0	0	0	0	0	78	0	10	0	88	3	54	0	0	57	0	60	39	0	99
17:15 17:30	0	0	0	0	0	53	0	7	0	60	10	64	0	0	74	0	80	41	0	121
17:30 17:45	0	0	0	0	0	48	0	6	0	54	8	50	0	0	58	0	68	24	0	92
17:45 18:00	0	0	0	0	0	41	0	3	0	44	4	53	0	0	57	0	55	25	0	80
Hourly Total	0	0	0	0	0	220	0	26	0	246	25	221	0	0	246	0	263	129	0	392
Grand Total	2	2	1	0	5	1665	1	325	0	1991	302	1971	1	0	2274	0	2252	1400	0	3652
Truck %	100%	100%	100%	0%	100%	2%	0%	8%	0%	3%	8%	2%	0%	0%	3%	0%	2%	1%	0%	2%



Turning Movement Count - Details Report

Location..... Northern Avenue East @ Pine Street

Municipality..... Sault Ste. Marie

Count Date..... Wednesday, June 22, 2016

Pine Street

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	1	65	13	0	79	41	109	4	0	154	2	1	3	0	6	5	0	28	0	33
08:15 08:30	2	92	19	0	113	42	115	3	0	160	1	1	2	0	4	11	3	25	0	39
08:30 08:45	2	63	9	0	74	48	82	3	0	133	1	3	0	0	4	1	2	36	0	39
08:45 09:00	2	57	4	0	63	48	88	1	0	137	2	0	0	0	2	5	2	30	0	37
Hourly Total	7	277	45	0	329	179	394	11	0	584	6	5	5	0	16	22	7	119	0	148
11:00 11:15	1	60	4	0	65	25	61	7	0	93	2	4	2	0	8	8	4	55	0	67
11:15 11:30	7	57	8	0	72	34	65	6	0	105	4	7	4	0	15	5	4	32	0	41
11:30 11:45	3	69	4	0	76	23	68	2	0	93	3	5	2	0	10	5	6	38	0	49
11:45 12:00	4	68	2	0	74	29	77	4	0	110	5	8	1	0	14	9	3	51	0	63
Hourly Total	15	254	18	0	287	111	271	19	0	401	14	24	9	0	47	27	17	176	0	220
12:00 12:15	1	95	10	0	106	31	63	4	0	98	2	7	2	0	11	8	3	60	0	71
12:15 12:30	1	56	4	0	61	24	68	4	0	96	3	3	5	0	11	7	8	38	0	53
12:30 12:45	3	68	5	0	76	46	77	3	0	126	3	6	2	0	11	6	6	49	0	61
12:45 13:00	0	64	8	0	72	33	74	4	0	111	2	4	3	0	9	11	4	55	0	70
Hourly Total	5	283	27	0	315	134	282	15	0	431	10	20	12	0	42	32	21	202	0	255
13:00 13:15	6	60	10	0	76	32	79	3	0	114	2	4	3	0	9	4	1	31	0	36
13:15 13:30	4	50	11	0	65	37	62	2	0	101	2	4	3	0	9	10	6	49	0	65
13:30 13:45	0	49	14	0	63	31	67	5	0	103	1	6	1	0	8	10	5	56	0	71
13:45 14:00	4	66	14	0	84	32	53	5	0	90	4	1	3	0	8	5	7	59	0	71
Hourly Total	14	225	49	0	288	132	261	15	0	408	9	15	10	0	34	29	19	195	0	243
14:00 14:15	4	53	18	0	75	23	64	4	0	91	2	0	7	0	9	6	5	58	0	69
14:15 14:30	2	62	17	0	81	44	51	7	0	102	1	4	3	0	8	5	7	55	0	67
14:30 14:45	2	58	20	0	80	36	88	14	0	138	8	6	6	0	20	16	7	54	0	77
14:45 15:00	10	109	11	0	130	34	69	11	0	114	10	11	14	0	35	9	7	64	0	80
Hourly Total	18	282	66	0	366	137	272	36	0	445	21	21	30	0	72	36	26	231	0	293
15:00 15:15	2	73	6	0	81	28	67	7	0	102	11	7	10	0	28	4	2	77	0	83
15:15 15:30	3	82	3	0	88	28	74	3	0	105	6	6	2	0	14	2	2	68	0	72
15:30 15:45	2	84	9	0	95	28	89	5	0	122	2	1	6	0	9	6	4	62	0	72
15:45 16:00	3	99	10	0	112	37	81	1	0	119	4	3	7	0	14	10	2	60	0	72
Hourly Total	10	338	28	0	376	121	311	16	0	448	23	17	25	0	65	22	10	267	0	299

Pine Street

Northern Avenue East

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	9	89	8	0	106	31	75	3	0	109	7	7	10	0	24	11	5	77	0	93
16:15 16:30	4	86	8	0	98	39	72	3	0	114	6	5	2	0	13	9	3	57	0	69
16:30 16:45	2	97	8	0	107	36	82	7	0	125	4	2	7	0	13	11	7	95	0	113
16:45 17:00	3	93	7	0	103	30	74	5	0	109	5	7	3	0	15	2	2	57	0	61
Hourly Total	18	365	31	0	414	136	303	18	0	457	22	21	22	0	65	33	17	286	0	336
17:00 17:15	1	92	7	0	100	31	74	4	0	109	2	3	5	0	10	6	1	77	0	84
17:15 17:30	3	73	3	0	79	28	69	3	0	100	2	3	2	0	7	7	1	52	0	60
17:30 17:45	1	93	4	0	98	23	96	1	0	120	1	1	6	0	8	4	2	56	0	62
17:45 18:00	0	88	6	0	94	21	74	3	0	98	3	3	2	0	8	4	2	52	0	58
Hourly Total	5	346	20	0	371	103	313	11	0	427	8	10	15	0	33	21	6	237	0	264
Grand Total	92	2370	284	0	2746	1053	2407	141	0	3601	113	133	128	0	374	222	123	1713	0	2058
Truck %	7%	3%	3%	0%	3%	4%	3%	3%	0%	4%	2%	4%	9%	0%	5%	12%	7%	3%	0%	4%



Volume Hourly Summary Report

Location..... Lake Street btwn Placid Avenue & Clearview Drive

Municipality..... Sault Ste. Marie

Date	StartTime	Northbound	Southbound	Grand Total
Wednesday, July 10, 2013	13	79	118	197
	14	92	143	235
	15	118	102	220
	16	166	171	337
	17	127	156	283
	18	105	142	247
	19	112	125	237
	20	114	124	238
	21	95	89	184
	22	69	55	124
	23	30	37	67
Wednesday, July 10, 2013		1107	1262	2369
Thursday, July 11, 2013	0	15	8	23
	1	6	7	13
	2	2	7	9
	3	0	1	1

	4	3	6	9
	5	3	14	17
	6	9	33	42
	7	36	88	124
	8	61	158	219
	9	70	135	205
	10	96	132	228
	11	104	169	273
	12	121	162	283
	13	116	156	272
	14	95	75	170
	15	82	77	159
	16	141	142	283
	17	170	191	361
	18	106	141	247
	19	124	139	263
	20	117	105	222
	21	94	101	195
	22	68	74	142
	23	33	47	80
Thursday, July 11, 2013		1672	2168	3840
Friday, July 12, 2013	0	17	15	32
	1	7	11	18

	2	10	9	19
	3	2	3	5
	4	7	1	8
	5	2	15	17
	6	12	39	51
	7	35	82	117
	8	55	139	194
	9	3	3	6
Friday, July 12, 2013		150	317	467
Grand Total		2929	3747	6676



Turning Movement Count - Details Report

Location..... Lake Street @ McNabb Street
Municipality..... Sault Ste. Marie
Count Date..... Thursday, September 29, 2016

Lake Street

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	12	14	8	0	34	30	6	4	0	40	4	115	8	0	127	2	57	17	0	76
08:15 08:30	15	22	8	0	45	27	9	3	0	39	11	145	8	0	164	4	66	29	0	99
08:30 08:45	17	7	6	0	30	38	8	7	0	53	6	123	13	0	142	8	54	31	0	93
08:45 09:00	11	18	11	0	40	32	9	7	0	48	12	163	12	0	187	4	80	25	0	109
Hourly Total	55	61	33	0	149	127	32	21	0	180	33	546	41	0	620	18	257	102	0	377
11:00 11:15	11	8	10	0	29	44	13	2	0	59	3	108	6	0	117	7	66	32	0	105
11:15 11:30	7	7	9	0	23	36	7	5	0	48	7	94	5	0	106	3	87	29	0	119
11:30 11:45	8	9	6	0	23	28	12	1	0	41	6	102	10	0	118	3	92	34	0	129
11:45 12:00	11	12	10	0	33	26	14	7	0	47	4	100	12	0	116	4	91	31	0	126
Hourly Total	37	36	35	0	108	134	46	15	0	195	20	404	33	0	457	17	336	126	0	479
12:00 12:15	13	12	6	0	31	27	14	3	0	44	3	97	15	0	115	10	87	46	0	143
12:15 12:30	7	11	11	0	29	27	16	7	0	50	6	97	19	0	122	7	121	48	0	176
12:30 12:45	15	12	9	0	36	24	13	1	0	38	4	92	10	0	106	4	76	38	0	118
12:45 13:00	9	15	5	0	29	33	10	5	0	48	4	87	11	0	102	7	105	43	0	155
Hourly Total	44	50	31	0	125	111	53	16	0	180	17	373	55	0	445	28	389	175	0	592
13:00 13:15	15	11	20	0	46	49	6	5	0	60	4	98	5	0	107	7	68	45	0	120
13:15 13:30	14	11	8	0	33	38	14	3	0	55	1	93	7	0	101	12	88	28	0	128
13:30 13:45	8	4	13	0	25	31	7	13	0	51	4	91	8	0	103	4	77	41	0	122
13:45 14:00	9	13	5	0	27	35	8	3	0	46	4	87	7	0	98	6	95	37	0	138
Hourly Total	46	39	46	0	131	153	35	24	0	212	13	369	27	0	409	29	328	151	0	508
14:00 14:15	14	5	4	0	23	37	12	2	0	51	6	69	11	0	86	2	89	29	0	120
14:15 14:30	9	10	5	0	24	37	11	5	0	53	5	88	8	0	101	7	97	35	0	139
14:30 14:45	7	18	8	0	33	32	19	4	0	55	2	84	5	0	91	8	102	51	0	161
14:45 15:00	18	14	4	0	36	42	9	5	0	56	13	87	6	0	106	16	101	54	0	171
Hourly Total	48	47	21	0	116	148	51	16	0	215	26	328	30	0	384	33	389	169	0	591
15:00 15:15	18	18	8	0	44	34	24	6	0	64	3	122	14	0	139	8	124	60	0	192
15:15 15:30	18	19	8	0	45	28	19	3	0	50	12	96	13	0	121	10	142	60	0	212
15:30 15:45	18	24	11	0	53	46	23	8	0	77	7	115	18	0	140	9	112	49	0	170
15:45 16:00	18	12	7	0	37	43	27	9	0	79	4	116	20	0	140	7	123	52	0	182
Hourly Total	72	73	34	0	179	151	93	26	0	270	26	449	65	0	540	34	501	221	0	756

Lake Street

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	15	20	7	0	42	36	16	6	0	58	6	111	12	0	129	8	136	58	0	202
16:15 16:30	12	14	6	0	32	37	19	11	0	67	8	104	15	0	127	4	124	57	0	185
16:30 16:45	19	13	8	0	40	39	25	9	0	73	6	105	10	0	121	8	146	54	0	208
16:45 17:00	19	17	10	0	46	44	12	15	0	71	10	124	15	0	149	13	150	71	0	234
Hourly Total	65	64	31	0	160	156	72	41	0	269	30	444	52	0	526	33	556	240	0	829
17:00 17:15	14	14	2	0	30	45	18	5	0	68	4	112	12	0	128	6	150	50	0	206
17:15 17:30	13	12	7	0	32	44	20	5	0	69	10	96	11	0	117	17	138	67	0	222
17:30 17:45	11	16	5	0	32	35	23	11	0	69	8	92	10	0	110	10	119	58	0	187
17:45 18:00	18	11	6	0	35	40	18	4	0	62	8	99	12	0	119	13	98	54	0	165
Hourly Total	56	53	20	0	129	164	79	25	0	268	30	399	45	0	474	46	505	229	0	780
Grand Total	423	423	251	0	1097	1144	461	184	0	1789	195	3312	348	0	3855	238	3261	1413	0	4912
Truck %	3%	1%	5%	0%	3%	2%	1%	2%	0%	2%	2%	2%	3%	0%	2%	4%	1%	2%	0%	2%



Volume Hourly Summary Report

Location..... Pentagon Boulevard btwn Placid Avenue & Pleasant Drive

Municipality..... Sault Ste. Marie

Date	StartTime	Northbound	Southbound	Grand Total
Wednesday, August 28, 2013	9	7	10	17
	10	24	32	56
	11	36	37	73
	12	52	45	97
	13	29	41	70
	14	36	34	70
	15	32	36	68
	16	48	37	85
	17	52	41	93
	18	41	50	91
	19	34	41	75
	20	42	31	73
	21	24	18	42
	22	25	14	39
23	11	8	19	
Wednesday, August 28, 2013		493	475	968

Thursday, August 29, 20	0	5	7	12
	1	0	1	1
	2	2	0	2
	3	0	0	0
	4	3	0	3
	5	1	3	4
	6	3	25	28
	7	9	34	43
	8	14	79	93
	9	35	43	78
	10	23	49	72
	11	36	41	77
	12	44	45	89
	13	41	51	92
	14	43	43	86
	15	37	40	77
	16	38	41	79
	17	48	27	75
	18	47	38	85
	19	32	35	67
	20	23	29	52
	21	27	19	46
	22	14	9	23

	23	14	10	24
Thursday, August 29, 2013		539	669	1208
Friday, August 30, 2013	0	8	5	13
	1	1	0	1
	2	3	1	4
	3	2	2	4
	4	2	1	3
	5	2	7	9
	6	2	15	17
	7	12	35	47
	8	65	55	120
	9	71	49	120
10	14	20	34	
Friday, August 30, 2013		182	190	372
Grand Total		1214	1334	2548



Turning Movement Count - Details Report

Location..... McNabb Street @ Pentagon Boulevard

Municipality..... Sault Ste. Marie

Count Date..... Thursday, June 23, 2016

Pentagon Boulevard

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	3	0	40	0	43	0	0	0	0	0	0	156	6	0	162	4	69	1	0	74
08:15 08:30	3	0	54	0	57	0	0	0	0	0	0	165	5	0	170	10	74	0	0	84
08:30 08:45	1	0	41	0	42	1	0	0	0	1	0	203	2	0	205	17	105	0	0	122
08:45 09:00	4	0	41	0	45	0	0	0	0	0	0	198	5	0	203	13	108	0	0	121
Hourly Total	11	0	176	0	187	1	0	0	0	1	0	722	18	0	740	44	356	1	0	401
11:00 11:15	2	0	16	0	18	0	0	0	0	0	0	109	4	0	113	8	123	0	0	131
11:15 11:30	2	0	19	0	21	0	0	0	0	0	0	125	2	0	127	14	161	1	0	176
11:30 11:45	3	0	16	0	19	0	0	0	0	0	0	125	3	0	128	15	142	0	0	157
11:45 12:00	3	0	20	0	23	0	0	0	0	0	0	119	6	0	125	17	156	0	0	173
Hourly Total	10	0	71	0	81	0	0	0	0	0	0	478	15	0	493	54	582	1	0	637
12:00 12:15	3	0	19	0	22	0	0	0	0	0	0	125	5	0	130	23	189	0	0	212
12:15 12:30	6	0	21	0	27	0	0	0	0	0	0	129	6	0	135	15	158	0	0	173
12:30 12:45	2	0	31	0	33	0	0	0	0	0	0	138	2	0	140	20	148	0	0	168
12:45 13:00	5	0	29	0	34	0	0	0	0	0	0	180	5	0	185	16	139	0	0	155
Hourly Total	16	0	100	0	116	0	0	0	0	0	0	572	18	0	590	74	634	0	0	708
13:00 13:15	8	0	24	0	32	0	0	0	0	0	0	156	3	0	159	16	157	0	0	173
13:15 13:30	4	0	31	0	35	0	0	0	0	0	0	163	4	0	167	10	119	1	0	130
13:30 13:45	3	0	26	0	29	0	0	0	0	0	0	125	0	0	125	11	128	0	0	139
13:45 14:00	4	0	18	0	22	0	0	0	0	0	0	138	10	0	148	14	144	0	0	158
Hourly Total	19	0	99	0	118	0	0	0	0	0	0	582	17	0	599	51	548	1	0	600
14:00 14:15	4	0	11	0	15	1	0	0	0	1	0	128	1	0	129	17	142	0	0	159
14:15 14:30	4	0	11	0	15	0	0	0	0	0	0	133	8	0	141	10	153	0	0	163
14:30 14:45	7	0	23	0	30	0	0	0	0	0	0	139	9	0	148	11	155	0	0	166
14:45 15:00	3	0	25	0	28	0	0	0	0	0	0	149	3	0	152	11	175	0	0	186
Hourly Total	18	0	70	0	88	1	0	0	0	1	0	549	21	0	570	49	625	0	0	674
15:00 15:15	4	0	32	0	36	0	0	0	0	0	0	152	3	0	155	20	169	0	0	189
15:15 15:30	3	0	26	0	29	0	0	0	0	0	0	152	7	0	159	25	178	1	0	204
15:30 15:45	0	0	22	0	22	0	0	0	0	0	0	157	6	0	163	22	174	0	0	196
15:45 16:00	7	0	19	0	26	1	0	0	0	1	0	173	4	0	177	15	173	0	0	188
Hourly Total	14	0	99	0	113	1	0	0	0	1	0	634	20	0	654	82	694	1	0	777

Pentagon Boulevard

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	3	0	34	0	37	0	0	0	0	0	0	140	3	0	143	28	219	0	0	247
16:15 16:30	4	0	23	0	27	0	0	0	0	0	0	138	6	0	144	25	215	0	0	240
16:30 16:45	3	0	17	0	20	1	0	0	0	1	0	154	2	0	156	33	194	0	0	227
16:45 17:00	3	0	22	0	25	0	0	0	0	0	0	145	2	0	147	21	228	0	0	249
Hourly Total	13	0	96	0	109	1	0	0	0	1	0	577	13	0	590	107	856	0	0	963
17:00 17:15	6	0	19	0	25	0	0	0	0	0	0	164	4	0	168	38	197	0	0	235
17:15 17:30	1	0	15	0	16	0	0	0	0	0	0	133	5	0	138	24	219	0	0	243
17:30 17:45	5	0	20	0	25	0	0	0	0	0	0	126	10	0	136	15	155	0	0	170
17:45 18:00	2	0	28	0	30	0	0	0	0	0	0	146	6	0	152	21	157	0	0	178
Hourly Total	14	0	82	0	96	0	0	0	0	0	0	569	25	0	594	98	728	0	0	826
Grand Total	115	0	793	0	908	4	0	0	0	4	0	4683	147	0	4830	559	5023	4	0	5586
Truck %	3%	0%	2%	0%	3%	0%	0%	0%	0%	0%	0%	2%	4%	0%	2%	3%	2%	0%	0%	2%



Turning Movement Count - Details Report

Location..... McNabb Street @ Pine Street

Municipality..... Sault Ste. Marie

Count Date..... Tuesday, June 02, 2015

Pine Street

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	28	31	9	0	68	21	45	4	0	70	15	118	50	0	183	5	44	13	0	62
08:15 08:30	31	49	15	0	95	36	68	6	0	110	20	162	59	0	241	16	59	18	0	93
08:30 08:45	27	37	18	0	82	32	62	11	0	105	11	155	70	0	236	14	62	15	0	91
08:45 09:00	41	33	15	0	89	33	56	12	0	101	21	137	62	0	220	13	84	17	0	114
Hourly Total	127	150	57	0	334	122	231	33	0	386	67	572	241	0	880	48	249	63	0	360
11:00 11:15	41	48	13	0	102	19	54	13	0	86	3	109	25	0	137	10	94	27	0	131
11:15 11:30	33	42	18	0	93	14	43	8	0	65	12	80	37	0	129	8	99	41	0	148
11:30 11:45	33	51	11	0	95	25	46	2	0	73	7	84	40	0	131	16	102	27	0	145
11:45 12:00	45	52	15	0	112	25	51	14	0	90	13	102	30	0	145	12	98	30	0	140
Hourly Total	152	193	57	0	402	83	194	37	0	314	35	375	132	0	542	46	393	125	0	564
12:00 12:15	50	58	14	0	122	33	54	14	0	101	12	123	30	0	165	17	120	39	0	176
12:15 12:30	52	54	6	0	112	19	42	5	0	66	5	122	28	0	155	19	123	34	0	176
12:30 12:45	38	50	15	0	103	30	46	7	0	83	6	84	46	0	136	17	96	25	0	138
12:45 13:00	34	57	19	0	110	29	57	5	0	91	13	112	59	0	184	8	105	27	0	140
Hourly Total	174	219	54	0	447	111	199	31	0	341	36	441	163	0	640	61	444	125	0	630
13:00 13:15	38	50	16	0	104	38	64	5	0	107	15	101	38	0	154	8	89	25	0	122
13:15 13:30	33	47	18	0	98	22	55	5	0	82	10	101	32	0	143	13	86	30	0	129
13:30 13:45	44	43	26	0	113	27	54	7	0	88	11	106	50	0	167	16	95	22	0	133
13:45 14:00	55	40	21	0	116	35	54	8	0	97	15	96	29	0	140	7	107	37	0	151
Hourly Total	170	180	81	0	431	122	227	25	0	374	51	404	149	0	604	44	377	114	0	535
14:00 14:15	39	62	12	0	113	23	46	4	0	73	8	95	37	0	140	9	128	23	0	160
14:15 14:30	58	55	16	0	129	26	51	5	0	82	10	82	35	0	127	19	107	30	0	156
14:30 14:45	51	71	22	0	144	25	46	8	0	79	5	116	30	0	151	21	105	27	0	153
14:45 15:00	47	55	15	0	117	28	45	13	0	86	12	87	47	0	146	19	123	36	0	178
Hourly Total	195	243	65	0	503	102	188	30	0	320	35	380	149	0	564	68	463	116	0	647
15:00 15:15	58	73	18	0	149	17	44	9	0	70	6	102	41	0	149	29	119	28	0	176
15:15 15:30	54	87	15	0	156	25	62	13	0	100	10	124	42	0	176	16	136	46	0	198
15:30 15:45	69	80	13	0	162	29	66	16	0	111	14	92	56	0	162	11	113	24	0	148
15:45 16:00	53	68	15	0	136	23	66	3	0	92	16	122	38	0	176	16	123	31	0	170
Hourly Total	234	308	61	0	603	94	238	41	0	373	46	440	177	0	663	72	491	129	0	692

Pine Street

McNabb Street

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	
16:00	16:15	56	76	12	0	144	37	62	15	0	114	15	95	50	0	160	28	155	36	0	219
16:15	16:30	66	63	18	0	147	42	65	10	0	117	9	110	29	0	148	19	173	35	0	227
16:30	16:45	68	87	17	0	172	30	63	11	0	104	7	98	40	0	145	15	126	36	0	177
16:45	17:00	64	81	14	0	159	28	49	13	0	90	13	99	44	0	156	22	153	40	0	215
Hourly Total		254	307	61	0	622	137	239	49	0	425	44	402	163	0	609	84	607	147	0	838
17:00	17:15	68	71	17	0	156	28	65	9	0	102	10	108	39	0	157	23	147	33	0	203
17:15	17:30	67	64	19	0	150	30	51	13	0	94	13	110	41	0	164	28	180	29	0	237
17:30	17:45	53	58	11	0	122	18	55	13	0	86	10	98	39	0	147	20	135	38	0	193
17:45	18:00	43	55	12	0	110	16	45	4	0	65	6	111	41	0	158	21	118	24	0	163
Hourly Total		231	248	59	0	538	92	216	39	0	347	39	427	160	0	626	92	580	124	0	796
Grand Total		1537	1848	495	0	3880	863	1732	285	0	2880	353	3441	1334	0	5128	515	3604	943	0	5062
Truck %		1%	2%	2%	0%	2%	1%	3%	1%	0%	2%	2%	2%	2%	0%	2%	3%	2%	2%	0%	2%



Volume Hourly Summary Report

Location..... Passmore Road btwn Plaintree Drive & Pine Street

Municipality..... Sault Ste. Marie

Date	StartTime	Eastbound	Westbound	Grand Total
Wednesday, October 11, 2016	13	18	12	30
	14	92	63	155
	15	132	113	245
	16	133	63	196
	17	90	57	147
	18	81	67	148
	19	67	39	106
	20	47	21	68
	21	37	28	65
	22	20	13	33
	23	12	6	18
Tuesday, October 11, 2016		729	482	1211
Wednesday, October 12, 2016	0	7	2	9
	1	3	2	5
	2	3	3	6
	3	0	1	1

Friday, October 14, 2016

	4	0	1	1
	5	2	7	9
	6	5	20	25
	7	20	72	92
	8	59	117	176
	9	54	71	125
	10	58	65	123
	11	71	51	122
	12	82	73	155
	13	79	64	143
	14	85	57	142
	15	128	71	199
	16	124	48	172
	17	99	56	155
	18	76	50	126
	19	60	42	102
	20	44	34	78
	21	40	13	53
	22	21	11	32
	23	14	4	18
Wednesday, October 12, 2016		1134	935	2069
Thursday, October 13, 2016	0	9	4	13
	1	6	3	9

2	3	1	4
3	0	5	5
4	0	0	0
5	3	11	14
6	2	15	17
7	19	58	77
8	58	139	197
9	51	74	125
10	47	65	112
11	81	71	152
12	91	86	177
13	75	68	143
14	79	77	156
15	121	91	212
16	128	64	192
17	116	68	184
18	73	61	134
19	69	51	120
20	56	41	97
21	41	20	61
22	25	16	41
23	15	4	19
Thursday, October 13, 2016	1168	1093	2261

Friday, October 14, 2016

Friday, October 14, 2016	0	8	9	17
	1	2	1	3
	2	6	3	9
	3	0	2	2
	4	2	1	3
	5	1	11	12
	6	4	19	23
	7	21	64	85
	8	59	126	185
	9	53	79	132
	10	15	28	43
Friday, October 14, 2016		171	343	514
Grand Total		3202	2853	6055



Volume Hourly Summary Report

Location..... Pleasant Drive btwn Panoramic Drive & Pine Street

Municipality..... Sault Ste. Marie

Date	StartTime	Eastbound	Westbound	Grand Total
uesday, May 10, 2016	11	30	47	77
	12	151	112	263
	13	161	149	310
	14	166	134	300
	15	231	153	384
	16	275	136	411
	17	211	148	359
	18	189	165	354
	19	159	94	253
	20	169	78	247
	21	142	63	205
	22	57	33	90
	23	34	18	52
Tuesday, May 10, 2016		1975	1330	3305
Wednesday, May 11, 2016	0	18	11	29
	1	8	1	9

2	5	2	7
3	1	1	2
4	4	3	7
5	5	25	30
6	18	53	71
7	44	156	200
8	86	205	291
9	93	131	224
10	104	119	223
11	137	124	261
12	182	145	327
13	143	142	285
14	150	106	256
15	200	114	314
16	265	144	409
17	263	136	399
18	161	132	293
19	176	134	310
20	149	84	233
21	140	65	205
22	53	24	77
23	40	18	58
Wednesday, May 11, 2016	2445	2075	4520

Thursday, May 12, 2016	0	22	16	38
	1	8	2	10
	2	6	1	7
	3	2	4	6
	4	3	4	7
	5	9	23	32
	6	19	59	78
	7	36	128	164
	8	99	216	315
	9	93	110	203
	10	89	100	189
	11	135	93	228
	12	177	139	316
	13	150	148	298
	14	162	108	270
	15	190	119	309
	16	260	125	385
	17	236	164	400
	18	158	143	301
	19	150	100	250
	20	159	82	241
	21	107	53	160
22	74	33	107	

	23	28	25	53
Thursday, May 12, 2016		2372	1995	4367
Friday, May 13, 2016	0	16	8	24
	1	11	2	13
	2	7	2	9
	3	2	3	5
	4	3	3	6
	5	4	18	22
	6	19	50	69
	7	45	120	165
	8	113	209	322
	9	4	10	14
Friday, May 13, 2016		224	425	649
Grand Total		7016	5825	12841



Turning Movement Count - Details Report

Location..... Pine Street @ Pleasant Drive

Municipality..... Sault Ste. Marie

Count Date..... Wednesday, May 11, 2016

Pine Street

Pleasant Drive

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
08:00 08:15	13	66	4	0	83	0	96	4	0	100	11	0	46	0	57	0	0	0	0	0
08:15 08:30	14	100	3	0	117	0	142	5	0	147	7	0	55	0	62	0	0	0	0	0
08:30 08:45	19	86	1	0	106	2	83	3	0	88	13	0	37	0	50	0	0	0	0	0
08:45 09:00	12	95	1	0	108	0	99	2	0	101	13	1	24	0	38	0	0	0	0	0
Hourly Total	58	347	9	0	414	2	420	14	0	436	44	1	162	0	207	0	0	0	0	0
11:00 11:15	14	79	0	0	93	0	56	6	0	62	6	0	20	0	26	0	0	0	0	0
11:15 11:30	22	85	0	0	107	0	61	7	0	68	5	0	22	0	27	0	0	0	0	0
11:30 11:45	18	104	1	0	123	0	87	13	0	100	11	0	24	0	35	0	0	0	0	0
11:45 12:00	29	79	0	0	108	0	86	12	0	98	7	0	31	0	38	0	0	0	0	0
Hourly Total	83	347	1	0	431	0	290	38	0	328	29	0	97	0	126	0	0	0	0	0
12:00 12:15	41	109	0	0	150	0	98	9	0	107	7	0	17	0	24	0	0	0	0	0
12:15 12:30	20	80	0	0	100	0	74	17	0	91	6	0	29	0	35	0	0	0	0	0
12:30 12:45	25	76	0	0	101	0	81	12	0	93	11	0	30	0	41	0	0	0	0	0
12:45 13:00	19	87	0	0	106	0	87	15	0	102	10	0	33	0	43	0	0	0	0	0
Hourly Total	105	352	0	0	457	0	340	53	0	393	34	0	109	0	143	0	0	0	0	0
13:00 13:15	28	89	0	0	117	3	79	14	0	96	8	0	31	0	39	0	0	0	0	0
13:15 13:30	19	85	0	0	104	0	92	7	0	99	7	0	22	0	29	0	0	0	0	0
13:30 13:45	18	79	0	0	97	0	65	10	0	75	6	0	23	0	29	0	0	0	0	0
13:45 14:00	28	91	0	0	119	0	81	13	0	94	14	0	34	0	48	0	0	0	0	0
Hourly Total	93	344	0	0	437	3	317	44	0	364	35	0	110	0	145	0	0	0	0	0
14:00 14:15	27	72	0	0	99	0	81	11	0	92	7	0	16	0	23	0	0	0	0	0
14:15 14:30	22	71	0	0	93	0	76	3	0	79	4	0	26	0	30	0	0	0	0	0
14:30 14:45	26	87	0	0	113	0	96	13	0	109	4	0	21	0	25	0	0	0	0	0
14:45 15:00	26	136	0	0	162	1	100	9	0	110	7	0	24	0	31	0	0	0	0	0
Hourly Total	101	366	0	0	467	1	353	36	0	390	22	0	87	0	109	0	0	0	0	0
15:00 15:15	39	133	3	0	175	0	78	5	0	83	13	1	24	0	38	0	0	0	0	0
15:15 15:30	29	127	3	0	159	1	74	9	0	84	5	0	18	0	23	0	0	0	0	0
15:30 15:45	35	107	0	0	142	1	79	14	0	94	3	0	16	0	19	0	0	0	0	0
15:45 16:00	36	105	0	0	141	0	97	21	0	118	12	0	27	0	39	0	0	0	0	0
Hourly Total	139	472	6	0	617	2	328	49	0	379	33	1	85	0	119	0	0	0	0	0

Pine Street

Pleasant Drive

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:00 16:15	48	118	0	0	166	0	86	16	0	102	11	0	26	0	37	0	0	0	0	0
16:15 16:30	34	104	0	0	138	1	108	20	0	129	9	0	26	0	35	0	0	0	0	0
16:30 16:45	49	133	0	0	182	0	88	19	0	107	10	0	16	0	26	0	0	0	0	0
16:45 17:00	43	109	1	0	153	0	104	20	0	124	7	0	35	0	42	0	0	0	0	0
Hourly Total	174	464	1	0	639	1	386	75	0	462	37	0	103	0	140	0	0	0	0	0
17:00 17:15	57	135	0	0	192	0	76	17	0	93	4	0	31	0	35	0	0	0	0	0
17:15 17:30	56	105	0	0	161	0	83	28	0	111	11	1	23	0	35	0	0	0	0	0
17:30 17:45	36	103	0	0	139	0	78	14	0	92	7	0	27	0	34	0	0	0	0	0
17:45 18:00	28	81	1	0	110	0	64	13	0	77	8	0	30	0	38	0	0	0	0	0
Hourly Total	177	424	1	0	602	0	301	72	0	373	30	1	111	0	142	0	0	0	0	0
Grand Total	930	3116	18	0	4064	9	2735	381	0	3125	264	3	864	0	1131	0	0	0	0	0
Truck %	2%	3%	72%	0%	3%	44%	3%	1%	0%	3%	2%	67%	2%	0%	2%	0%	0%	0%	0%	0%

APPENDIX B – SIGNAL TIMING PLANS

B000699



Intersection Location:	Great Northern Rd @ Northern Ave	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	Great Northern RD	
Offset (s):	30	
Cycle Length (s):	110	
Signal Timing effect Time period :	9:10 am - 11:30 am	
Northbound Direction Street Name:	Great Northern Rd	
Total Split (s):	36	
Arrow Green		
Minimum(s):	7	
Extension (s):	4	
Maximum(s):	20-40	
Arrow Amber Time (s):	3	
Arrow All-Red Time (s)	1	
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	40-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	Great Northern Rd	
Total Split (s)	36	
Arrow Green		
Minimum Green Time (s):	7	
Extension (s):	4	
Max Green Time(s):	20-40	
Arrow Amber Time (s):	3	
Arrow All-Red Time (s)	1	
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	40-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	36	
Arrow Green		
Minimum Green Time (s):	7	
Extension (s):	4	
Max Green Time(s):	20-40	
Arrow Amber Time (s):	3	

Arrow All-Red Time (s)	1
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	35-40
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10
Westbound Direction Street Name:	Northern Ave
Total Split (s)	36
ArrowGreen	
Minimum Green Time (s):	7
Extension (s):	4
Max Green Time(s):	20-40
Arrow Amber Time (s):	3
Arrow All-Red Time (s)	1
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	35-40
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10

Intersection Location:	Great Northern Rd @ Northern Ave	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	Great Northern RD	
Offset (s):	40	
Cycle Length (s):	120	
Signal Timing effect Time period :	11:30 am - 5:15 pm	
Northbound Direction Street Name:	Great Northern Rd	
Total Split (s):	33	
Arrow Green		
Minimum(s):	7	
Extension (s):	4	
Maximum(s):	20-40	
Arrow Amber Time (s):	3	
Arrow All-Red Time (s)	1	
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	40-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	Great Northern Rd	
Total Split (s)	33	
Arrow Green		
Minimum Green Time (s):	7	
Extension (s):	4	
Max Green Time(s):	20-40	
Arrow Amber Time (s):	3	
Arrow All-Red Time (s)	1	
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	40-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	34	
7		
Minimum Green Time (s):	7	
Extension (s):	4	
Max Green Time(s):	20-40	
Arrow Amber Time (s):	3	

Arrow All-Red Time (s)	1
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	35-40
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10
Westbound Direction Street Name:	Second Line
Total Split (s)	34
ArrowGreen	
Minimum Green Time (s):	7
Extension (s):	4
Max Green Time(s):	20-40
Arrow Amber Time (s):	3
Arrow All-Red Time (s)	1
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	35-40
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10

Intersection Location:	
Control Type:	
Signal Timing Plan Effect Day:	
If Coordinated	
Coordinate Street:	
Offset (s):	
Cycle Length (s):	
Signal Timing effect Time period :	
Northbound Direction Street Name:	
Total Split (s):	
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Southbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Eastbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Westbound Direction Street Name:	
Total Split (s)	
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	

Intersection Location:	Northern Ave @ North St
Control Type:	Coordinated and Actuated
Signal Timing Plan Effect Day:	Monday to Friday
If Coordinated	
Coordinate Street:	North St
Offset (s):	35
Cycle Length (s):	90
Signal Timing effect Time period :	8:15 am - 9:05 am
Northbound Direction Street Name:	North St
Total Split (s):	45
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Southbound Direction Street Name:	North St
Total Split (s)	45
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Eastbound Direction Street Name:	Northern Ave
Total Split (s)	45
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	15
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Westbound Direction Street Name:	Northern Ave
Total Split (s)	45
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	15
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8

Intersection Location:	Northern Ave @ North St	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	North St	
Offset (s):	35	
Cycle Length (s):	100	
Signal Timing effect Time period :	2:30 pm - 5:15 pm	
Northbound Direction Street Name:	North St	
Total Split (s):	50	
Arrow Green		
Minimum(s):		
Extension (s):		
Maximum(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	20	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	North St	
Total Split (s)	45	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	5.4	
Through All Red (s):	1.6	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	50	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	15
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Westbound Direction Street Name:	Northern Ave
Total Split (s)	50
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	15
Extension (s):	4
Maximum(s):	35-45
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8

Intersection Location:	
Control Type:	
Signal Timing Plan Effect Day:	
If Coordinated	
Coordinate Street:	
Offset (s):	
Cycle Length (s):	
Signal Timing effect Time period :	
Northbound Direction Street Name:	
Total Split (s):	
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Southbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Eastbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Westbound Direction Street Name:	
Total Split (s)	
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	

Intersection Location:	Northern Ave @ Pine St
Control Type:	Coordinated and Actuated
Signal Timing Plan Effect Day:	Monday to Friday
If Coordinated	
Coordinate Street:	Pine St
Offset (s):	96
Cycle Length (s):	110
Signal Timing effect Time period :	8:00 am - 9:00 am
Northbound Direction Street Name:	Pine St
Total Split (s):	65
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6
Southbound Direction Street Name:	Pine St
Total Split (s)	65
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6
Eastbound Direction Street Name:	Northern Ave
Total Split (s)	45
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	12
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6
Westbound Direction Street Name:	Northern Ave
Total Split (s)	45
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	12
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6

Intersection Location:	Northern Ave @ Pine St	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	Pine St	
Offset (s):	96	
Cycle Length (s):	110	
Signal Timing effect Time period :	2:40 pm - 5:30 pm	
Northbound Direction Street Name:	Pine St	
Total Split (s):	65	
Arrow Green		
Minimum(s):		
Extension (s):		
Maximum(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	20	
Extension (s):	4	
Maximum(s):	45-55	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	12	
Pedestrian Flash-Do Not Walk (s)	6	
Southbound Direction Street Name:	Pine St	
Total Split (s)	65	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	20	
Extension (s):	4	
Maximum(s):	45-55	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	12	
Pedestrian Flash-Do Not Walk (s)	6	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	45	
7		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	12
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6
Westbound Direction Street Name:	Northern Ave
Total Split (s)	45
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	12
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	12
Pedestrian Flash-Do Not Walk (s)	6

Intersection Location:	
Control Type:	
Signal Timing Plan Effect Day:	
If Coordinated	
Coordinate Street:	
Offset (s):	
Cycle Length (s):	
Signal Timing effect Time period :	
Northbound Direction Street Name:	
Total Split (s):	
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Southbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Eastbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Westbound Direction Street Name:	
Total Split (s)	
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	

Intersection Location:	Northern Ave @ Sackville Rd	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:		
Offset (s):		
Cycle Length (s):		
Signal Timing effect Time period :	9:05 am - 11:50 am	
Northbound Direction Street Name:	Sackville Rd	
Total Split (s):	40	
Arrow Green		
Minimum(s):		
Extension (s):		
Maximum(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	Sackville Rd	
Total Split (s)	40	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	40	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		

Arrow All-Red Time (s)	
Through Green	
<i>Minimum (s):</i>	30
<i>Extension (s):</i>	4
<i>Maximum(s):</i>	35-45
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Westbound Direction Street Name:	Northern Ave
Total Split (s)	40
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
<i>Minimum (s):</i>	30
<i>Extension (s):</i>	4
<i>Maximum(s):</i>	34-45
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8

Intersection Location:	Northern Ave @ Sackville Rd	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	Great Northern RD	
Offset (s):	40	
Cycle Length (s):	120	
Signal Timing effect Time period :	2:30 pm - 5:15 pm	
Northbound Direction Street Name:	Sackville Rd	
Total Split (s):	50	
Arrow Green		
Minimum(s):		
Extension (s):		
Maximum(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	Sackville Rd	
Total Split (s)	50	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	15	
Extension (s):	4	
Maximum(s):	35-45	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	50	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		

Arrow All-Red Time (s)		
Through Green		
Minimum (s):		30
Extension (s):		4
Maximum(s):	35-45	
Through Amber (s):		5.4
Through All Red (s):		1.6
Pedestrian Walk (s)		13
Pedestrian Flash-Do Not Walk (s)		8
Westbound Direction Street Name:	Northern Ave	
Total Split (s)		50
ArrowGreen		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):		30
Extension (s):		4
Maximum(s):	35-45	
Through Amber (s):		5.4
Through All Red (s):		1.6
Pedestrian Walk (s)		13
Pedestrian Flash-Do Not Walk (s)		8

Intersection Location:	
Control Type:	
Signal Timing Plan Effect Day:	
If Coordinated	
Coordinate Street:	
Offset (s):	
Cycle Length (s):	
Signal Timing effect Time period :	
Northbound Direction Street Name:	
Total Split (s):	
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Southbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Eastbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Westbound Direction Street Name:	
Total Split (s)	
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	

Intersection Location:	Northern Ave @ Willow Ave	
Control Type:	Coordinated and Actuated	
Signal Timing Plan Effect Day:	Monday to Friday	
If Coordinated		
Coordinate Street:	Northern Ave	
Offset (s):	1	
Cycle Length (s):	120	
Signal Timing effect Time period :	8:15 am - 9:30 am	
Northbound Direction Street Name:	Willow Ave	
Total Split (s):	50	
Arrow Green		
Minimum(s):		
Extension (s):		
Maximum(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	11	
Extension (s):	4	
Maximum(s):	45-55	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Southbound Direction Street Name:	Willow Ave	
Total Split (s)	50	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		
Arrow All-Red Time (s)		
Through Green		
Minimum (s):	11	
Extension (s):	4	
Maximum(s):	45-55	
Through Amber (s):	4.3	
Through All Red (s):	1.7	
Pedestrian Walk (s)	13	
Pedestrian Flash-Do Not Walk (s)	8	
Eastbound Direction Street Name:	Northern Ave	
Total Split (s)	70	
Arrow Green		
Minimum Green Time (s):		
Extension (s):		
Max Green Time(s):		
Arrow Amber Time (s):		

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10
Westbound Direction Street Name:	Northern Ave
Total Split (s)	70
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10

Intersection Location:	Northern Ave @ Willow Ave
Control Type:	Coordinated and Actuated
Signal Timing Plan Effect Day:	Monday to Friday
If Coordinated	
Coordinate Street:	Northern Ave
Offset (s):	55
Cycle Length (s):	120
Signal Timing effect Time period :	2:30 pm - 5:30 pm
Northbound Direction Street Name:	Willow Ave
Total Split (s):	50
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Southbound Direction Street Name:	Willow Ave
Total Split (s)	50
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	11
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	4.3
Through All Red (s):	1.7
Pedestrian Walk (s)	13
Pedestrian Flash-Do Not Walk (s)	8
Eastbound Direction Street Name:	Northern Ave
Total Split (s)	70
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10
Westbound Direction Street Name:	Northern Ave
Total Split (s)	70
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	20
Extension (s):	4
Maximum(s):	45-55
Through Amber (s):	5.4
Through All Red (s):	1.6
Pedestrian Walk (s)	15
Pedestrian Flash-Do Not Walk (s)	10

Intersection Location:	
Control Type:	
Signal Timing Plan Effect Day:	
If Coordinated	
Coordinate Street:	
Offset (s):	
Cycle Length (s):	
Signal Timing effect Time period :	
Northbound Direction Street Name:	
Total Split (s):	
Arrow Green	
Minimum(s):	
Extension (s):	
Maximum(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Southbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Eastbound Direction Street Name:	
Total Split (s)	
Arrow Green	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	

Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	
Westbound Direction Street Name:	
Total Split (s)	
ArrowGreen	
Minimum Green Time (s):	
Extension (s):	
Max Green Time(s):	
Arrow Amber Time (s):	
Arrow All-Red Time (s)	
Through Green	
Minimum (s):	
Extension (s):	
Maximum(s):	
Through Amber (s):	
Through All Red (s):	
Pedestrian Walk (s)	
Pedestrian Flash-Do Not Walk (s)	

APPENDIX C – SYNCHRO REPORTS

B000699



HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

Existing AM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖↗		↖	↗		↖	↗	
Traffic Volume (vph)	22	7	119	6	5	5	179	394	11	7	277	45
Future Volume (vph)	22	7	119	6	5	5	179	394	11	7	277	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.96		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		0.99		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.96		1.00	1.00		1.00	0.98	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1562	1465		3077		1651	1750		1719	1750	
Flt Permitted		0.85	1.00		0.90		0.49	1.00		0.42	1.00	
Satd. Flow (perm)		1373	1465		2833		855	1750		755	1750	
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)	24	8	129	7	5	5	195	428	12	8	301	49
RTOR Reduction (vph)	0	0	83	0	3	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	32	46	0	14	0	195	439	0	8	345	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		39.0	39.0		39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)		39.0	39.0		39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio		0.35	0.35		0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		486	519		1004		458	938		404	938	
v/s Ratio Prot								c0.25				0.20
v/s Ratio Perm		0.02	c0.03		0.00		0.23			0.01		
v/c Ratio		0.07	0.09		0.01		0.43	0.47		0.02	0.37	
Uniform Delay, d1		23.5	23.7		23.0		15.3	15.8		11.9	14.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.3		0.0		2.9	1.7		0.1	1.1	
Delay (s)		23.7	24.0		23.1		18.2	17.5		12.0	15.8	
Level of Service		C	C		C		B	B		B	B	
Approach Delay (s)		23.9			23.1			17.7			15.8	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Willow Avenue & Northern Avenue East

Existing AM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↓			↑↓		↖		↗		↕	
Traffic Volume (vph)	0	267	230	35	224	0	125	0	43	0	0	0
Future Volume (vph)	0	267	230	35	224	0	125	0	43	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		6.0		6.0			
Lane Util. Factor		0.95			0.95		1.00		1.00			
Frbp, ped/bikes		0.98			1.00		1.00		0.94			
Flpb, ped/bikes		1.00			1.00		0.99		1.00			
Frt		0.93			1.00		1.00		0.85			
Flt Protected		1.00			0.99		0.95		1.00			
Satd. Flow (prot)		3125			3262		1616		1401			
Flt Permitted		1.00			0.83		0.76		1.00			
Satd. Flow (perm)		3125			2711		1288		1401			
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	290	250	38	243	0	136	0	47	0	0	0
RTOR Reduction (vph)	0	119	0	0	0	0	0	0	30	0	0	0
Lane Group Flow (vph)	0	421	0	0	281	0	136	0	17	0	0	0
Confl. Peds. (#/hr)			11	11			4		26	26		4
Heavy Vehicles (%)	0%	1%	0%	4%	5%	0%	6%	0%	4%	0%	0%	0%
Turn Type		NA		Perm	NA		Perm		Perm			
Protected Phases		4			8							6
Permitted Phases				8			2		2	6		
Actuated Green, G (s)		63.0			63.0		44.0		44.0			
Effective Green, g (s)		63.0			63.0		44.0		44.0			
Actuated g/C Ratio		0.52			0.52		0.37		0.37			
Clearance Time (s)		7.0			7.0		6.0		6.0			
Vehicle Extension (s)		4.0			4.0		4.0		4.0			
Lane Grp Cap (vph)		1640			1423		472		513			
v/s Ratio Prot		c0.13										
v/s Ratio Perm					0.10		c0.11		0.01			
v/c Ratio		0.26			0.20		0.29		0.03			
Uniform Delay, d1		15.6			15.1		26.9		24.4			
Progression Factor		1.00			1.00		1.00		1.00			
Incremental Delay, d2		0.4			0.3		1.5		0.1			
Delay (s)		16.0			15.4		28.4		24.5			
Level of Service		B			B		C		C			
Approach Delay (s)		16.0			15.4			27.4			0.0	
Approach LOS		B			B			C			A	
Intersection Summary												
HCM 2000 Control Delay			17.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			13.0		
Intersection Capacity Utilization			61.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

9: Great Northern Road & Northern Avenue East

Existing AM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	152	139	21	121	135	111	418	6	175	647	71
Future Volume (vph)	135	152	139	21	121	135	111	418	6	175	647	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1652	1651		1718	1798	1436	1724	3342		1706	3322	
Flt Permitted	0.60	1.00		0.57	1.00	1.00	0.18	1.00		0.35	1.00	
Satd. Flow (perm)	1050	1651		1029	1798	1436	331	3342		622	3322	
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)	147	165	151	23	132	147	121	454	7	190	703	77
RTOR Reduction (vph)	0	23	0	0	0	100	0	1	0	0	7	0
Lane Group Flow (vph)	147	293	0	23	132	47	121	460	0	190	773	0
Confl. Peds. (#/hr)	23		8	8		23	11		4	4		11
Heavy Vehicles (%)	3%	1%	1%	0%	1%	3%	0%	3%	0%	1%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	51.4	44.2		38.4	35.2	35.2	38.6	27.6		44.6	30.6	
Effective Green, g (s)	51.4	44.2		38.4	35.2	35.2	38.6	27.6		44.6	30.6	
Actuated g/C Ratio	0.47	0.40		0.35	0.32	0.32	0.35	0.25		0.41	0.28	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0		4.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	557	663		379	575	459	255	838		390	924	
v/s Ratio Prot	c0.03	c0.18		0.00	0.07		0.05	0.14		c0.06	c0.23	
v/s Ratio Perm	0.09			0.02		0.03	0.12			0.14		
v/c Ratio	0.26	0.44		0.06	0.23	0.10	0.47	0.55		0.49	0.84	
Uniform Delay, d1	17.2	23.9		23.6	27.4	26.3	25.9	35.8		22.3	37.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	2.1		0.1	0.9	0.4	1.9	2.6		1.3	8.9	
Delay (s)	17.6	26.1		23.7	28.4	26.7	27.8	38.4		23.6	46.2	
Level of Service	B	C		C	C	C	C	D		C	D	
Approach Delay (s)		23.4			27.2			36.2			41.8	
Approach LOS		C			C			D			D	

Intersection Summary

HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: North Steet & Northern Avenue West/Northern Avenue East

Existing AM
 25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←↑→		←↑	←↑			←↑→		←↑	←↑	
Traffic Volume (vph)	21	265	27	59	99	63	14	158	61	75	195	28
Future Volume (vph)	21	265	27	59	99	63	14	158	61	75	195	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			7.0		7.0	7.0	
Lane Util. Factor		0.95		1.00	1.00			0.95		1.00	1.00	
Frb, ped/bikes		1.00		1.00	0.99			0.99		1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00		0.98	1.00	
Frt		0.99		1.00	0.94			0.96		1.00	0.98	
Flt Protected		1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3316		1640	1687			3008		1586	1645	
Flt Permitted		0.93		0.55	1.00			0.93		0.60	1.00	
Satd. Flow (perm)		3090		945	1687			2808		993	1645	
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)	23	288	29	64	108	68	15	172	66	82	212	30
RTOR Reduction (vph)	0	8	0	0	25	0	0	38	0	0	6	0
Lane Group Flow (vph)	0	332	0	64	151	0	0	215	0	82	236	0
Confl. Peds. (#/hr)	3		2	2		3	11		18	18		11
Heavy Vehicles (%)	0%	2%	6%	5%	0%	2%	0%	11%	5%	7%	8%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		39.0		39.0	39.0			38.0		38.0	38.0	
Effective Green, g (s)		39.0		39.0	39.0			38.0		38.0	38.0	
Actuated g/C Ratio		0.43		0.43	0.43			0.42		0.42	0.42	
Clearance Time (s)		6.0		6.0	6.0			7.0		7.0	7.0	
Vehicle Extension (s)		4.0		4.0	4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)		1339		409	731			1185		419	694	
v/s Ratio Prot					0.09						c0.14	
v/s Ratio Perm		c0.11		0.07				0.08		0.08		
v/c Ratio		0.25		0.16	0.21			0.18		0.20	0.34	
Uniform Delay, d1		16.2		15.5	15.9			16.3		16.4	17.5	
Progression Factor		1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.4		0.8	0.6			0.3		1.0	1.3	
Delay (s)		16.6		16.3	16.5			16.6		17.4	18.9	
Level of Service		B		B	B			B		B	B	
Approach Delay (s)		16.6			16.5			16.6			18.5	
Approach LOS		B			B			B			B	

Intersection Summary		
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.29	B
Actuated Cycle Length (s)	90.0	Sum of lost time (s)
Intersection Capacity Utilization	91.7%	13.0
Analysis Period (min)	15	ICU Level of Service
		F

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Grand Boulevard/Sackville Road & Northern Avenue East

Existing AM
 25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↔↔		↔	↔		↔	↔	
Traffic Volume (vph)	33	208	18	15	125	76	14	78	26	93	54	30
Future Volume (vph)	33	208	18	15	125	76	14	78	26	93	54	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		0.95			0.95		1.00	1.00		1.00	1.00	
Frt		0.99			0.95		1.00	0.96		1.00	0.95	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3364			3203		1675	1748		1691	1718	
Flt Permitted		0.89			0.92		0.70	1.00		0.68	1.00	
Satd. Flow (perm)		3004			2968		1229	1748		1218	1718	
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)	36	226	20	16	136	83	15	85	28	101	59	33
RTOR Reduction (vph)	0	7	0	0	49	0	0	15	0	0	19	0
Lane Group Flow (vph)	0	275	0	0	186	0	15	98	0	101	73	0
Heavy Vehicles (%)	0%	1%	0%	0%	1%	3%	3%	0%	0%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		33.0			33.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)		33.0			33.0		34.0	34.0		34.0	34.0	
Actuated g/C Ratio		0.41			0.41		0.42	0.42		0.42	0.42	
Clearance Time (s)		7.0			7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1239			1224		522	742		517	730	
v/s Ratio Prot								0.06			0.04	
v/s Ratio Perm		c0.09			0.06		0.01			c0.08		
v/c Ratio		0.22			0.15		0.03	0.13		0.20	0.10	
Uniform Delay, d1		15.2			14.7		13.4	14.0		14.4	13.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.3		0.1	0.4		0.8	0.3	
Delay (s)		15.6			15.0		13.5	14.4		15.3	14.1	
Level of Service		B			B		B	B		B	B	
Approach Delay (s)		15.6			15.0			14.3			14.7	
Approach LOS		B			B			B			B	

Intersection Summary		
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.21	B
Actuated Cycle Length (s)	80.0	Sum of lost time (s)
Intersection Capacity Utilization	55.6%	13.0
Analysis Period (min)	15	ICU Level of Service
c Critical Lane Group		B

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:27	8:27	8:27	8:27	8:27	8:27
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	4028	4074	4009	3997	3943	4010
Vehs Exited	4024	4068	4019	3991	3991	4020
Starting Vehs	123	116	121	107	134	119
Ending Vehs	127	122	111	113	86	110
Travel Distance (km)	3903	3884	3886	3866	3791	3866
Travel Time (hr)	119.7	118.1	117.5	117.0	114.6	117.4
Total Delay (hr)	37.8	36.5	35.8	35.8	35.0	36.2
Total Stops	3633	3602	3517	3502	3390	3526
Fuel Used (l)	334.4	331.4	330.7	329.2	323.6	329.8

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	8:27
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	4028	4074	4009	3997	3943	4010
Vehs Exited	4024	4068	4019	3991	3991	4020
Starting Vehs	123	116	121	107	134	119
Ending Vehs	127	122	111	113	86	110
Travel Distance (km)	3903	3884	3886	3866	3791	3866
Travel Time (hr)	119.7	118.1	117.5	117.0	114.6	117.4
Total Delay (hr)	37.8	36.5	35.8	35.8	35.0	36.2
Total Stops	3633	3602	3517	3502	3390	3526
Fuel Used (l)	334.4	331.4	330.7	329.2	323.6	329.8

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	TR	L	TR	L	TR
Maximum Queue (m)	21.6	31.1	12.8	9.0	53.0	76.8	10.4	67.5
Average Queue (m)	5.6	12.1	2.2	0.9	24.3	41.4	2.0	32.2
95th Queue (m)	17.0	24.9	9.1	5.2	43.7	70.8	8.1	56.8
Link Distance (m)	579.5	579.5	394.1	394.1		335.7		377.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)					42.0			30.0
Storage Blk Time (%)					1	7	9	
Queuing Penalty (veh)					5	13	1	

Intersection: 6: Willow Avenue & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	TR	LT	T	L	R
Maximum Queue (m)	38.4	60.3	37.0	38.6	47.5	31.6
Average Queue (m)	15.8	31.4	15.5	10.4	19.0	6.6
95th Queue (m)	32.8	54.8	31.6	27.8	36.3	19.6
Link Distance (m)	257.8	257.8	579.5	579.5		329.5
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	23.0					
Storage Blk Time (%)	10 0					
Queuing Penalty (veh)	4 0					

Intersection: 9: Great Northern Road & Northern Avenue East

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB	
Directions Served	L	TR	L	T	R	L	T	TR	L	T	TR	
Maximum Queue (m)	46.1	64.1	10.9	36.8	35.1	31.8	61.0	56.5	55.8	89.2	83.3	
Average Queue (m)	17.9	24.5	2.1	15.3	12.9	15.2	37.2	29.7	22.7	54.1	50.4	
95th Queue (m)	35.9	52.2	6.7	30.0	25.5	28.6	56.0	52.7	44.9	81.6	76.7	
Link Distance (m)	733.4	733.4		257.8	257.8		329.6	329.6		374.7	374.7	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	26.0			80.0			80.0					
Storage Blk Time (%)				4			0			1		
Queuing Penalty (veh)				1			0			1		

Queuing and Blocking Report
Baseline

25/11/2016

Intersection: 12: North Steet & Northern Avenue West/Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	L	TR	LT	TR	L	TR
Maximum Queue (m)	44.8	37.9	27.6	38.3	56.4	33.4	33.1	52.0
Average Queue (m)	23.0	12.9	11.3	14.8	23.7	8.5	11.1	24.4
95th Queue (m)	37.7	27.4	23.1	30.5	43.2	21.1	26.7	44.3
Link Distance (m)	293.9	293.9	523.4	523.4	344.7	344.7		73.3
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (m)							16.0	
Storage Blk Time (%)							3	14
Queuing Penalty (veh)							7	11

Intersection: 15: Grand Boulevard/Sackville Road & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (m)	30.5	34.5	24.9	32.0	7.8	31.5	27.8	29.8
Average Queue (m)	13.0	15.4	8.4	13.9	2.3	9.7	11.6	9.1
95th Queue (m)	25.1	29.8	18.5	26.0	8.0	22.2	23.4	21.1
Link Distance (m)	523.4	523.4	733.4	733.4		342.7		373.5
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)					21.0		30.0	
Storage Blk Time (%)						1	0	0
Queuing Penalty (veh)						0	0	0

Network Summary

Network wide Queuing Penalty: 42

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

Existing PM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖↗		↖	↗		↖	↗	
Traffic Volume (vph)	33	17	286	22	21	22	136	303	18	18	365	31
Future Volume (vph)	33	17	286	22	21	22	136	303	18	18	365	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.96		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		0.99		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.95		1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1580	1465		3056		1652	1737		1717	1771	
Flt Permitted		0.81	1.00		0.87		0.42	1.00		0.49	1.00	
Satd. Flow (perm)		1330	1465		2716		738	1737		891	1771	
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)	36	18	311	24	23	24	148	329	20	20	397	34
RTOR Reduction (vph)	0	0	201	0	15	0	0	2	0	0	3	0
Lane Group Flow (vph)	0	54	110	0	56	0	148	347	0	20	428	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		39.0	39.0		39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)		39.0	39.0		39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio		0.35	0.35		0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		471	519		962		395	931		477	949	
v/s Ratio Prot								0.20			c0.24	
v/s Ratio Perm		0.04	c0.08		0.02		0.20			0.02		
v/c Ratio		0.11	0.21		0.06		0.37	0.37		0.04	0.45	
Uniform Delay, d1		23.9	24.8		23.4		14.8	14.8		12.1	15.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.9		0.1		2.7	1.1		0.2	1.5	
Delay (s)		24.4	25.7		23.5		17.5	15.9		12.3	17.1	
Level of Service		C	C		C		B	B		B	B	
Approach Delay (s)		25.5			23.5			16.4			16.9	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Willow Avenue & Northern Avenue East

Existing PM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑		↑		↑		↑	
Traffic Volume (vph)	0	335	156	46	308	0	319	0	53	0	0	1
Future Volume (vph)	0	335	156	46	308	0	319	0	53	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		6.0		6.0		6.0	
Lane Util. Factor		0.95			0.95		1.00		1.00		1.00	
Frbp, ped/bikes		0.99			1.00		1.00		0.94		0.98	
Flpb, ped/bikes		1.00			1.00		0.99		1.00		1.00	
Frt		0.95			1.00		1.00		0.85		0.86	
Flt Protected		1.00			0.99		0.95		1.00		1.00	
Satd. Flow (prot)		3215			3263		1616		1401		1541	
Flt Permitted		1.00			0.81		0.76		1.00		1.00	
Satd. Flow (perm)		3215			2674		1288		1401		1541	
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	364	170	50	335	0	347	0	58	0	0	1
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	37	0	1	0
Lane Group Flow (vph)	0	488	0	0	385	0	347	0	21	0	0	0
Confl. Peds. (#/hr)			11	11			4		26	26		4
Heavy Vehicles (%)	0%	1%	0%	4%	5%	0%	6%	0%	4%	0%	0%	0%
Turn Type		NA		Perm	NA		Perm		Perm		NA	
Protected Phases		4			8							6
Permitted Phases				8			2		2	6		
Actuated Green, G (s)		63.0			63.0		44.0		44.0		44.0	
Effective Green, g (s)		63.0			63.0		44.0		44.0		44.0	
Actuated g/C Ratio		0.52			0.52		0.37		0.37		0.37	
Clearance Time (s)		7.0			7.0		6.0		6.0		6.0	
Vehicle Extension (s)		4.0			4.0		4.0		4.0		4.0	
Lane Grp Cap (vph)		1687			1403		472		513		565	
v/s Ratio Prot		c0.15									0.00	
v/s Ratio Perm					0.14		c0.27		0.02			
v/c Ratio		0.29			0.27		0.74		0.04		0.00	
Uniform Delay, d1		16.0			15.8		32.9		24.4		24.1	
Progression Factor		0.58			1.00		1.00		1.00		1.00	
Incremental Delay, d2		0.3			0.5		9.8		0.2		0.0	
Delay (s)		9.5			16.3		42.7		24.6		24.1	
Level of Service		A			B		D		C		C	
Approach Delay (s)		9.5			16.3			40.1			24.1	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			20.9				HCM 2000 Level of Service		C			
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		13.0			
Intersection Capacity Utilization			76.8%				ICU Level of Service		D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

9: Great Northern Road & Northern Avenue East

Existing PM
25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	249	169	36	195	153	194	668	6	201	734	163
Future Volume (vph)	172	249	169	36	195	153	194	668	6	201	734	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1661	1673		1723	1798	1432	1725	3345		1707	3272	
Flt Permitted	0.45	1.00		0.31	1.00	1.00	0.10	1.00		0.23	1.00	
Satd. Flow (perm)	790	1673		555	1798	1432	186	3345		418	3272	
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)	187	271	184	39	212	166	211	726	7	218	798	177
RTOR Reduction (vph)	0	18	0	0	0	123	0	1	0	0	16	0
Lane Group Flow (vph)	187	437	0	39	212	43	211	732	0	218	959	0
Confl. Peds. (#/hr)	23		8	8		23	11		4	4		11
Heavy Vehicles (%)	3%	1%	1%	0%	1%	3%	0%	3%	0%	1%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	49.6	40.2		36.8	31.4	31.4	53.7	39.3		53.1	39.0	
Effective Green, g (s)	49.6	40.2		36.8	31.4	31.4	53.7	39.3		53.1	39.0	
Actuated g/C Ratio	0.41	0.34		0.31	0.26	0.26	0.45	0.33		0.44	0.32	
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0		4.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	429	560		222	470	374	267	1095		336	1063	
v/s Ratio Prot	c0.05	c0.26		0.01	0.12		c0.09	0.22		0.08	c0.29	
v/s Ratio Perm	0.13			0.05		0.03	0.26			0.21		
v/c Ratio	0.44	0.78		0.18	0.45	0.12	0.79	0.67		0.65	0.90	
Uniform Delay, d1	23.8	35.9		30.2	37.1	33.7	28.3	34.7		22.7	38.7	
Progression Factor	1.00	1.00		0.62	0.73	0.74	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	10.3		0.5	2.7	0.6	15.4	3.2		4.8	12.3	
Delay (s)	24.7	46.3		19.2	29.8	25.4	43.7	38.0		27.5	50.9	
Level of Service	C	D		B	C	C	D	D		C	D	
Approach Delay (s)		40.0			27.1			39.3			46.7	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: North Steet & Northern Avenue West/Northern Avenue East

Existing PM
 25/11/2016



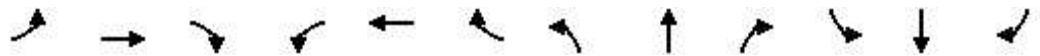
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↔	↔			↔↔		↔	↔	
Traffic Volume (vph)	4	207	17	73	283	88	24	164	84	56	119	18
Future Volume (vph)	4	207	17	73	283	88	24	164	84	56	119	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			7.0		7.0	7.0	
Lane Util. Factor		0.95		1.00	1.00			0.95		1.00	1.00	
Frb, ped/bikes		1.00		1.00	1.00			0.99		1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00			1.00		0.98	1.00	
Frt		0.99		1.00	0.96			0.95		1.00	0.98	
Flt Protected		1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3330		1639	1736			2987		1584	1641	
Flt Permitted		0.95		0.60	1.00			0.92		0.57	1.00	
Satd. Flow (perm)		3165		1033	1736			2761		953	1641	
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)	4	225	18	79	308	96	26	178	91	61	129	20
RTOR Reduction (vph)	0	6	0	0	11	0	0	51	0	0	6	0
Lane Group Flow (vph)	0	241	0	79	393	0	0	244	0	61	143	0
Confl. Peds. (#/hr)	3		2	2		3	11		18	18		11
Heavy Vehicles (%)	0%	2%	6%	5%	0%	2%	0%	11%	5%	7%	8%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		44.0		44.0	44.0			43.0		43.0	43.0	
Effective Green, g (s)		44.0		44.0	44.0			43.0		43.0	43.0	
Actuated g/C Ratio		0.44		0.44	0.44			0.43		0.43	0.43	
Clearance Time (s)		6.0		6.0	6.0			7.0		7.0	7.0	
Vehicle Extension (s)		4.0		4.0	4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)		1392		454	763			1187		409	705	
v/s Ratio Prot					c0.23						0.09	
v/s Ratio Perm		0.08		0.08				c0.09		0.06		
v/c Ratio		0.17		0.17	0.51			0.21		0.15	0.20	
Uniform Delay, d1		17.0		17.0	20.3			17.8		17.4	17.8	
Progression Factor		1.00		0.50	0.46			1.00		1.00	1.00	
Incremental Delay, d2		0.3		0.8	2.3			0.4		0.8	0.7	
Delay (s)		17.2		9.4	11.6			18.2		18.1	18.5	
Level of Service		B		A	B			B		B	B	
Approach Delay (s)		17.2			11.2			18.2			18.4	
Approach LOS		B			B			B			B	

Intersection Summary		
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.36	B
Actuated Cycle Length (s)	100.0	Sum of lost time (s)
Intersection Capacity Utilization	94.5%	13.0
Analysis Period (min)	15	ICU Level of Service
		F

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Grand Boulevard/Sackville Road & Northern Avenue East

Existing PM
 25/11/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	33	343	27	23	358	146	30	78	24	161	117	33
Future Volume (vph)	33	343	27	23	358	146	30	78	24	161	117	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		0.95			0.95		1.00	1.00		1.00	1.00	
Frt		0.99			0.96		1.00	0.96		1.00	0.97	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3373			3250		1675	1752		1691	1755	
Flt Permitted		0.86			0.92		0.65	1.00		0.69	1.00	
Satd. Flow (perm)		2924			2992		1153	1752		1220	1755	
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)	36	373	29	25	389	159	33	85	26	175	127	36
RTOR Reduction (vph)	0	5	0	0	40	0	0	11	0	0	10	0
Lane Group Flow (vph)	0	433	0	0	533	0	33	100	0	175	153	0
Heavy Vehicles (%)	0%	1%	0%	0%	1%	3%	3%	0%	0%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		43.0			43.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)		43.0			43.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio		0.43			0.43		0.44	0.44		0.44	0.44	
Clearance Time (s)		7.0			7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		1257			1286		507	770		536	772	
v/s Ratio Prot								0.06			0.09	
v/s Ratio Perm		0.15			0.18		0.03			0.14		
v/c Ratio		0.34			0.41		0.07	0.13		0.33	0.20	
Uniform Delay, d1		19.1			19.8		16.1	16.6		18.3	17.2	
Progression Factor		0.93			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7			1.0		0.2	0.3		1.6	0.6	
Delay (s)		18.5			20.8		16.4	17.0		19.9	17.8	
Level of Service		B			C		B	B		B	B	
Approach Delay (s)		18.5			20.8			16.8			18.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:30	3:30	3:30	3:30	3:30	3:30
End Time	5:00	5:00	5:00	5:00	5:00	5:00
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	4782	4685	4673	4766	4715	4726
Vehs Exited	4810	4654	4701	4747	4710	4724
Starting Vehs	187	147	173	158	160	163
Ending Vehs	159	178	145	177	165	162
Travel Distance (km)	5141	5045	5063	5128	5093	5094
Travel Time (hr)	163.9	159.6	162.8	165.6	164.5	163.3
Total Delay (hr)	55.7	53.5	56.3	57.8	57.1	56.1
Total Stops	4881	4806	4835	4931	4944	4879
Fuel Used (l)	447.4	434.5	440.1	446.9	442.1	442.2

Interval #0 Information Seeding

Start Time	3:30
End Time	4:00
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:00
End Time	5:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	4782	4685	4673	4766	4715	4726
Vehs Exited	4810	4654	4701	4747	4710	4724
Starting Vehs	187	147	173	158	160	163
Ending Vehs	159	178	145	177	165	162
Travel Distance (km)	5141	5045	5063	5128	5093	5094
Travel Time (hr)	163.9	159.6	162.8	165.6	164.5	163.3
Total Delay (hr)	55.7	53.5	56.3	57.8	57.1	56.1
Total Stops	4881	4806	4835	4931	4944	4879
Fuel Used (l)	447.4	434.5	440.1	446.9	442.1	442.2

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	TR	L	TR	L	TR
Maximum Queue (m)	28.4	63.2	18.3	15.0	47.6	62.2	14.5	85.6
Average Queue (m)	8.6	25.6	7.5	4.1	21.6	30.1	4.0	43.6
95th Queue (m)	22.3	47.4	17.8	12.1	39.9	54.6	12.2	74.8
Link Distance (m)	579.5	579.5	394.1	394.1		335.7		377.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)					42.0		30.0	
Storage Blk Time (%)					1	3		16
Queuing Penalty (veh)					2	4		3

Intersection: 6: Willow Avenue & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	TR	LT	T	L	R
Maximum Queue (m)	31.4	46.2	48.4	46.4	53.9	110.7
Average Queue (m)	10.8	24.2	23.1	14.9	42.3	35.0
95th Queue (m)	25.5	41.8	42.3	35.3	62.5	92.8
Link Distance (m)	257.8	257.8	579.5	579.5		329.5
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)					23.0	
Storage Blk Time (%)					39	0
Queuing Penalty (veh)					21	0

Intersection: 9: Great Northern Road & Northern Avenue East

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	TR	L	T	TR
Maximum Queue (m)	74.6	142.7	36.4	69.7	31.5	70.9	96.2	76.6	76.0	112.1	111.9
Average Queue (m)	24.2	62.1	6.2	31.7	13.6	32.3	51.6	46.3	31.0	64.3	66.7
95th Queue (m)	51.5	124.2	20.5	60.3	23.7	57.0	76.6	70.1	62.8	95.1	98.1
Link Distance (m)	733.4	733.4		257.8	257.8		329.6	329.6		374.7	374.7
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)			26.0			80.0			80.0		
Storage Blk Time (%)			0	17		0	1		0	3	
Queuing Penalty (veh)			0	6		0	1		0	5	

Queuing and Blocking Report
Baseline

25/11/2016

Intersection: 12: North Steet & Northern Avenue West/Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	L	TR	LT	TR	L	TR
Maximum Queue (m)	42.4	34.9	20.5	45.3	61.8	28.8	32.8	46.4
Average Queue (m)	19.8	8.9	7.5	18.0	25.8	10.5	9.1	17.6
95th Queue (m)	35.7	22.1	17.2	35.3	48.1	21.2	21.8	36.6
Link Distance (m)	293.9	293.9	523.4	523.4	344.7	344.7		73.3
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (m)							16.0	
Storage Blk Time (%)							2	9
Queuing Penalty (veh)							3	5

Intersection: 15: Grand Boulevard/Sackville Road & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (m)	45.3	47.4	52.4	68.8	18.3	31.7	43.4	42.0
Average Queue (m)	24.1	27.0	23.7	37.1	5.2	10.5	20.7	18.6
95th Queue (m)	39.0	43.6	42.4	61.0	14.6	23.0	36.9	36.0
Link Distance (m)	523.4	523.4	733.4	733.4		342.7		373.5
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)					21.0		30.0	
Storage Blk Time (%)					1	2	4	2
Queuing Penalty (veh)					1	1	5	3

Network Summary

Network wide Queuing Penalty: 60

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

Future AM
01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	24	8	131	7	6	6	198	435	12	8	306	50
Future Volume (vph)	24	8	131	7	6	6	198	435	12	8	306	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.96		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.93		1.00	1.00		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)	1512	1480		1695	1569		1647	1751		1720	1747	
Flt Permitted	0.75	1.00		0.65	1.00		0.46	1.00		0.38	1.00	
Satd. Flow (perm)	1191	1480		1164	1569		799	1751		689	1747	
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)	26	9	142	8	7	7	215	473	13	9	333	54
RTOR Reduction (vph)	0	92	0	0	5	0	0	1	0	0	5	0
Lane Group Flow (vph)	26	59	0	8	9	0	215	485	0	9	382	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	422	524		412	556		428	939		369	937	
v/s Ratio Prot		c0.04			0.01			c0.28			0.22	
v/s Ratio Perm	0.02			0.01			0.27			0.01		
v/c Ratio	0.06	0.11		0.02	0.02		0.50	0.52		0.02	0.41	
Uniform Delay, d1	23.4	23.9		23.1	23.1		16.2	16.4		12.0	15.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		0.1	0.1		4.2	2.0		0.1	1.3	
Delay (s)	23.7	24.3		23.2	23.1		20.4	18.4		12.1	16.4	
Level of Service	C	C		C	C		C	B		B	B	
Approach Delay (s)		24.2			23.1			19.0			16.3	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Willow Avenue & Northern Avenue East

Future AM
01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	295	254	39	247	0	138	0	47	0	0	0
Future Volume (vph)	0	295	254	39	247	0	138	0	47	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0		7.0	7.0		6.0		6.0			
Lane Util. Factor		1.00		1.00	1.00		1.00		1.00			
Frbp, ped/bikes		0.98		1.00	1.00		1.00		0.91			
Flpb, ped/bikes		1.00		0.99	1.00		0.99		1.00			
Frt		0.93		1.00	1.00		1.00		0.85			
Flt Protected		1.00		0.95	1.00		0.95		1.00			
Satd. Flow (prot)		1645		1647	1729		1609		1346			
Flt Permitted		1.00		0.29	1.00		0.76		1.00			
Satd. Flow (perm)		1645		504	1729		1282		1346			
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	321	276	42	268	0	150	0	51	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	32	0	0	0
Lane Group Flow (vph)	0	571	0	42	268	0	150	0	19	0	0	0
Confl. Peds. (#/hr)			11	11			4		26	26		4
Heavy Vehicles (%)	0%	1%	0%	4%	5%	0%	6%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm		Perm			
Protected Phases		4			8							6
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		63.0		63.0	63.0		44.0		44.0			
Effective Green, g (s)		63.0		63.0	63.0		44.0		44.0			
Actuated g/C Ratio		0.52		0.52	0.52		0.37		0.37			
Clearance Time (s)		7.0		7.0	7.0		6.0		6.0			
Vehicle Extension (s)		4.0		4.0	4.0		4.0		4.0			
Lane Grp Cap (vph)		863		264	907		470		493			
v/s Ratio Prot		c0.35			0.15							
v/s Ratio Perm				0.08			c0.12		0.01			
v/c Ratio		0.66		0.16	0.30		0.32		0.04			
Uniform Delay, d1		20.7		14.8	16.0		27.3		24.4			
Progression Factor		1.00		1.00	1.00		1.00		1.00			
Incremental Delay, d2		4.0		1.3	0.8		1.8		0.1			
Delay (s)		24.7		16.1	16.9		29.0		24.6			
Level of Service		C		B	B		C		C			
Approach Delay (s)		24.7			16.7			27.9			0.0	
Approach LOS		C			B			C			A	
Intersection Summary												
HCM 2000 Control Delay			23.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			13.0			
Intersection Capacity Utilization			60.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 9: Great Northern Road & Northern Avenue East

Future AM
 01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	168	154	23	134	149	123	462	7	193	715	78
Future Volume (vph)	149	168	154	23	134	149	123	462	7	193	715	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0	6.0	4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1657	1653		1716	1798	1444	1723	3341		1706	3318	
Flt Permitted	0.57	1.00		0.55	1.00	1.00	0.19	1.00		0.35	1.00	
Satd. Flow (perm)	999	1653		995	1798	1444	352	3341		637	3318	
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)	162	183	167	25	146	162	134	502	8	210	777	85
RTOR Reduction (vph)	0	37	0	0	0	117	0	1	0	0	9	0
Lane Group Flow (vph)	162	313	0	25	146	45	134	509	0	210	853	0
Confl. Peds. (#/hr)	23		8	8		23	11		4	4		11
Heavy Vehicles (%)	3%	1%	1%	0%	1%	3%	0%	3%	0%	1%	2%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	36.0	36.0		25.0	25.0	25.0	34.3	26.4		39.7	29.1	
Effective Green, g (s)	36.0	36.0		25.0	25.0	25.0	34.3	26.4		39.7	29.1	
Actuated g/C Ratio	0.40	0.40		0.28	0.28	0.28	0.38	0.29		0.44	0.32	
Clearance Time (s)	4.0	6.0		6.0	6.0	6.0	4.0	7.0		4.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	450	661		276	499	401	254	980		406	1072	
v/s Ratio Prot	0.03	c0.19			0.08		0.05	0.15		c0.06	c0.26	
v/s Ratio Perm	0.12			0.03		0.03	0.15			0.17		
v/c Ratio	0.36	0.47		0.09	0.29	0.11	0.53	0.52		0.52	0.80	
Uniform Delay, d1	18.1	20.0		24.1	25.5	24.2	19.5	26.5		16.4	27.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	2.4		0.6	1.5	0.6	2.6	2.0		1.5	6.1	
Delay (s)	18.7	22.4		24.7	27.0	24.8	22.1	28.5		17.9	33.9	
Level of Service	B	C		C	C	C	C	C		B	C	
Approach Delay (s)		21.3			25.8			27.1			30.7	
Approach LOS		C			C			C			C	

Intersection Summary		
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.66	C
Actuated Cycle Length (s)	90.0	Sum of lost time (s)
Intersection Capacity Utilization	78.3%	21.0
Analysis Period (min)	15	ICU Level of Service
		D

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: North Street & Northern Avenue West/Northern Avenue East

Future AM
 01/12/2016



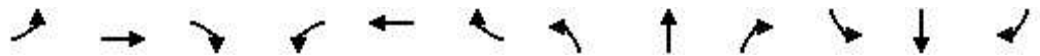
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	293	30	65	109	70	15	175	67	83	215	31
Future Volume (vph)	23	293	30	65	109	70	15	175	67	83	215	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	0.99			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.97	1.00	
Frt	1.00	0.99		1.00	0.94			0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1720	1746		1640	1685			2989		1570	1644	
Flt Permitted	0.63	1.00		0.46	1.00			0.93		0.58	1.00	
Satd. Flow (perm)	1146	1746		796	1685			2786		959	1644	
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)	25	318	33	71	118	76	16	190	73	90	234	34
RTOR Reduction (vph)	0	4	0	0	26	0	0	39	0	0	6	0
Lane Group Flow (vph)	25	347	0	71	169	0	0	240	0	90	262	0
Confl. Peds. (#/hr)	3		2	2		3	11		18	18		11
Heavy Vehicles (%)	0%	2%	6%	5%	0%	2%	0%	11%	5%	7%	8%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0			38.0		38.0	38.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0			38.0		38.0	38.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.42		0.42	0.42	
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0		7.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)	496	756		344	730			1176		404	694	
v/s Ratio Prot		c0.20			0.10						c0.16	
v/s Ratio Perm	0.02			0.09				0.09		0.09		
v/c Ratio	0.05	0.46		0.21	0.23			0.20		0.22	0.38	
Uniform Delay, d1	14.8	18.0		15.9	16.1			16.4		16.6	17.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.2	2.0		1.4	0.7			0.4		1.3	1.6	
Delay (s)	15.0	20.0		17.2	16.8			16.8		17.9	19.4	
Level of Service	B	C		B	B			B		B	B	
Approach Delay (s)		19.7			16.9			16.8			19.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Grand Boulevard/Sackville Road & Northern Avenue East

Future AM
 01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	36	230	20	17	138	84	15	86	29	103	60	33
Future Volume (vph)	36	230	20	17	138	84	15	86	29	103	60	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.94		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1725	1777		1725	1683		1675	1746		1691	1718	
Flt Permitted	0.60	1.00		0.57	1.00		0.69	1.00		0.68	1.00	
Satd. Flow (perm)	1097	1777		1030	1683		1219	1746		1205	1718	
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)	39	250	22	18	150	91	16	93	32	112	65	36
RTOR Reduction (vph)	0	4	0	0	27	0	0	16	0	0	21	0
Lane Group Flow (vph)	39	268	0	18	214	0	16	109	0	112	80	0
Heavy Vehicles (%)	0%	1%	0%	0%	1%	3%	3%	0%	0%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.0	33.0		33.0	33.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	33.0	33.0		33.0	33.0		34.0	34.0		34.0	34.0	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.42	0.42		0.42	0.42	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	452	733		424	694		518	742		512	730	
v/s Ratio Prot		c0.15			0.13			0.06			0.05	
v/s Ratio Perm	0.04			0.02			0.01			c0.09		
v/c Ratio	0.09	0.37		0.04	0.31		0.03	0.15		0.22	0.11	
Uniform Delay, d1	14.3	16.3		14.1	15.8		13.4	14.1		14.6	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.4		0.2	1.2		0.1	0.4		1.0	0.3	
Delay (s)	14.7	17.7		14.2	17.0		13.5	14.5		15.6	14.2	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		17.3			16.8			14.4			14.9	
Approach LOS		B			B			B			B	

Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:27	8:27	8:27	8:27	8:27	8:27
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	4500	4461	4328	4395	4231	4383
Vehs Exited	4488	4452	4333	4403	4252	4387
Starting Vehs	117	120	125	133	137	124
Ending Vehs	129	129	120	125	116	121
Travel Distance (km)	4322	4284	4203	4265	4080	4231
Travel Time (hr)	132.7	132.0	127.4	131.1	124.4	129.5
Total Delay (hr)	41.6	42.2	39.0	41.4	38.5	40.5
Total Stops	4111	4124	3978	4091	3883	4042
Fuel Used (l)	368.0	366.7	356.9	364.0	348.5	360.8

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	8:27
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	4500	4461	4328	4395	4231	4383
Vehs Exited	4488	4452	4333	4403	4252	4387
Starting Vehs	117	120	125	133	137	124
Ending Vehs	129	129	120	125	116	121
Travel Distance (km)	4322	4284	4203	4265	4080	4231
Travel Time (hr)	132.7	132.0	127.4	131.1	124.4	129.5
Total Delay (hr)	41.6	42.2	39.0	41.4	38.5	40.5
Total Stops	4111	4124	3978	4091	3883	4042
Fuel Used (l)	368.0	366.7	356.9	364.0	348.5	360.8

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	18.1	41.5	11.5	11.5	72.7	99.8	10.4	77.6
Average Queue (m)	5.3	14.1	2.3	1.7	32.1	47.9	2.0	34.6
95th Queue (m)	14.6	30.5	8.9	7.6	58.7	81.9	8.0	60.6
Link Distance (m)		579.8		394.1		337.4		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)		1			5	11		11
Queuing Penalty (veh)		0			23	21		1

Intersection: 6: Willow Avenue & Northern Avenue East

Movement	EB	WB	WB	NB	NB
Directions Served	TR	L	TR	L	R
Maximum Queue (m)	120.2	39.8	93.5	47.1	39.0
Average Queue (m)	67.6	12.4	32.2	21.9	8.4
95th Queue (m)	107.3	29.2	78.6	38.6	23.2
Link Distance (m)	257.1		579.8		331.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		40.0		23.0	
Storage Blk Time (%)	18	0	6	15	0
Queuing Penalty (veh)	0	0	2	7	0

Intersection: 9: Great Northern Road & Northern Avenue East

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	TR	L	T	TR
Maximum Queue (m)	39.8	87.7	12.6	38.6	33.0	33.1	61.3	56.5	55.4	68.6	67.5
Average Queue (m)	20.9	29.1	3.0	17.0	15.3	14.9	33.9	24.8	21.3	44.4	43.1
95th Queue (m)	39.7	60.3	8.5	33.3	27.4	28.0	53.3	47.4	42.2	64.8	63.6
Link Distance (m)		733.6		257.1			329.4	329.4		372.7	372.7
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	40.0		26.0		50.0	80.0			80.0		
Storage Blk Time (%)	0	3		5							
Queuing Penalty (veh)	2	4		9							

Intersection: 12: North Street & Northern Avenue West/Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	TR
Maximum Queue (m)	19.7	70.7	36.8	48.7	43.5	24.3	39.7	67.3
Average Queue (m)	5.3	35.1	12.3	17.5	22.3	7.5	14.3	28.1
95th Queue (m)	16.7	61.0	27.1	35.0	38.1	17.1	31.1	52.0
Link Distance (m)		294.0		523.7	346.2	346.2		73.3
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (m)	20.0		40.0				16.0	
Storage Blk Time (%)	0	21	0	1			6	18
Queuing Penalty (veh)	1	5	0	0			14	15

Intersection: 15: Grand Boulevard/Sackville Road & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	31.1	62.0	11.2	47.1	10.2	26.6	38.7	28.5
Average Queue (m)	6.6	25.6	2.6	20.7	2.6	10.2	14.6	10.6
95th Queue (m)	19.4	47.5	9.3	36.6	8.6	20.9	29.7	22.9
Link Distance (m)		523.7		733.6		344.3		375.1
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		21.0		30.0	
Storage Blk Time (%)	0	3		1		1	1	0
Queuing Penalty (veh)	0	1		0		0	1	0

Network Summary

Network wide Queuing Penalty: 108

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

Future PM
01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	19	316	24	23	24	150	335	20	20	403	34
Future Volume (vph)	36	19	316	24	23	24	150	335	20	20	403	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.96		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.92		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1514	1480		1710	1566		1650	1737		1718	1769	
Flt Permitted	0.72	1.00		0.38	1.00		0.39	1.00		0.46	1.00	
Satd. Flow (perm)	1153	1480		678	1566		676	1737		835	1769	
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)	39	21	343	26	25	26	163	364	22	22	438	37
RTOR Reduction (vph)	0	221	0	0	17	0	0	2	0	0	3	0
Lane Group Flow (vph)	39	143	0	26	34	0	163	384	0	22	472	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	408	524		240	555		362	931		447	948	
v/s Ratio Prot		c0.10			0.02			0.22			c0.27	
v/s Ratio Perm	0.03			0.04			0.24			0.03		
v/c Ratio	0.10	0.27		0.11	0.06		0.45	0.41		0.05	0.50	
Uniform Delay, d1	23.7	25.4		23.8	23.4		15.6	15.2		12.1	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.3		0.9	0.2		4.0	1.4		0.2	1.9	
Delay (s)	24.2	26.6		24.7	23.6		19.6	16.5		12.4	18.0	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		26.4			24.0			17.4			17.8	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Willow Avenue & Northern Avenue East

Future PM
01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	370	172	51	340	0	352	0	59	0	0	1
Future Volume (vph)	0	370	172	51	340	0	352	0	59	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0		7.0	7.0		6.0		6.0		6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00		1.00		1.00	
Frbp, ped/bikes		0.99		1.00	1.00		1.00		0.91		0.97	
Flpb, ped/bikes		1.00		0.99	1.00		0.99		1.00		1.00	
Frt		0.95		1.00	1.00		1.00		0.85		0.86	
Flt Protected		1.00		0.95	1.00		0.95		1.00		1.00	
Satd. Flow (prot)		1692		1647	1729		1609		1346		1521	
Flt Permitted		1.00		0.30	1.00		0.76		1.00		1.00	
Satd. Flow (perm)		1692		515	1729		1282		1346		1521	
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	402	187	55	370	0	383	0	64	0	0	1
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	41	0	1	0
Lane Group Flow (vph)	0	575	0	55	370	0	383	0	23	0	0	0
Confl. Peds. (#/hr)			11	11			4		26	26		4
Heavy Vehicles (%)	0%	1%	0%	4%	5%	0%	6%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm		Perm		NA	
Protected Phases		4			8						6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		63.0		63.0	63.0		44.0		44.0		44.0	
Effective Green, g (s)		63.0		63.0	63.0		44.0		44.0		44.0	
Actuated g/C Ratio		0.52		0.52	0.52		0.37		0.37		0.37	
Clearance Time (s)		7.0		7.0	7.0		6.0		6.0		6.0	
Vehicle Extension (s)		4.0		4.0	4.0		4.0		4.0		4.0	
Lane Grp Cap (vph)		888		270	907		470		493		557	
v/s Ratio Prot		c0.34			0.21							0.00
v/s Ratio Perm				0.11			c0.30		0.02			
v/c Ratio		0.65		0.20	0.41		0.81		0.05			0.00
Uniform Delay, d1		20.5		15.2	17.2		34.3		24.5			24.1
Progression Factor		1.00		1.00	1.00		1.00		1.00			1.00
Incremental Delay, d2		3.6		1.7	1.4		14.4		0.2			0.0
Delay (s)		24.2		16.9	18.6		48.7		24.7			24.1
Level of Service		C		B	B		D		C			C
Approach Delay (s)		24.2			18.4			45.3				24.1
Approach LOS		C			B			D				C
Intersection Summary												
HCM 2000 Control Delay			28.9				HCM 2000 Level of Service		C			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		13.0			
Intersection Capacity Utilization			81.1%				ICU Level of Service		D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
9: Great Northern Road & Northern Avenue East

Future PM
01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	275	187	40	215	169	214	738	7	222	811	180
Future Volume (vph)	190	275	187	40	215	169	214	738	7	222	811	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0	6.0	4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	1675		1718	1798	1444	1724	3344		1707	3264	
Flt Permitted	0.45	1.00		0.40	1.00	1.00	0.15	1.00		0.16	1.00	
Satd. Flow (perm)	788	1675		732	1798	1444	278	3344		284	3264	
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)	207	299	203	43	234	184	233	802	8	241	882	196
RTOR Reduction (vph)	0	27	0	0	0	133	0	1	0	0	21	0
Lane Group Flow (vph)	207	475	0	43	234	51	233	809	0	241	1057	0
Confl. Peds. (#/hr)	23		8	8		23	11		4	4		11
Heavy Vehicles (%)	3%	1%	1%	0%	1%	3%	0%	3%	0%	1%	2%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	36.0	36.0		25.0	25.0	25.0	34.1	26.1		39.9	29.0	
Effective Green, g (s)	36.0	36.0		25.0	25.0	25.0	34.1	26.1		39.9	29.0	
Actuated g/C Ratio	0.40	0.40		0.28	0.28	0.28	0.38	0.29		0.44	0.32	
Clearance Time (s)	4.0	6.0		6.0	6.0	6.0	4.0	7.0		4.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	383	670		203	499	401	233	969		298	1051	
v/s Ratio Prot	0.04	c0.28			0.13		c0.09	0.24		c0.10	c0.32	
v/s Ratio Perm	0.17			0.06		0.04	0.29			0.26		
v/c Ratio	0.54	0.71		0.21	0.47	0.13	1.00	0.84		0.81	1.01	
Uniform Delay, d1	19.4	22.6		24.9	27.0	24.3	23.8	29.9		18.5	30.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	6.2		2.4	3.1	0.7	59.0	8.5		15.6	29.2	
Delay (s)	21.4	28.9		27.3	30.1	25.0	82.8	38.4		34.1	59.7	
Level of Service	C	C		C	C	C	F	D		C	E	
Approach Delay (s)		26.7			27.8			48.3			55.0	
Approach LOS		C			C			D			D	

Intersection Summary

HCM 2000 Control Delay	43.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: North Street & Northern Avenue West/Northern Avenue East

Future PM
 01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕		↖	↗	
Traffic Volume (vph)	4	229	19	81	313	97	27	181	93	62	131	20
Future Volume (vph)	4	229	19	81	313	97	27	181	93	62	131	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.97	1.00	
Frt	1.00	0.99		1.00	0.96			0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1722	1752		1640	1736			2964		1568	1641	
Flt Permitted	0.36	1.00		0.54	1.00			0.92		0.55	1.00	
Satd. Flow (perm)	658	1752		933	1736			2729		915	1641	
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)	4	249	21	88	340	105	29	197	101	67	142	22
RTOR Reduction (vph)	0	3	0	0	11	0	0	51	0	0	6	0
Lane Group Flow (vph)	4	267	0	88	434	0	0	276	0	67	158	0
Confl. Peds. (#/hr)	3		2	2		3	11		18	18		11
Heavy Vehicles (%)	0%	2%	6%	5%	0%	2%	0%	11%	5%	7%	8%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	44.0	44.0		44.0	44.0			43.0		43.0	43.0	
Effective Green, g (s)	44.0	44.0		44.0	44.0			43.0		43.0	43.0	
Actuated g/C Ratio	0.44	0.44		0.44	0.44			0.43		0.43	0.43	
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0		7.0	7.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lane Grp Cap (vph)	289	770		410	763			1173		393	705	
v/s Ratio Prot		0.15			c0.25						0.10	
v/s Ratio Perm	0.01			0.09				c0.10		0.07		
v/c Ratio	0.01	0.35		0.21	0.57			0.24		0.17	0.22	
Uniform Delay, d1	15.8	18.5		17.3	20.9			18.1		17.5	18.0	
Progression Factor	1.00	1.00		0.48	0.39			1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.2		0.9	2.3			0.5		0.9	0.7	
Delay (s)	15.9	19.7		9.2	10.4			18.5		18.5	18.7	
Level of Service	B	B		A	B			B		B	B	
Approach Delay (s)		19.7			10.2			18.5			18.6	
Approach LOS		B			B			B			B	

Intersection Summary		
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.40	B
Actuated Cycle Length (s)	100.0	Sum of lost time (s)
Intersection Capacity Utilization	91.6%	13.0
Analysis Period (min)	15	ICU Level of Service
		F

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Grand Boulevard/Sackville Road & Northern Avenue East

Future PM
 01/12/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	36	379	30	25	395	161	33	86	27	178	129	36
Future Volume (vph)	36	379	30	25	395	161	33	86	27	178	129	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.96		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)	1725	1779		1725	1710		1675	1751		1691	1756	
Flt Permitted	0.22	1.00		0.37	1.00		0.64	1.00		0.68	1.00	
Satd. Flow (perm)	391	1779		667	1710		1131	1751		1208	1756	
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)	39	412	33	27	429	175	36	93	29	193	140	39
RTOR Reduction (vph)	0	3	0	0	15	0	0	11	0	0	10	0
Lane Group Flow (vph)	39	442	0	27	589	0	36	111	0	193	169	0
Heavy Vehicles (%)	0%	1%	0%	0%	1%	3%	3%	0%	0%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	43.0	43.0		43.0	43.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)	43.0	43.0		43.0	43.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.44	0.44		0.44	0.44	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	168	764		286	735		497	770		531	772	
v/s Ratio Prot		0.25			c0.34			0.06			0.10	
v/s Ratio Perm	0.10			0.04			0.03			c0.16		
v/c Ratio	0.23	0.58		0.09	0.80		0.07	0.14		0.36	0.22	
Uniform Delay, d1	18.0	21.6		16.9	24.8		16.2	16.7		18.7	17.4	
Progression Factor	0.86	0.89		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	3.1		0.7	9.0		0.3	0.4		1.9	0.7	
Delay (s)	18.7	22.3		17.6	33.8		16.5	17.1		20.6	18.0	
Level of Service	B	C		B	C		B	B		C	B	
Approach Delay (s)		22.0			33.1			17.0			19.3	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:27	8:27	8:27	8:27	8:27	8:27
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	5330	5283	5254	5180	5197	5252
Vehs Exited	5303	5294	5301	5182	5226	5261
Starting Vehs	175	194	222	196	225	197
Ending Vehs	202	183	175	194	196	184
Travel Distance (km)	5641	5707	5666	5513	5632	5632
Travel Time (hr)	193.2	190.4	199.9	182.3	189.8	191.1
Total Delay (hr)	74.6	70.4	80.7	66.1	71.1	72.6
Total Stops	6133	6144	6428	5739	6106	6113
Fuel Used (l)	499.6	498.8	505.8	481.6	495.9	496.4

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	8:27
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	5330	5283	5254	5180	5197	5252
Vehs Exited	5303	5294	5301	5182	5226	5261
Starting Vehs	175	194	222	196	225	197
Ending Vehs	202	183	175	194	196	184
Travel Distance (km)	5641	5707	5666	5513	5632	5632
Travel Time (hr)	193.2	190.4	199.9	182.3	189.8	191.1
Total Delay (hr)	74.6	70.4	80.7	66.1	71.1	72.6
Total Stops	6133	6144	6428	5739	6106	6113
Fuel Used (l)	499.6	498.8	505.8	481.6	495.9	496.4

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.8	93.4	20.9	24.7	57.1	65.0	30.7	91.2
Average Queue (m)	10.9	37.4	6.3	7.6	25.1	37.5	4.2	47.2
95th Queue (m)	33.4	72.8	16.1	18.8	44.5	63.7	18.5	76.8
Link Distance (m)		579.8		394.1		337.4		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)	0	9		0	3	6		19
Queuing Penalty (veh)	0	3		0	10	10		4

Intersection: 6: Willow Avenue & Northern Avenue East

Movement	EB	WB	WB	NB	NB
Directions Served	TR	L	TR	L	R
Maximum Queue (m)	110.9	39.7	100.8	53.9	115.5
Average Queue (m)	62.2	12.2	43.2	49.1	56.7
95th Queue (m)	103.7	31.2	82.0	60.4	119.4
Link Distance (m)	257.1		579.8		331.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		40.0		23.0	
Storage Blk Time (%)	19	1	10	40	0
Queuing Penalty (veh)	0	2	5	23	1

Intersection: 9: Great Northern Road & Northern Avenue East

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	TR	L	T	TR
Maximum Queue (m)	39.9	161.7	17.9	61.4	53.6	79.7	107.8	95.0	79.9	140.4	138.2
Average Queue (m)	32.4	70.8	5.4	27.8	17.3	40.2	55.9	49.8	39.0	79.0	78.6
95th Queue (m)	48.3	135.8	14.0	51.0	34.5	73.6	92.2	80.8	81.4	131.5	127.1
Link Distance (m)		733.6		257.1			329.4	329.4		372.7	372.7
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	40.0		26.0		50.0	80.0			80.0		
Storage Blk Time (%)	3	18		15	0	3	2		0	9	
Queuing Penalty (veh)	12	35		31	0	12	4		1	20	

Intersection: 12: North Street & Northern Avenue West/Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	TR
Maximum Queue (m)	15.1	64.4	34.0	54.3	57.3	36.0	37.8	52.6
Average Queue (m)	1.4	29.2	10.6	23.2	24.9	11.0	11.2	18.3
95th Queue (m)	8.1	54.2	23.7	43.2	47.0	25.1	25.4	39.3
Link Distance (m)		294.0		523.7	346.2	346.2		73.3
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (m)	20.0		40.0				16.0	
Storage Blk Time (%)	0	17	0	2			5	10
Queuing Penalty (veh)	0	1	0	2			7	6

Intersection: 15: Grand Boulevard/Sackville Road & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.8	97.9	39.8	130.2	20.0	32.1	55.3	49.0
Average Queue (m)	11.3	53.6	9.2	69.9	4.8	12.2	25.0	21.2
95th Queue (m)	31.6	87.8	31.1	113.6	14.4	24.8	43.6	40.2
Link Distance (m)		523.7		733.6		344.3		375.1
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		21.0		30.0	
Storage Blk Time (%)	0	11	0	26	1	3	6	2
Queuing Penalty (veh)	0	4	0	6	1	1	10	4

Network Summary

Network wide Queuing Penalty: 218

HCM Unsignalized Intersection Capacity Analysis

2: Pine Street & Pleasant Drive

01/30/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	178	462	15	64	382
Future Volume (Veh/h)	48	178	462	15	64	382
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	59	220	570	19	79	472
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	1210	580			589	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1210	580			589	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	57			92	
cM capacity (veh/h)	186	515			986	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	59	220	589	79	472	
Volume Left	59	0	0	79	0	
Volume Right	0	220	19	0	0	
cSH	186	515	1700	986	1700	
Volume to Capacity	0.32	0.43	0.35	0.08	0.28	
Queue Length 95th (m)	10.3	17.0	0.0	2.1	0.0	
Control Delay (s)	33.2	17.1	0.0	9.0	0.0	
Lane LOS	D	C			A	
Approach Delay (s)	20.5		0.0	1.3		
Approach LOS	C					
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

2: Pine Street & Pleasant Drive

01/30/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	41	113	425	83	191	510
Future Volume (Veh/h)	41	113	425	83	191	510
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	42	116	438	86	197	526
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	1401	481			524	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1401	481			524	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	80			81	
cM capacity (veh/h)	125	585			1043	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	42	116	524	197	526	
Volume Left	42	0	0	197	0	
Volume Right	0	116	86	0	0	
cSH	125	585	1700	1043	1700	
Volume to Capacity	0.34	0.20	0.31	0.19	0.31	
Queue Length 95th (m)	10.7	5.9	0.0	5.6	0.0	
Control Delay (s)	47.6	12.7	0.0	9.3	0.0	
Lane LOS	E	B		A		
Approach Delay (s)	22.0		0.0	2.5		
Approach LOS	C					
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			51.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

2: Pine Street & Pleasant Drive

01/26/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	129	462	15	46	382
Future Volume (Veh/h)	48	129	462	15	46	382
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	59	159	570	19	57	472
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	1166	580			589	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1166	580			589	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	69			94	
cM capacity (veh/h)	202	515			986	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	59	159	589	57	472	
Volume Left	59	0	0	57	0	
Volume Right	0	159	19	0	0	
cSH	202	515	1700	986	1700	
Volume to Capacity	0.29	0.31	0.35	0.06	0.28	
Queue Length 95th (m)	9.3	10.4	0.0	1.5	0.0	
Control Delay (s)	30.0	15.1	0.0	8.9	0.0	
Lane LOS	D	C		A		
Approach Delay (s)	19.1		0.0	1.0		
Approach LOS	C					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			41.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

01/30/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	15	124	7	24	37	179	403	13	19	294	50
Future Volume (vph)	25	15	124	7	24	37	179	403	13	19	294	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.96		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		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)	1514	1492		1695	1536		1646	1749		1719	1745	
Flt Permitted	0.71	1.00		0.65	1.00		0.47	1.00		0.41	1.00	
Satd. Flow (perm)	1138	1492		1164	1536		818	1749		737	1745	
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)	27	16	135	8	26	40	195	438	14	21	320	54
RTOR Reduction (vph)	0	87	0	0	26	0	0	1	0	0	6	0
Lane Group Flow (vph)	27	64	0	8	40	0	195	451	0	21	368	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	403	528		412	544		438	938		395	935	
v/s Ratio Prot		c0.04			0.03			c0.26			0.21	
v/s Ratio Perm	0.02			0.01			0.24			0.03		
v/c Ratio	0.07	0.12		0.02	0.07		0.45	0.48		0.05	0.39	
Uniform Delay, d1	23.5	23.9		23.1	23.5		15.5	15.9		12.2	15.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.1	0.3		3.3	1.8		0.3	1.2	
Delay (s)	23.8	24.4		23.2	23.8		18.8	17.7		12.4	16.2	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		24.3			23.7			18.0			16.0	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queuing and Blocking Report

Baseline

01/26/2017

Intersection: 2: Pine Street & Pleasant Drive

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (m)	23.7	21.7	9.3
Average Queue (m)	7.9	12.1	4.8
95th Queue (m)	18.5	19.3	12.3
Link Distance (m)	140.9		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	15.0	20.0	
Storage Blk Time (%)	3	3	
Queuing Penalty (veh)	4	1	

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	21.1	28.6	39.8	41.5	64.0	77.6	9.2	77.7
Average Queue (m)	4.8	13.6	3.8	10.4	28.3	44.8	3.0	38.4
95th Queue (m)	15.0	23.5	16.9	25.9	52.8	73.4	9.8	67.4
Link Distance (m)		812.7		394.0				379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)			0	0	4	8		14
Queuing Penalty (veh)			0	0	18	14		3

HCM Unsignalized Intersection Capacity Analysis
6: Pine Street & Pleasant Drive

C2 Future PM
01/26/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	41	81	425	83	143	510
Future Volume (Veh/h)	41	81	425	83	143	510
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	42	84	438	86	147	526
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	1301	481			524	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1301	481			524	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	86			86	
cM capacity (veh/h)	153	585			1043	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	42	84	524	147	526	
Volume Left	42	0	0	147	0	
Volume Right	0	84	86	0	0	
cSH	153	585	1700	1043	1700	
Volume to Capacity	0.28	0.14	0.31	0.14	0.31	
Queue Length 95th (m)	8.5	4.0	0.0	3.9	0.0	
Control Delay (s)	37.3	12.2	0.0	9.0	0.0	
Lane LOS	E	B		A		
Approach Delay (s)	20.6		0.0	2.0		
Approach LOS	C					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			48.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

01/30/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	37	297	25	36	45	138	314	20	50	372	35
Future Volume (vph)	37	37	297	25	36	45	138	314	20	50	372	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.96		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.92		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1515	1493		1710	1551		1649	1735		1717	1766	
Flt Permitted	0.70	1.00		0.38	1.00		0.42	1.00		0.48	1.00	
Satd. Flow (perm)	1116	1493		680	1551		721	1735		870	1766	
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)	40	40	323	27	39	49	150	341	22	54	404	38
RTOR Reduction (vph)	0	208	0	0	32	0	0	2	0	0	3	0
Lane Group Flow (vph)	40	155	0	27	56	0	150	361	0	54	439	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	395	529		241	549		386	930		466	947	
v/s Ratio Prot		c0.10			0.04			0.21			c0.25	
v/s Ratio Perm	0.04			0.04			0.21			0.06		
v/c Ratio	0.10	0.29		0.11	0.10		0.39	0.39		0.12	0.46	
Uniform Delay, d1	23.8	25.6		23.9	23.8		14.9	14.9		12.6	15.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.4		0.9	0.4		2.9	1.2		0.5	1.6	
Delay (s)	24.3	27.0		24.8	24.2		17.9	16.1		13.1	17.4	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		26.7			24.3			16.7			16.9	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queuing and Blocking Report
Baseline

01/26/2017

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.6	129.5	33.3	21.4	78.1	71.8	34.2	94.2
Average Queue (m)	7.6	42.3	9.3	10.8	25.6	34.5	8.3	46.8
95th Queue (m)	21.2	86.2	24.1	20.3	49.4	63.9	20.1	78.1
Link Distance (m)		812.7		394.0		390.0		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)	0	11			3	4	0	19
Queuing Penalty (veh)	0	4			9	6	1	10

Queuing and Blocking Report
Baseline

01/30/2017

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.8	67.7	27.3	28.4	47.9	85.6	28.1	82.7
Average Queue (m)	11.2	37.2	8.9	11.3	26.2	43.7	8.1	44.3
95th Queue (m)	31.6	65.1	19.2	26.2	47.4	74.0	19.3	68.9
Link Distance (m)		812.7		394.0		390.0		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)	0	9			2	9	0	18
Queuing Penalty (veh)	0	3			6	12	0	9

HCM Unsignalized Intersection Capacity Analysis

2: Pine Street & Pleasant Drive

C3 Future AM
01/26/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	56	462	15	18	382
Future Volume (Veh/h)	48	56	462	15	18	382
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	59	69	570	19	22	472
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	1096	580			589	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1096	580			589	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	87			98	
cM capacity (veh/h)	231	515			986	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	59	69	589	22	472	
Volume Left	59	0	0	22	0	
Volume Right	0	69	19	0	0	
cSH	231	515	1700	986	1700	
Volume to Capacity	0.26	0.13	0.35	0.02	0.28	
Queue Length 95th (m)	7.9	3.7	0.0	0.5	0.0	
Control Delay (s)	25.8	13.1	0.0	8.7	0.0	
Lane LOS	D	B		A		
Approach Delay (s)	19.0		0.0	0.4		
Approach LOS	C					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			35.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

01/30/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	25	114	7	52	84	151	356	13	37	276	50
Future Volume (vph)	25	25	114	7	52	84	151	356	13	37	276	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.91		1.00	0.99		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)	1517	1510		1695	1533		1646	1747		1718	1742	
Flt Permitted	0.66	1.00		0.65	1.00		0.49	1.00		0.45	1.00	
Satd. Flow (perm)	1049	1510		1164	1533		847	1747		812	1742	
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)	27	27	124	8	57	91	164	387	14	40	300	54
RTOR Reduction (vph)	0	80	0	0	52	0	0	1	0	0	6	0
Lane Group Flow (vph)	27	71	0	8	96	0	164	400	0	40	348	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	371	535		412	543		454	937		435	934	
v/s Ratio Prot		0.05			c0.06			c0.23			0.20	
v/s Ratio Perm	0.03			0.01			0.19			0.05		
v/c Ratio	0.07	0.13		0.02	0.18		0.36	0.43		0.09	0.37	
Uniform Delay, d1	23.5	24.0		23.1	24.4		14.7	15.3		12.4	14.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.5		0.1	0.7		2.2	1.4		0.4	1.1	
Delay (s)	23.9	24.6		23.2	25.1		16.9	16.7		12.9	15.9	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		24.5			25.0			16.8			15.6	
Approach LOS		C			C			B			B	

Intersection Summary		
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.33	B
Actuated Cycle Length (s)	110.0	Sum of lost time (s)
Intersection Capacity Utilization	72.0%	12.0
Analysis Period (min)	15	ICU Level of Service
		C

c Critical Lane Group

Intersection: 2: Pine Street & Pleasant Drive

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (m)	16.4	15.7	9.2
Average Queue (m)	9.2	7.2	1.5
95th Queue (m)	16.6	14.3	7.0
Link Distance (m)	129.4		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	15.0		20.0
Storage Blk Time (%)	4	1	
Queuing Penalty (veh)	2	0	

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	26.9	40.2	9.2	34.8	58.5	75.7	16.1	68.6
Average Queue (m)	8.5	15.5	0.3	18.0	27.6	41.5	7.9	32.6
95th Queue (m)	22.3	29.5	3.0	30.6	49.5	65.4	16.5	57.3
Link Distance (m)		812.7		394.1		337.4		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)		0		0	3	7		9
Queuing Penalty (veh)		0		0	10	11		3

HCM Unsignalized Intersection Capacity Analysis
6: Pine Street & Pleasant Drive

C3 Future PM
01/26/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	41	32	425	83	70	510
Future Volume (Veh/h)	41	32	425	83	70	510
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	42	33	438	86	72	526
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	1151	481			524	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1151	481			524	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	94			93	
cM capacity (veh/h)	204	585			1043	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	42	33	524	72	526	
Volume Left	42	0	0	72	0	
Volume Right	0	33	86	0	0	
cSH	204	585	1700	1043	1700	
Volume to Capacity	0.21	0.06	0.31	0.07	0.31	
Queue Length 95th (m)	6.0	1.4	0.0	1.8	0.0	
Control Delay (s)	27.2	11.5	0.0	8.7	0.0	
Lane LOS	D	B		A		
Approach Delay (s)	20.3		0.0	1.0		
Approach LOS	C					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			44.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

3: Pine Street & Northern Avenue East

01/30/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	64	270	25	54	76	120	283	20	96	326	35
Future Volume (vph)	37	64	270	25	54	76	120	283	20	96	326	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1517	1513		1710	1542		1647	1733		1716	1762	
Flt Permitted	0.67	1.00		0.38	1.00		0.46	1.00		0.51	1.00	
Satd. Flow (perm)	1062	1513		680	1542		792	1733		921	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)	40	70	293	27	59	83	130	308	22	104	354	38
RTOR Reduction (vph)	0	137	0	0	46	0	0	2	0	0	4	0
Lane Group Flow (vph)	40	226	0	27	96	0	130	328	0	104	388	0
Confl. Peds. (#/hr)	6		7	7		6	5		3	3		5
Heavy Vehicles (%)	12%	6%	1%	0%	5%	5%	4%	3%	11%	0%	1%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0		59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.54	0.54		0.54	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	376	536		241	546		424	929		493	945	
v/s Ratio Prot		c0.15			0.06			0.19			c0.22	
v/s Ratio Perm	0.04			0.04			0.16			0.11		
v/c Ratio	0.11	0.42		0.11	0.18		0.31	0.35		0.21	0.41	
Uniform Delay, d1	23.8	26.9		23.9	24.4		14.1	14.6		13.3	15.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.4		0.9	0.7		1.9	1.1		1.0	1.3	
Delay (s)	24.4	29.4		24.8	25.1		16.0	15.6		14.3	16.5	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		28.9			25.1			15.7			16.0	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queuing and Blocking Report
Baseline

01/26/2017

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.9	101.4	39.8	47.2	62.1	63.4	28.5	66.0
Average Queue (m)	12.5	40.4	8.5	17.4	21.4	32.1	12.0	35.7
95th Queue (m)	32.0	75.1	22.7	35.7	41.8	54.3	23.6	56.7
Link Distance (m)		812.7		394.0		405.1		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)	0	9	0	1	2	2	1	10
Queuing Penalty (veh)	0	3	0	0	7	3	2	9

Intersection: 3: Pine Street & Northern Avenue East

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	39.8	100.6	15.4	40.2	40.7	71.0	38.7	70.8
Average Queue (m)	9.5	36.6	4.8	14.9	19.9	30.3	15.3	37.2
95th Queue (m)	27.9	74.8	12.5	29.6	34.5	56.3	28.6	60.7
Link Distance (m)		812.7		394.1		337.4		379.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	40.0		40.0		42.0		30.0	
Storage Blk Time (%)	0	10		0	0	3	1	12
Queuing Penalty (veh)	0	4		0	1	4	4	12

Network Summary

Network wide Queuing Penalty: 25

APPENDIX 8
SEPTEMBER 26, 2017 PUBLIC INFORMATION CENTRE

Sept. 16, 2017 - Sault Star



CITY INFORMATION

The Corporation of the City of Sault Ste. Marie

Notice of Public Information Centre Municipal Class Environment Assessment

Northern Avenue Corridor Improvements

The City of Sault Ste. Marie (City) has initiated a Municipal Class Environmental Assessment to investigate alternatives to improve the efficiency of the Northern Avenue Corridor.

The Transportation Master Plan, completed for the City of Sault Ste. Marie in 2015, identified Northern Avenue as a candidate for potential improvements that may enhance road network connectivity while reducing traffic demands on nearby streets. In conjunction with the recommended improvements, the City also identified the opportunity to integrate improvements to the access/egress of the P-Patch subdivision.

The study is being undertaken as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment. The study will include public and external agency consultation as well as review the need and justification for possible improvements to the existing corridor. The study will also evaluate alternative designs based on their potential impacts on the natural, social and economic environments. Preceding any decisions recommending or accepting a preferred design, interested parties will have the opportunity to review the study findings and provide input and comments into the evaluation.

A Notice of Study Commencement, introducing the proposed project and inviting public input, was published in June of 2016. To present alternative solutions and offer the opportunity for the public to provide comments and suggestions, the City held the project's first Public Information Centre on June 22, 2016.

~Public Information Centre~

To present the recommended design, further facilitate input and ensure that anyone interested in this Study has the opportunity to get involved, the City is holding a Public Information Centre on:

Tuesday September 26, 2017 from 3:00 p.m. to 7:00 p.m.

Russ Ramsay Room, Third Floor, Civic Centre, 99 Foster Drive.

All members of the public are welcome to attend.

City staff and Consultants will be available to discuss the project.

Please contact one of the following project team members if you would like to be included on the project mailing list, have any questions or wish to obtain more information on the project:

City of Sault Ste. Marie
Attention: Don Elliott, P. Eng.
Director of Engineering
99 Foster Drive, Civic Centre
Sault Ste. Marie, ON
Tel: (705) 759-5329
d.elliott@cityssm.on.ca

Kresin Engineering Corporation
Attention: Michael Kresin, P. Eng.
Consulting Engineer
536 Fourth Line East
Sault Ste. Marie, ON
Tel: (705) 949-4900
northernave@kresinengineering.ca

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

This notice published on September 16 and 23, 2017.



CITY INFORMATION

The Corporation of the City of Sault Ste. Marie

Notice of Public Information Centre Municipal Class Environment Assessment

Northern Avenue Corridor Improvements

The City of Sault Ste. Marie (City) has initiated a Municipal Class Environmental Assessment to investigate alternatives to improve the efficiency of the Northern Avenue Corridor.

The Transportation Master Plan, completed for the City of Sault Ste. Marie in 2015, identified Northern Avenue as a candidate for potential improvements that may enhance road network connectivity while reducing traffic demands on nearby streets. In conjunction with the recommended improvements, the City also identified the opportunity to integrate improvements to the access/egress of the P-Patch subdivision.

The study is being undertaken as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment. The study will include public and external agency consultation as well as review the need and justification for possible improvements to the existing corridor. The study will also evaluate alternative designs based on their potential impacts on the natural, social and economic environments. Preceding any decisions recommending or accepting a preferred design, interested parties will have the opportunity to review the study findings and provide input and comments into the evaluation.

A Notice of Study Commencement, introducing the proposed project and inviting public input, was published in June of 2016. To present alternative solutions and offer the opportunity for the public to provide comments and suggestions, the City held the project's first Public Information Centre on June 22, 2016.

~Public Information Centre~

To present the recommended design, further facilitate input and ensure that anyone interested in this Study has the opportunity to get involved, the City is holding a Public Information Centre on:

Tuesday September 26, 2017 from 3:00 p.m. to 7:00 p.m.

Russ Ramsay Room, Third Floor, Civic Centre, 99 Foster Drive.

All members of the public are welcome to attend.

City staff and Consultants will be available to discuss the project.

Please contact one of the following project team members if you would like to be included on the project mailing list, have any questions or wish to obtain more information on the project:

City of Sault Ste. Marie
Attention: Don Elliott, P. Eng.
Director of Engineering
99 Foster Drive, Civic Centre
Sault Ste. Marie, ON
Tel: (705) 759-5329
d.elliott@cityssm.on.ca

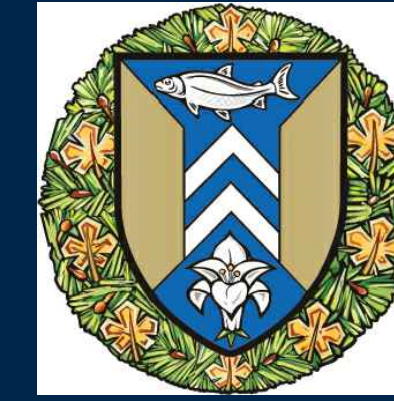
Kresin Engineering Corporation
Attention: Michael Kresin, P. Eng.
Consulting Engineer
536 Fourth Line East
Sault Ste. Marie, ON
Tel: (705) 949-4900
northernave@kresinengineering.ca

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

This notice published on September 16 and 23, 2017.

Appendix 8a
Information Presented

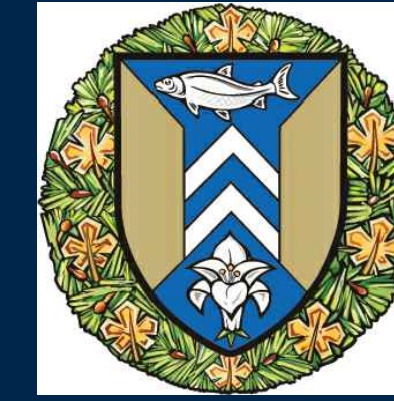
WHY IS THIS PROJECT BEING UNDERTAKEN?



City of
Sault Ste. Marie

- This study was initiated to investigate alternatives to improve the efficiency of the Northern Avenue corridor.
 - The opportunity for Northern Avenue to undergo a possible lane reassignment and/or elimination as well as a possible extension to Black Road was presented in the City of Sault Ste. Marie's Transportation Master Plan, completed in 2015.
- The City also identified the opportunity to possibly incorporate improvements to the access/egress of the P-Patch subdivision.
- Upon completion of the EA process, the City will have a preferred design which can be implemented as required and when funding is available.

OPPORTUNITY STATEMENT



City of
Sault Ste. Marie

Vehicular travel patterns throughout Sault Ste. Marie have shifted over the years as a result of development in the north end of the City. Improving the efficiency of the Northern Avenue corridor is one of the recommendations of the recently completed Transportation Master Plan meant to help accommodate this shift. Implementation of Active Transportation modes was also recommended in the Transportation Master Plan.

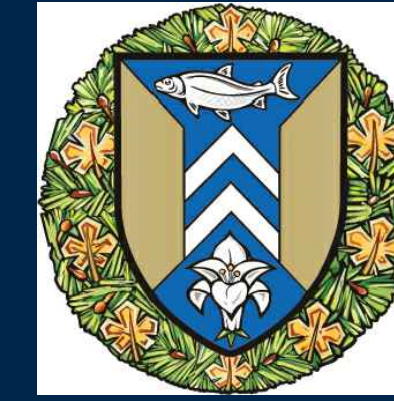
Potential improvements noted in the Transportation Master Plan include:

- Opportunity A: Lane reassignment or elimination along the Northern Avenue Corridor
- Opportunity B: Extension of Northern Avenue to Black Road

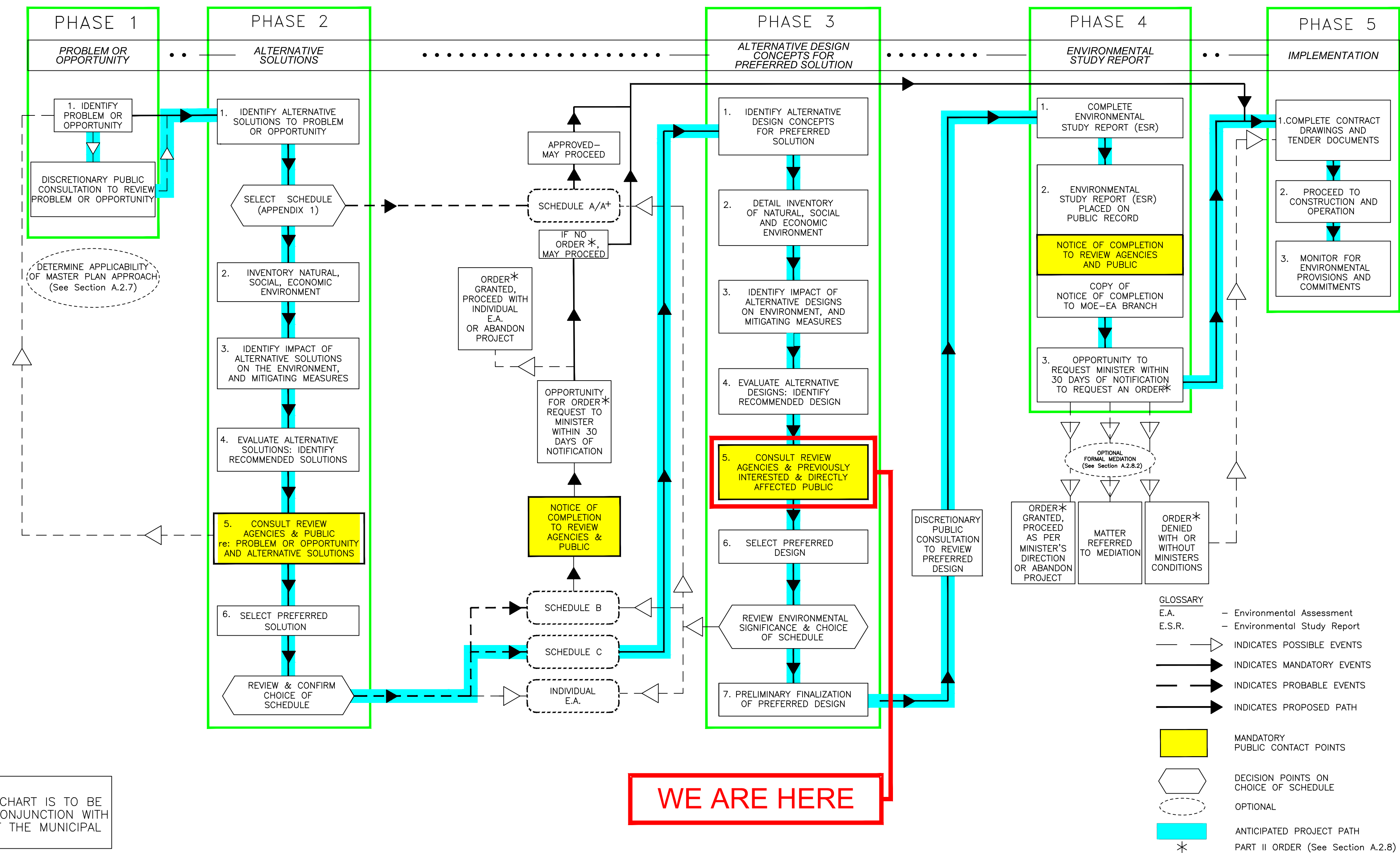
In conjunction with these possible improvements, the City has also identified:

- Opportunity C: Improvements to the access/egress of the P- Patch subdivision

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS



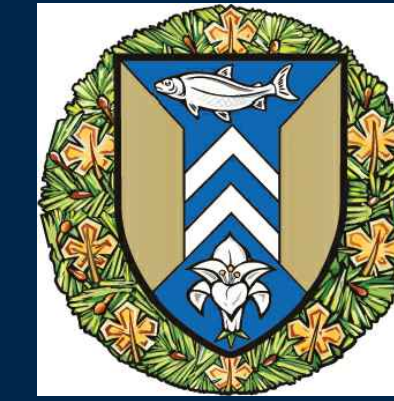
City of Sault Ste. Marie



NOTE:
THIS FLOWCHART IS TO BE READ IN CONJUNCTION WITH PART A OF THE MUNICIPAL CLASS EA.



RECOMMENDED DESIGN

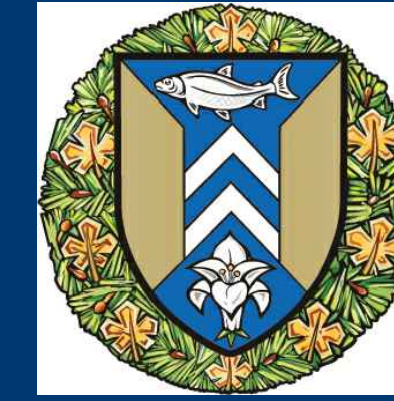


City of
Sault Ste. Marie

Based on the evaluation of the identified Alternative Solutions, the following recommended design is proposed.

- Implement lane reassignment along Northern Avenue between North Street and Pine Street, providing three lanes with a continuous turn lane;
- Designate bike lanes along the north and south sides of Northern Avenue;
- Maintain existing pedestrian sidewalks and boulevards along the corridor; and,
- Construct a new two-lane road from the existing east termination of Northern Avenue south to Princeton Drive to improve access/egress to the P-Patch subdivision.

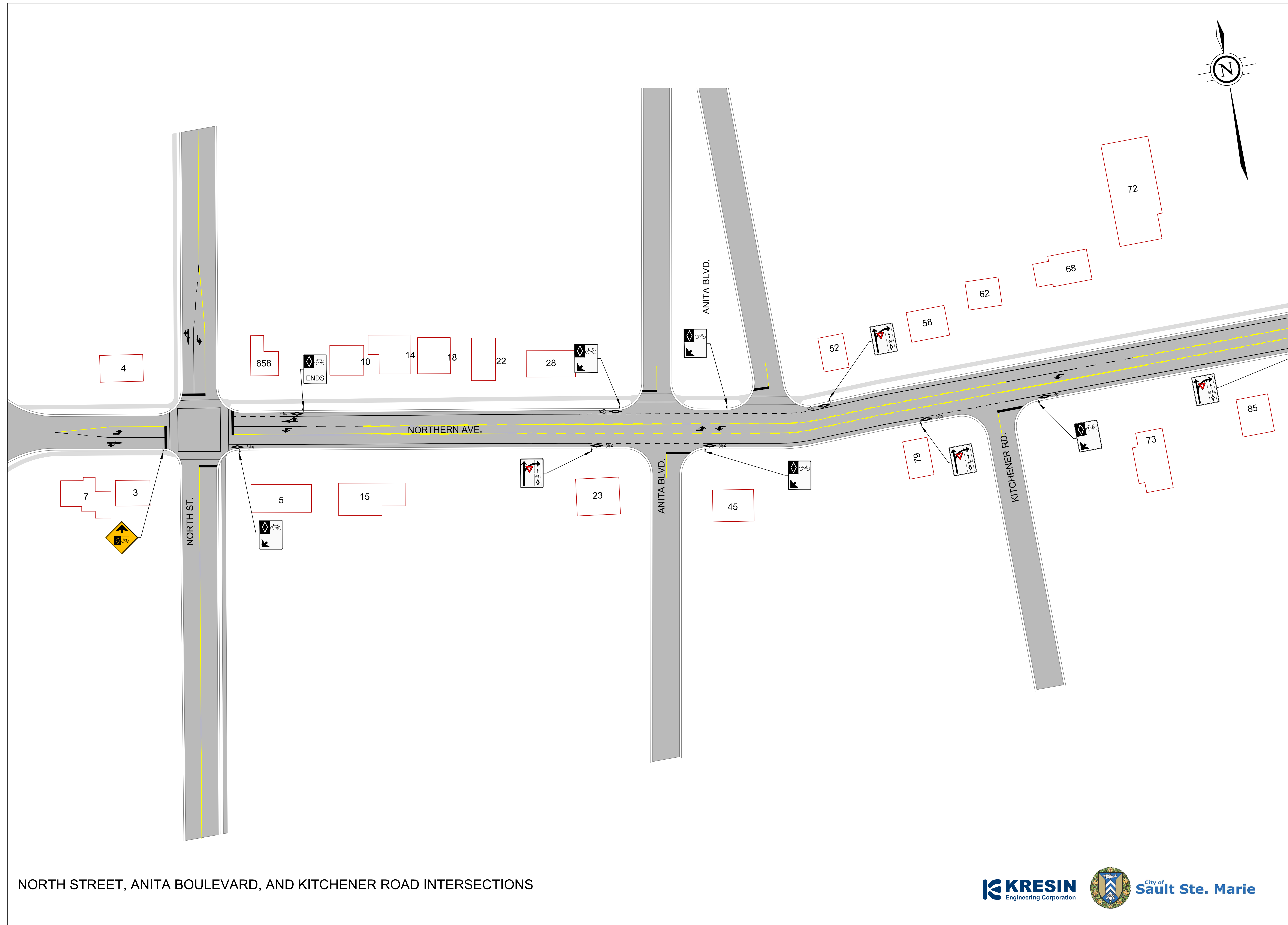
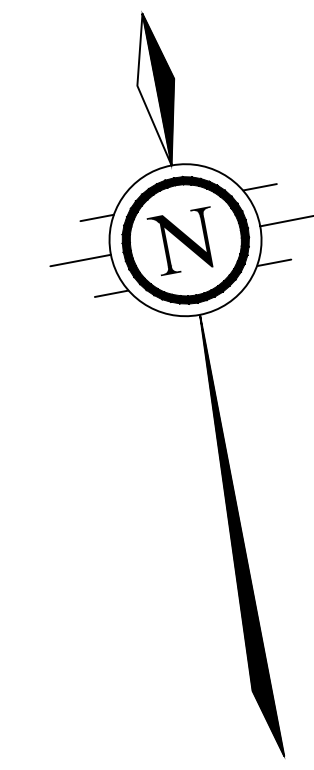
P-PATCH ACCESS



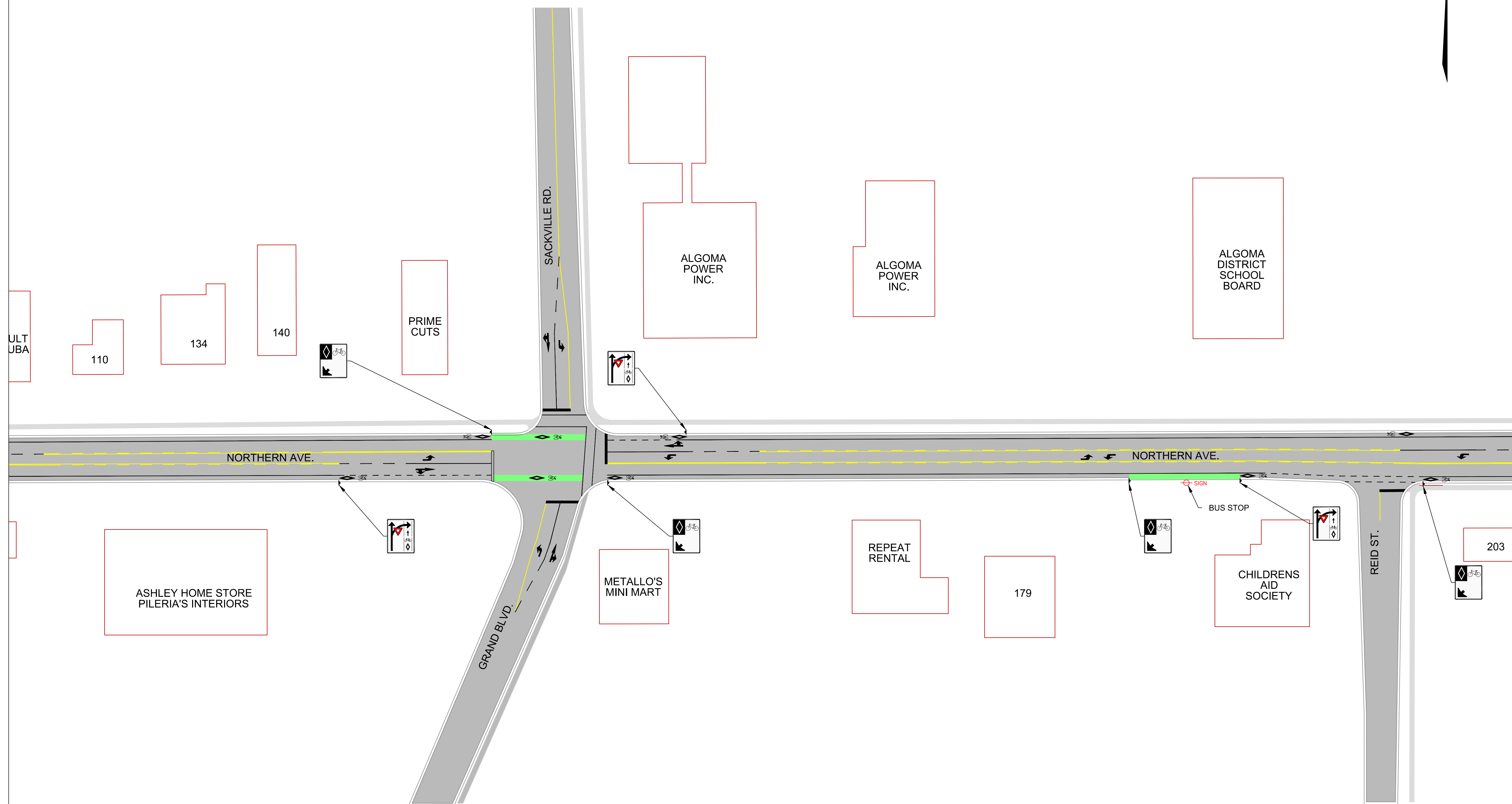
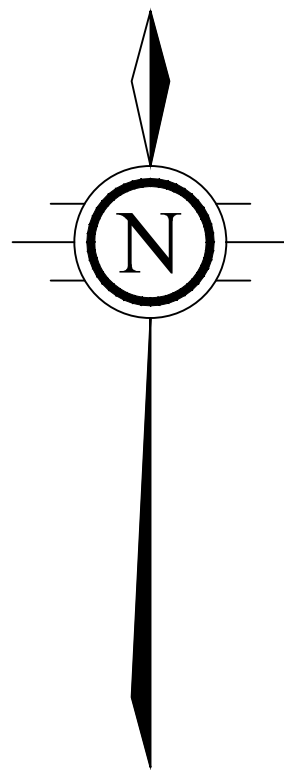
City of
Sault Ste. Marie

CIMA Canada Inc. completed a traffic assessment to further evaluate the identified proposed solutions from a traffic engineering perspective. The following conclusions were noted:

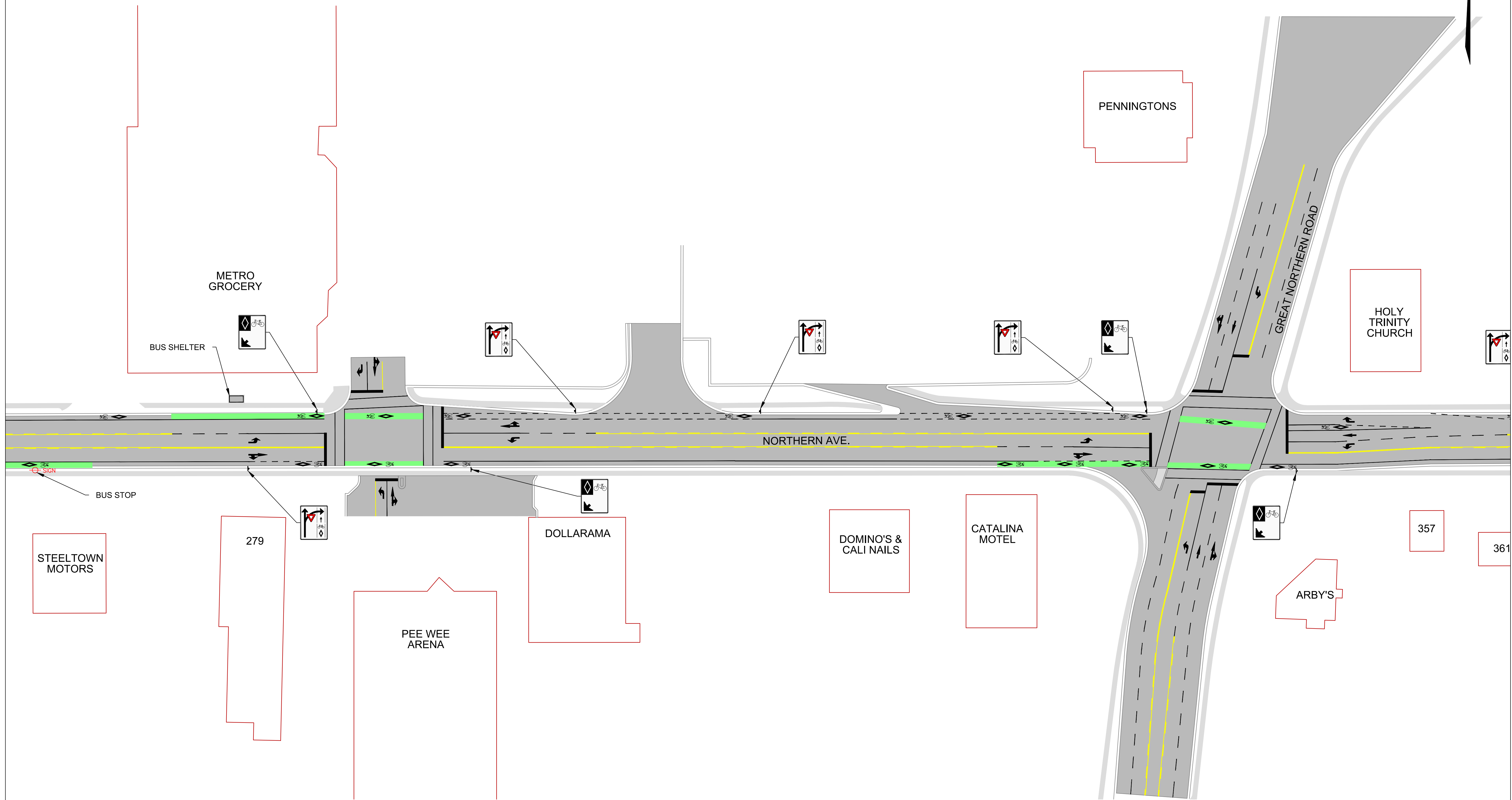
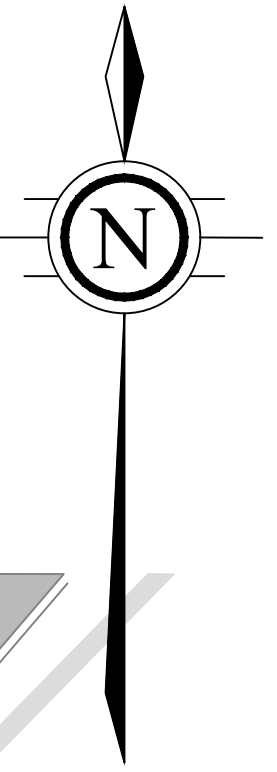
- Under the "do-nothing" option, the Pine Street/Pleasant and Northern Avenue/Pine Street intersections operate with acceptable volume to capacity ratios and levels of service for all approaches;
- The construction of a new access/egress from the east termination of Northern Avenue to Princeton Drive is expected to reduce the average delay for westbound traffic making left-turns at Pine Street and Pleasant Drive; and,
- A neutral impact on traffic operations at the Pine Street/Northern Avenue intersection is anticipated following the addition of a new road between the east termination of Northern Avenue and Princeton Drive.



NORTH STREET, ANITA BOULEVARD, AND KITCHENER ROAD INTERSECTIONS

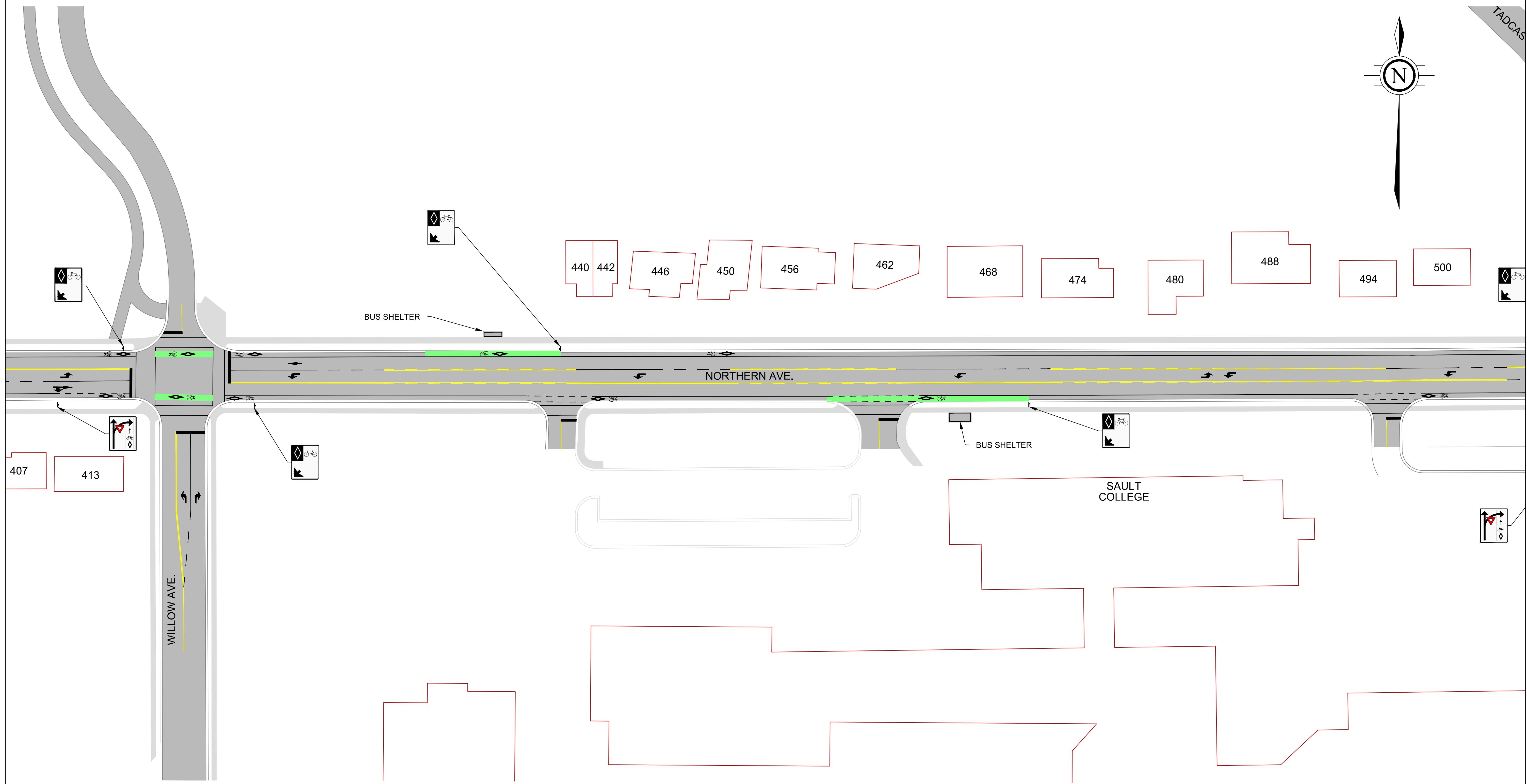
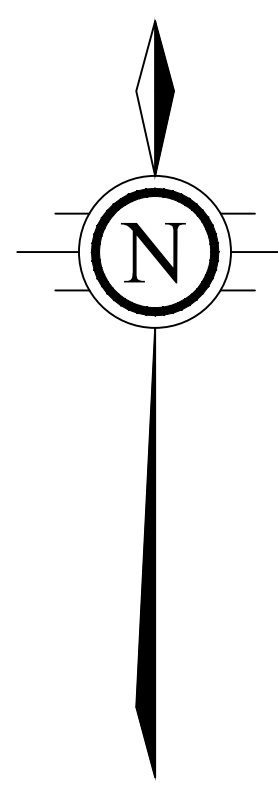


SACKVILLE ROAD, GRAND BOULEVARD AND REID STREET INTERSECTIONS

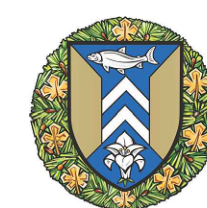


GREAT NORTHERN ROAD INTERSECTION

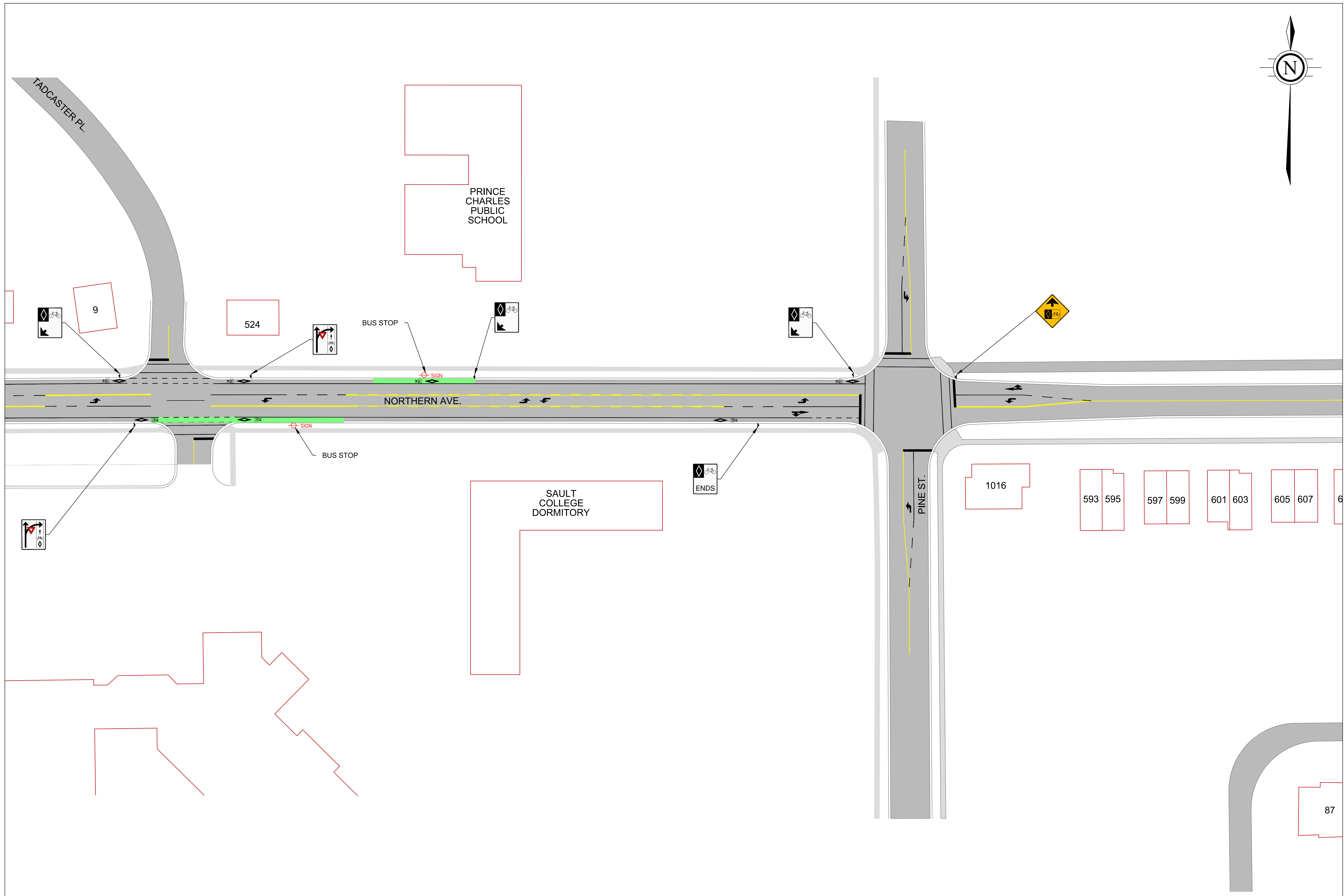
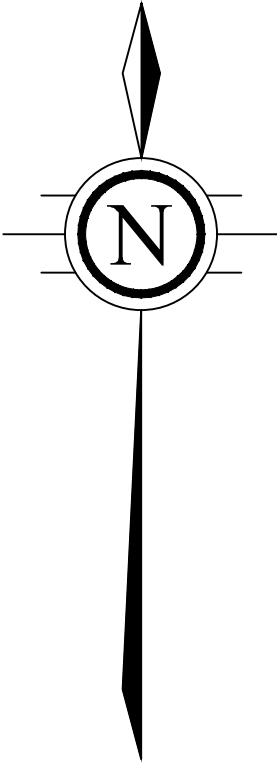
TADCAS



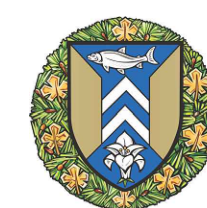
SAULT COLLEGE AND WILLOW AVENUE INTERSECTIONS



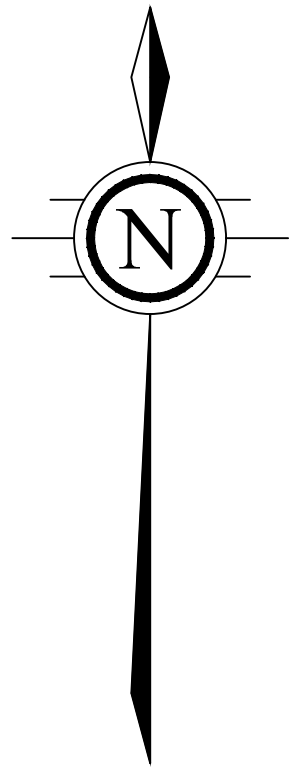
City of Sault Ste. Marie



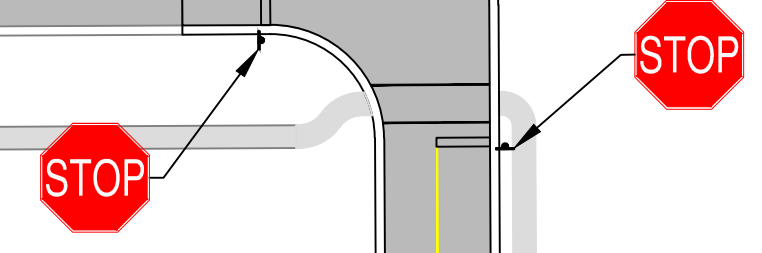
TADCASTER PLACE AND PINE STREET INTERSECTIONS



City of Sault Ste. Marie



NORTHERN AVE.



615 617 621 623 625 627 631 633 635 637 641 643 645 647 651 653 655 657

93 95 99 101 103 105 109 111 113 115 117 119 123 125 127 129 133 135



PANORAMIC DR.

94 96 100 102 104 106 112 114 116 118 120 122 124 126 128 130 134 136

145 149 153 157 161 165 169 179 177 181 185 189



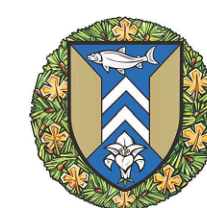
14 16 18 20 24 26 28 30 34 36 38 40 44 46 48 50 54 56

66 70 74 78 82 86 90 94 98



PRINCETON DR.

P-PATCH ACCESS - NEW ROAD



City of Sault Ste. Marie

Appendix 8b
Attendance List

Appendix 8c
Comments Received

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

The project as presented on September 26th, 2017 looks very encouraging if implemented.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) MR. PETE BULAS
Address #1-30 ALBERT ST. EAST
Phone No. _____
Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I LIKE THE ENTIRE DESIGN - PETER McGRATH

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) _____

Address _____

Phone No. _____

Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

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**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I am fully opposed to the R-Patch access road joining PRINCETON DRIVE to NORTHERN Ave.
As a property owner at the junction of this proposed jet on freeway prepared to fight this to its fullest extent the property values have already been lowered because of all the roadcuts to the west of this property and certainly be made worse by the addition of this road.
If I knew all of these events were to take place would have never purchased property and made all the improvements.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification

Name (print)

JOHN CODY & KAREN CAFFINI

Address

61 PRINCETON DRIVE

Phone No.

Email:

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
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Corporation of the City of Sault Ste. Marie

NORTHERN AVENUE IMPROVEMENTS



PUBLIC INFORMATION
CENTRE
COMMENT SHEET -(please print
clearly)

We have review the project material and have the following comments:

- Installing a traffic light at Pine St. And Pleasant would be the logical way to levitate the traffic problem at this intersection for these reasons:
 1. **Issue:** School crossing which is holding up traffic between the hours of 8:30 am to 9:00am 3:209pm to 4:00pm
Solution: Install a traffic light to assist the 2 crossing guards to allow traffic to stop from all three directions, which also allows the traffic to flow with controlled mechanism (traffic light).With the Pine St. Extension from Second Line vehicle traffic is moving at a high rate of speed as there are no intersections between Northern Ave. & McNabb St. That have neither traffic lights nor a 3or 4 way stop to slow the traffic down.
 2. **Issue:** There has been increase of traffic from the Pine St. Extension from Second Line which has been making it difficult to exit Pleasant when turning left onto Pine St.
Solution: Install traffic light to allow traffic exiting left from Pleasant onto Pine St.with a controlled mechanism (traffic light). There is no issue turning right onto Pine St, from Pleasant. There is not a problem neither turning left off of Pine St. onto Pleasant nor turning right off of Pine St. onto Pleasant.

Putting a road from Northern Avenue to Princeton does not make logical sense for these reasons:

- Opening road would cause increased traffic through a residential neighborhood
- Would increase excessive noise pollution, trash pollution & road dust. Especially in Spring.
- Excessive snow plowing pushing snow into properties and driveways adjacent to proposed roadway.
- Decreasing the value of the 8 properties adjacent to the proposed Northern Avenue to Princeton Road Extension.
- Turning what was purchased originally regular property lots next to a lane way to proposed corner lot properties.
- Increasing the risk of contact between vehicles to pedestrian traffic example: Panoramic Dr. without pedestrian sidewalks. Winter the road narrows approx. 6 feet. 3 feet per side of street.
- Would levitate the traffic from major arteries and increase to residential streets. Example: would divert traffic flow at McNabb and Lake and just be a short cut through the residential P-patch instead of keeping the traffic to major arteries.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

THIS PROJECT WILL NOT WORK!! THE REASON QUEEN ST WORKS IS IT IS PICKING UP RESIDENTIAL TRAFFIC AND THE HOSPITAL IS CLOSED THUS FREEING UP 2 ADDITIONAL LANES. NORTHERN AVE HAS HUGE COMMERCIAL TRAFFIC VOLUMES, TURNING LANES DO NOT WORK NOW & BY REDUCING THE # OF LANES IT WILL ONLY IMPEDE TRAFFIC. THE WORST TIMES ARE BETWEEN 11+ 1PM + 3-6PM. CRAZY TRAFFIC.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) TERRY ROBERTS

Address 1707 OLD GARDEN RIVER RD.

Phone No. _____

Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

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**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

I operate a business on Northern Ave and travel this road on a daily basis. I believe by decreasing one lane, traffic will be slower, especially at Northern Ave & second line. Wait times will be longer, which in turn cost money. Every day I have employees waiting for light changes. This costs money.

* Please reconsider extending Sackville to Third Line



Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Steve Roberts

Address 134 & 140 Northern Ave

Phone No. _____

Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

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**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

- As discussed with Michael Kresin:
- ① Potential for greatly increased traffic on Princeton due to new & efficient "cut through" in the P-Patch for Lake St. traffic wanting to go North.
 - ② Need to plow sidewalks on Princeton & new P-Patch road to N. Ave in winter due to increased traffic flow. This is a heavily walked area due to Habitat circuits used.
 - ③ If there are to be no traffic lights at Pleasant & Pine Sts, timing of lights at Pine/Pl. N. Ave & 2nd Ave/Pine to create "gap" for left turns from Pleasant onto Pine.

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Rich Greenwood
Address 184 Promenade
Phone No. _____
Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

**PUBLIC INFORMATION CENTRE
COMMENT SHEET - (PLEASE PRINT CLEARLY)**

I/We have reviewed the project material and have the following comments:

- SUPPORT THE EXTENSION OF WILSON AVE TO PENNINGTON
- SUPPORT THE WILSON AVE BIKE LANE SIDE
- WOULD LIKE TO SEE LIGHTS AS PER PLAN
- DO NOT SUPPORT WILSON AVE TO LAKE OR BEACH PARKS

Thank you for your comment(s). Please complete the following if you would like to be contacted for clarification.

Name (print) Michael Kresin
Address 185 Pennington
Phone No. _____
Email: _____

Yes No Please add me to consultation list for this project.

Please leave the completed form with the project team or deliver/email to:

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, Ontario P6A 6J8
Fax: 705-949-9965
Email: northernave@kresinengineering.ca
Attention: Mr. Michael Kresin, P.Eng.

Respondents should note that information collected for this study will be subject to the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in the study documentation prepared for public review.

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Wednesday, September 27, 2017 1:33 PM
To: 'Febbraro, Lucas'; Northern Avenue EA
Cc: Michael Kresin; Jennifer Sharpe; Carl Rumiel
Subject: RE: Northern Avenue Corridor

Hello Lucas: Thanks for your e-mail. Responses to your questions are embedded below:

Regards,
 Don Elliott

From: Febbraro, Lucas
Sent: Tuesday, September 26, 2017 10:32 AM
To: Don Elliott; 'northernave@kresinengineering.ca'
Subject: Northern Avenue Corridor
Importance: High

Good morning,

As a property owner on Northern Avenue I received notification by mail yesterday pertaining to today's meeting regarding the Northern Avenue corridor. Unfortunately, I am unable to attend but do have questions I hope you can answer. Please see below:

- Do you have a plan/map for the extension that you can share? [DE The presentation slides should be available at the following link. If they are not there, they will be shortly. www.saultstemarie.ca/NorthernAveEA]
- In what capacity will areas of access/ egress to the P-Patch subdivision be made? What streets will connect? [DE It is recommended that a new road be constructed from the east limit of Northern Avenue straight southerly to Princeton.]
- Who owns the property abutting both sides of this extension and are there further plans of development? [Most adjacent properties are already single family residences. The undeveloped portion on the east side near Northern Ave. is owned by the City.]
- What is the timeline for this project? [DE It is not scheduled for construction at this time. If the EA is finalized, the project is most likely to be recommended to Council for a capital program in or after 2020.]

Please provide response at your earliest convenience.

Thank you,
 Lucas

Jennifer Sharpe

From: Northern Avenue EA
Sent: Thursday, September 28, 2017 2:14 PM
To: 'Paul McDonald'
Subject: RE: Northern Ave. EA

Good afternoon Paul,

A roundabout was discussed as part of an Operations and Safety review completed for the intersection of Pine Street and Pleasant Drive and it was determined that a roundabout was not appropriate for this intersection.

Thank you for your comments.

Regards,
Jennifer

Jennifer Sharpe, B.Sc.
Environmental Scientist

Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 6J8

tel: 705-949-4900
Fax: 705-949-9965
jennifer@kresinengineering.ca

From: Paul McDonald
Sent: Monday, September 18, 2017 1:54 PM
To: Northern Avenue EA <NorthernAve@kresinengineering.ca>
Subject: Northern Ave. EA

Hi,

Can you tell me if a roundabout has been considered for the Pine St / Pleasant Ave intersection as a way of easing congestion and calming traffic?

I also just want to say that I am glad to see that the suggested plan is **not** to extend Northern Ave. eastward towards Black Road. This is one of the best parts of the hub trail and the feeling of being away from the city while using this stretch would be taken away with a roadway running next to or through it.

Thank you

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Monday, October 02, 2017 12:47 PM
To:
Cc: Michael Kresin; Northern Avenue EA
Subject: RE:

Thank you for your e-mail. If you have any specific questions, we would be glad to answer them.

Sincerely,
Don Elliott

From: N Garrow
Sent: Monday, October 02, 2017 3:07 AM
To: Don Elliott; northernave@kresinengineering.ca
Subject:

Good Morning,

I realize that asking for submissions is just a formality and that your minds are already made up. However, I am going to respond by suggesting that you cannot maintain the current roads yet you are seeking permission to build new ones.

Northern Avenue East is an example. It is in very rough shape from Pine Street to Great Northern Road and it is extremely bumpy from Great Northern Road to Reid Street.

Of course, you already know this.

Shame on you, in advance, for betraying the public's trust.

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Wednesday, October 11, 2017 9:01 AM
To: 'Robert Carricato'; Northern Avenue EA; Michael Kresin
Cc: Carl Rumiel
Subject: RE: Northern Avenue Realignment

Follow Up Flag: Follow up
Flag Status: Completed

Robert: Thank you for your input. Your comments will form part of the EA documents. Mike will ensure you are placed on the mailing list.

Regards,
Don Elliott

From: Robert Carricato
Sent: Friday, October 06, 2017 12:20 PM
To: Don Elliott; northernave@kresinengineering.ca
Subject: Northern Avenue Realignment

Don and Mike,

Please add me to your mail out list regarding the Northern Avenue realignment. I was not aware of this project has been ongoing since March.

I have lived on Plummer Court (off of Princeton Drive) for 28 years and have been speaking to our councillors many times over the years to put in a roadway from Princeton to Northern Avenue. It appears that it is finally getting some traction. If and when the road is constructed, a bicycle lane on this road or a trail along the side of the road to be used by both bicycles and walkers/runners would also be beneficial. There are a lot of walkers/runners and bicyclists presently using this path to access the hub trail. Please explain the reasoning of putting stop signs at Northern Avenue and the proposed new road. (opposite Mapleview) To me, stop signs here do not seem necessary.

With regards to the Northern Avenue, I am in agreement with the realignment as presented from Pine to North Streets. If and when Northern Avenue can be extended, either to Lake Street or Black Road, I am in agreement with this extension.

I am not in agreement with putting lights at Pleasant and Pine. Our city presently has too many lights. This light will be unnecessary if the above new road between and Princeton and Northern Avenue is constructed.

Thank you for reading my input. I look forward to hearing from you with the progress of this project.

Robert Carricato
12 Plummer Court

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Friday, October 13, 2017 3:48 PM
To: Michael Kresin; Jennifer Sharpe; Carl Rumiel
Subject: FW: P-Patch Access

Follow Up Flag: Follow up
Flag Status: Completed

For your info.

-----Original Message-----

From: Mark
Sent: Thursday, October 12, 2017 4:12 PM
To: Don Elliott
Cc: Matthew Shoemaker; Judy Hupponen
Subject: P-Patch Access

Hi Don,

Thanks for forwarding the documents, it was interesting reading. The one thing that stands out and completely defies logic and reason, if there "were no obvious problems found at this intersection." Why has the city been studying this issue for over twenty years?

What is going to be created by this proposal is that you are going to have the same "no obvious problem " at Pine and Pleasant and create an unnecessary secondary problem with traffic and safety issues in front of my home.

I believe there are better solutions available and better ways to spend taxpayer dollars.

Every neighbour I have spoken to is opposed to the construction of this two lane roadway and I have not even started my door to door campaign.

Again, thanks for the material and listening to my concerns. We will be in touch.

Mark Cady
61 Princeton Dr.

Sent from my iPad

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Monday, October 30, 2017 8:36 AM
To: 'Pat Sutherland'
Cc: Michael Kresin; Jennifer Sharpe; Carl Rumiel
Subject: RE: Panoramic and Princeton extension

Follow Up Flag: Follow up
Flag Status: Completed

Hi Pat: Thank you for your comments. By copy of this e-mail, I will have the consultant ensure you are included on the mailing list for the Environmental Assessment.

Regards,
Don Elliott

-----Original Message-----

From: Pat Sutherland
Sent: Monday, October 30, 2017 12:34 AM
To: Don Elliott
Subject: Panoramic and Princeton extension

Hi Don- we live on Princeton Dr and we are very interested in this proposal. We anticipate that it will bring a ton of traffic on our street which we aren't interested in having. A traffic light at the corner of Princess and Pine would be a cheaper alternative. A traffic light at this corner would also make it much safer for school related traffic- the school being ST Paul's school.

Please put me on your list for updates of this proposal. We are travelling right now and are unable to attend meetings. We will be back in the Sault in December.

Thank you.

Pat Sutherland

Sent from my iPad

Sent from my iPad

Jennifer Sharpe

From: Don Elliott <d.elliott@cityssm.on.ca>
Sent: Friday, November 03, 2017 8:00 AM
To: steve
Cc: Tom Vair; Lou Turco; Carl Rumiell; Michael Kresin; Jennifer Sharpe
Subject: RE: Northern Ave Lane Reduction

Dear Mr. Roberts: Thank you for your input – it is appreciated. I have copied your e-mail to our consultant for a more formal response. Also, your comments and our responses will be included in the Environmental Study Report (ESR). There is a traffic study that will form an appendix to the ESR that addresses several of your concerns. We are advised by our traffic specialist that a three lane configuration will operate at an acceptable level of service for the current and projected traffic volumes. Mike Kresin can provide you with a more detailed reply.

Thank you again for your e-mail.

Regards,
Don Elliott



Don Elliott, P. Eng.

Director of Engineering, Engineering Division
Public Works and Engineering Services
City of Sault Ste. Marie
t. 705.759.5329
d.elliott@cityssm.on.ca

99 Foster Drive, Sault Ste. Marie, ON P6A 5X6
saultstemarie.ca



From: Lou Turco
Sent: Thursday, November 02, 2017 9:09 PM
To: Don Elliott
Cc: Tom Vair; steve
Subject: FW: Northern Ave Lane Reduction

Hi Don,

Please see email from Mr. Roberts with his input on the proposed lane reduction for Northern Avenue East.

Lou T.

From: Steve Roberts
Sent: October 30, 2017 3:29 PM
To: Rick Niro; Lou Turco
Subject: Northern Ave Lane Reduction

Hi Rick and Lou,

I just wanted to touch base with you regarding the Northern Ave E proposed lane reduction. I am part owner of Permanent Electric, which is located at 134 Northern Ave. I also own the building next door as well at 140 Northern Ave. After attending the information session at city hall regarding the lane reduction and bike lane addition, I voiced my concerns and am not sure if they were heard. I have spoke with the majority of business owners on Northern Ave and every single one is opposed to the change. The traffic on Northern Ave has become increasingly busier over the past few years and I am afraid with the proposed change that it will make traffic even more congested. When I was at the information session I was told that they tried it on Queen St E with great success. There are a few things wrong here. Queen St. E does not have the traffic it used to have for a few reasons, the main reason being that the hospital is no longer there. This obviously has lead to far less commercial traffic and overall general traffic (hospital employees, patients etc). That area of town is mainly residential traffic, which can support a lane reduction and bike lane addition.

Northern Ave E is a completely different case. It consists of an abundance of commercial and residential traffic all day long. Removing a lane in each direction and adding a turning lane will not increase traffic flow, it will reduce it considerably. Furthermore, the amount of bike traffic I have witnessed on Northern Ave does not warrant two bike lanes. There are times that it will take 3 to 4 light changes to turn right on Great Northern Road. Trying to operate a business and having employees waiting that long of a time in traffic only costs money. Removing two lanes will only add to the already long traffic wait times. Also, I am wondering if the operation of the new school (formerly Alexander Henry), has been taken into account in the city's study. It will be opening in the fall of 2018. There will be a lot of additional traffic and buses that will be turning right in the school. I believe this could also be a safety issue with the bike lane in place. After speaking with other business owners, we are of the general mindset that all 4 lanes should remain and an additional turning lane put in, much like Second line or Great Northern Road. If you would like to talk about this further, please feel free to contact me at anytime.

--

Steve Roberts, BA, BEd, ELEC

Owner/Operator

Permanent Electric
140 Northern Avenue East, Unit B
Sault Ste. Marie, On
P6B 4H4

Jennifer Sharpe

From: Michael Kresin
Sent: Wednesday, November 08, 2017 1:29 PM
To: Jennifer Sharpe
Subject: FW: Northern Avenue EA comments
Attachments: september 26, 2017 PIC comments.pdf

FYI

From: Robert Rattle [
Sent: Wednesday, November 08, 2017 1:19 PM
To: Northern Avenue EA <NorthernAve@kresinengineering.ca>
Cc: Don Elliott <d.elliott@cityssm.on.ca>; Michael Kresin <Mike@kresinengineering.ca>
Subject: Northern Avenue EA comments

Thank you for the information at the latest Northern Avenue PIC September 26, 2017. Apologies in advance for the criticisms, but I believe that the preferred alternative neglects many opportunities that could provide for a much healthier and sustainable outcome for the corridor and community in general.

Attached is a summary of some of these issues with a few suggestions to build upon for a healthy and sustainable design. Would be happy to discuss further how these suggestions could be incorporated and built upon, and how any proposed project results could be monitored moving forward.

As one final question, were roundabouts considered for any of the intersections within the study area (other than Pine/Pleasant which I recall was discussed at the PIC)? eg. Pine/Northern. Northern/GNR.

Robert

When planning, designing and building mobility infrastructure ask yourself this: will it work as well for a six year old girl on a bicycle in the summer as it will for a 90 year old pedestrian in winter? If the answer is no, then head back to the drawing board to reconsider the plan. Our age friendly policy requires this as a minimum.

We need a new roadmap that puts people first.

Northern Avenue PIC Comments

Ultimately, there are simply too many health, safety, sustainability and environmental concerns to fully include in my comments, and the proposed alternative conflicts with the Transportation Master Plan (TMP) recommendations 15, 16, 17, 18, 19, 24, and the new access point to the P-Patch is not included in the TMP. I would be happy to discuss these and additional health, safety and environmental concerns in more detail, but would prefer a complete re-work of the EA including a redefining of the problem/opportunity statement which is one source of the many deficiencies identified below.

Overall, I would strongly encourage consideration of an alternative proposal which incorporates the design of an intersection at Pine and Northern that prohibits north- or south-bound through traffic, with the exception of emergency vehicles, transit and cyclists, while building upon the following suggestions for Northern Avenue, no additional access point for the P-Patch, and expanded public transit throughout the corridor.

Primary issues:

1. The proposal for a new access point to the P-Patch will result in, as evidenced by Pine Street extension of a decade ago, additional traffic problems. As you are aware, this is known as latent demand. This has been an accepted fact for decades in traffic planning, and was identified as an issue in the Pine Street extension EA of a decade ago. A new access point will place the municipality in a similarly untenable position of needing to alleviate traffic issues as a direct result of this proposal in another few years, at an enormous cost in relation to real solutions, some considered and many more which were not considered in this EA, and at an unacceptable risk to non-vehicle road users, local pollution and climate change, property taxes and health; and
2. Safety, environmental, sustainability, and health concerns were virtually omitted from the vast toolbox of evaluation considerations and alternative options within the entire corridor. This will place at risk both drivers and non-vehicle occupants by creating substantial inequities, promoting aggressive driving, contributing to local pollution and climate change, causing community disruptions (such as has been produced on Pine Street), and raising costs to all users, citizens of Sault Ste. Marie, and the municipality (resulting in a misallocation of municipal revenue streams now and in the future).

1. Northern Avenue:

Main Points:

- ▶ three lane configuration (unobstructed centre turn lane) is dangerous and promotes aggressive driving - enforcement has proven inadequate; proper engineering design is required to resolve this risk
- ▶ essential pedestrian infrastructure is missing
- ▶ no consideration of traffic calming measures
- ▶ grade separated cycling infrastructure required
- ▶ additional corridor greening needed
- ▶ speed reductions in key sections and throughout corridor are required and should be engineered in design rather than left to enforcement measures

A two lane configuration over a three lane configuration would adequately accommodate current travel

demand and removes the safety risks inherent in unobstructed three lane configuration. The three lane with centre turn lane road cross section configuration in SSMarie has proven dangerous due to historical road design that has created a sense of entitlement and aggressiveness. The centre lane of the three lane configuration is too often used for through travel, merging and passing. Police and law enforcement have been unable to prevent these actions. Not only are these increasingly frequent actions illegal and dangerous, creating conflicts with oncoming traffic and turning vehicles while generating a local social norm, they are important factors contributing to the production of aggressive driving and promotion of single occupant vehicle use at the expense of active transportation. While in some cases it provides a dangerous opportunity for drivers to yield additional space to cyclists, a better configuration for this purpose would be to eliminate the centre turn lane and use the additional space to create a grade separated cycle lane on each side of the road, or a single bi-directional grade separated cycling path on (preferably the north) side of Northern Avenue. A two lane configuration with left turn lanes, if used, would prove a better alternative if they were only provided at high volume turning points. A landscaped central boulevard and pedestrian refuge could be constructed from additional freed space in the road cross section. Suggest a centrally greened boulevard two lane configuration with left turn lanes at high volume turning points and a grade separated multi-use pathway(s).

An added benefit of a central boulevard, in addition to storm water retention, aggressive driving discouragement, promoting the reduction in usage of single occupant vehicles and greening, would be a pedestrian refuge/crossing accommodation. To complement this infrastructure, several pedestrian crossings are very much needed along Northern Avenue on both sides of GNR. For example, a half signal at the north Sault College parking lot, one near the Essar Hall, and one across from Prince Charles school would help reduce dangerous crossings and improve pedestrian safety while encouraging active mobility and not compromising mode choice. Similarly, on the west of GNR (see below) numerous locations for pedestrian cross overs are needed. These appeared to be absent from the designs at the PIC. Co-locating pedestrian crossings at bus stops (and other key high pedestrian zones) would facilitate safe crossing zones for public transit riders and help encourage modal shifts without penalising those choices. These could be enhanced with a raised-to-sidewalk-level crossing to remind drivers of the crossing zone, better accommodate accessibility (in accordance with the municipal accessibility plan and provincial legislation) and serve as additional traffic calming measures.

A pedestrian cross walk on the west side of Willow at Northern Avenue is also needed along with a raised intersection at that intersection. Eliminate the need to trigger for all pedestrian cross walks is essential (ie. remove push button so all cross walks always signal for pedestrians at signal timing) and install countdown timers during all new construction. [Also recommend the city begin a program to switch all old pedestrian signals to those that provide countdown timers and automatic function, with no need to press button.] All pedestrian crossings should be grade level for the pedestrian (ie. raised intersection/cross walk) as this accommodates mobility needs, increases safety, reminds drivers they have entered a pedestrian crossing zone, meets the city's Age Friendly Policies, and "[a]ctively promotes the reduction in usage of single occupant vehicles", and promotes "active transportation and transit usage."

Traffic calming measures throughout is also absent in the proposed alternative. There is sufficient latitude for speed humps (in addition to raised crosswalks), chicanes, vertical greenery and a grade separated non-motorised trail.

Engineering measures (including traffic calming) that create a 30 kph speed limit are needed along this entire corridor (the risk of serious injury at 30 kph in a pedestrian-vehicle collision is 10%; this rises to 90% at 50 kph). Given the pedestrian traffic volumes, ages, and nearby commercial, residential and institutional land uses, 30 kph would be more than adequate speed maximum. This should be engineered

into the planning and design processes.

The preferred alternative - especially west of GNR - completely fails to recognise and operationalise the Transportation Master Plans' recommendation 24: "Build complete streets and consider 'road diets' to meet the needs of all modes." Given the mixed use developments - including schools, low income housing, and municipal, commercial and institutional - along Northern Avenue west of GNR, this is an inexcusable oversight. One would have expected a two lane configuration street cross section that narrows lane widths with speeds engineered to max 30 that includes ample pedestrian zones and cross overs at a human scale, permits on street parking, includes wide setbacks for sidewalks, provides for substantial greenery and landscaping, benches, and parkades, and a grade separated non-motorised trail. Numerous other design features could readily be envisioned that accommodate the TMP and are manageable within the available cross section widths. There did not appear to be any consideration of modes outside of single occupant vehicles, let alone a fair design 'that meets the needs of all modes.'

A residential/institutional zone crossing marker (pillars with an arched entrance for example) for Northern Ave. stretch east of GNR should be incorporated into the design as a further visual reminder to drivers of the need for alertness in the area as they enter from Pine or GNR. Similar entrances would establish the commercial/institutional/residential areas to the west of GNR. These will be and should be designed as areas people go to; not as areas for (single occupant) vehicles to drive through.

2. Pine Street:

Main Points:

- ▶ pedestrian and cycling infrastructure has been completely ignored, despite high cyclist and pedestrian traffic
- ▶ pedestrian and cycling infrastructure can help mitigate access/egress problems to Pleasant Avenue
- ▶ traffic calming measures were neglected
- ▶ speed reductions must be engineered into design
- ▶ control measures at St. Paul school are required

Features along Pine are very much needed to improve safety and access for pedestrians and cyclists. Suggest at least two pedestrian cross walks or half signals between Northern Ave and Pleasant (including one at the pathway from Sault College into the P-Patch - motion triggered lighting along pathway is also required as part of this proposal) as well as an automatic pedestrian signal at Northern Avenue (ie. not requiring a push button) along with a raised intersection and a stop light at the Pleasant intersection/St. Paul school with a similar pedestrian prioritization cross-section configuration as identified above. While dedicated for pedestrian traffic, controlled crossing along with promotion of active transport modes would also serve to resolve P-Patch access/egress issues and help alleviate driver frustrations at intersection. St. Paul elementary school traffic and pedestrians/cyclists would also be better accommodated, helping encourage greater compatibility with and acceptance of the numerous healthy children initiatives the city is currently involved in, as well would include consideration of the city's age friendly policies, and help "[a]ctively promote the reduction in usage of single occupant vehicles, and active transportation and transit usage." Traffic calming along Pleasant also would be warranted (does Pleasant even have a sidewalk!?). Similarly as above, pedestrian zone crossings should be raised to sidewalk level to reduce mobility barriers and calm traffic. Traffic calming measures including a central median landscaped is also needed along Pine as well as adequate setbacks for sidewalks and grade separated cycling paths in this stretch. Road and lane widths should be narrowed, with on street parking and grade separated non-motorised trail on both sides. A 30 kph max speed limit should be engineered given the high pedestrian, residential and school uses of this street.

3. New Access Point:

Main Points:

- ▶ new access point to P-Patch has not been justified, is unwarranted, and will produce additional traffic volume
- ▶ additional traffic volumes will increase health impacts, safety risks and municipal costs
- ▶ insufficient consideration of 'alternatives to' this proposal (eg. pedestrian, cycling and public transit; demand management)

Traffic volumes do not support a traffic light for vehicles at Pleasant, so the justification of cost - capital and maintenance, along with environmental and health - makes a new access point absolutely unwarranted and unjustified, dangerous and needlessly costly. Traffic calming measures plus a pedestrian signalisation at Pleasant/St. Paul school would improve access to P-Patch. A four way stop might also be adequate for all purposes at Pleasant at a greatly reduced environmental, capital and long term cost. This configuration already exists along Willow, why not on Pine? If traffic volumes do not warrant lights at Pleasant, they certainly do not warrant a new access road. If safety concerns at Pleasant do not warrant a signal, they certainly do not warrant a new road. Historically, the city has refused pedestrian crossing lights when traffic volumes fail to warrant the lights. In such cases, no other actions have been taken to accommodate pedestrians. In this case, why does the city exhibit a double standard that encourages less healthy modes of travel in order to accommodate and encourage greater vehicular usage traffic? Is this not contrary to the existing TMP? A new access point will permanently and dramatically alter the community character and nature of Northern Avenue east of Pine Street, affecting hub trail users, college students, LTC facilities, property values, and residents. Further, why does the preferred alternative fail to accommodate pedestrians? This is a very high pedestrian zone where many college students cross Pine daily, residents walk and citizens use. They deserve equitable infrastructure. Failure to do so is a failure not only of the Age Friendly Policy, and fundamental social equity issues, it is a failure to accommodate the existing Transportation Master Plan which recommends to "[a]ctively promote the reduction in usage of single occupant vehicles, and active transportation and public transit."

4. Travel Demand:

Main Points:

- ▶ proposed alternative does not consider travel demand
- ▶ travel demand increases are by definition cause of increased traffic on Pine Street
- ▶ increased traffic on Pine street is a direct and primary result of Pine Street extension
- ▶ additional efficiency measures of vehicular traffic and new vehicular infrastructure will result in additional travel demand
- ▶ additional travel demand will generate new traffic conflicts
- ▶ future problems will be created as a direct result of new road access to P-Patch in an identical manner to Pine Street extension, requiring future costs and municipal expenses, and adverse environmental and health impacts

The traffic volumes on Pine, the cause of increased conflicts and delays at Pleasant, are a direct and primary result of opening up Pine Street to Second Line. This is a classic case of latent demand coupled with poor planning (eg. SAH, new high school, northern residential developments siting process and OP amendments) that were directly responsible for increased traffic volumes on Pine Street. This was predicted by several Part II Order petitioners over a decade ago when the Pine Street proposal was made. Building a new access road will result in exactly the same outcomes - an increase in traffic volumes - and the city will be placed in the untenable position of raising taxes again to manage increased vehicular travel demand while functionally compromising active, equitable and sustainable travel choices.

How does a new access road assist the residents of Pine Street who will not benefit from any traffic control at their driveways? Unlike P-Patch residents, residents along Pine Street will not have the advantage of an additional access point to their driveways in order to access Pine Street. As traffic volumes increase along Pine, access and egress to driveways will become increasingly difficult. This will be the direct result of a new access road, failure to deter traffic volumes/demand on Pine, neglect of other measures not considered in the alternative to this proposal (eg. public transit), and a failure to “[a]ctively promote the reduction in usage of single occupant vehicles” through this EA. As traffic volumes increase due to the latent demand imparted by a new access road, existing residents, and pedestrians and cyclists will increasingly conflict with vehicular traffic along Pine Street. Coupled with the safety risks that accompany increasing traffic volumes are additional aggressive driving practices, air pollution, noise and crime in the area. The decreased property values will be a serious health impact to the already dropping values along Pine Street.

Jennifer Sharpe

From: Castle Realty
Sent: Thursday, November 09, 2017 2:46 PM
To: d.elliott@cityssm.on.ca
Cc: Northern Avenue EA
Subject: Northern Avenue Corridor Improvements

Follow Up Flag: Follow up
Flag Status: Completed

November 9, 2017

Don Elliott, P. Eng.
Director of Engineering Services
99 Foster Drive, Civic Centre
Sault Ste. Marie, ON
d.elliott@cityssm.on.ca

Michael Kresin P.Eng.
Consulting Engineer
536 Fourth Line East
Sault Ste. Marie, ON
northernave@kresinengineering.ca

Dear Sir:

Re: Schedule C Project
Municipal Class Environmental Assessment
Northern Avenue Corridor

I am writing on behalf of my mother, Jean Kehoe who has lived on Northern Avenue since the early 1960s.

Needless to say, there have been many changes on the street, when I lived there, it was a dirt road and my late father parked on the street!

I'm sure there have been numerous traffic studies completed with the results being that there is more and more traffic on Northern Avenue.

Speaking as a person who travels on Northern Avenue a minimum of 3 times a day and who has to pull into a driveway located between Great Northern Road and Willow Avenue, at times I feel that I am in Toronto. In the mornings when Sault College staff and students are arriving, the lineup is sometimes down to Great Northern Road, making it nearly impossible to pull in the driveway heading west on Northern Avenue. Lunch hour is not much better as well as 5:00 pm area and also 7:00 pm area.

Since Pine Street was opened up as a thorough fare to Second Line, the traffic has gotten worse instead of better.

Now the City wants to open up an access/egress from the P-Patch subdivision which in my opinion would at least double the traffic along Northern Avenue.

There was talk of extending Willow Avenue through to Old Garden River Road which would have eased the traffic between Great Northern and Willow immensely making it easier for all the residents to enter and exit their driveways in a safer environment than which is the case now. There are apartments on the north side of Northern Avenue as well as townhouses which also add to the traffic and I'm sure they find it just as challenging.

Just wanted to express my thoughts on this subject for what it is worth and try and give you a human perspective instead of just a numbers perspective. My mother is 89 years old and does drive occasionally and would hate for her to give up driving entirely based on the fact that she can't exit her driveway safely. I back her car in her driveway for her so she can just drive out instead of having to back out on to Northern Avenue.

Thank you for your time.

Sandra Ramsay

I am using the Free version of [SPAMfighter](#).
SPAMfighter has removed 14926 of my spam emails to date.

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APPENDIX 9
SUMMARY OF QUESTIONS AND CONCERNS

Summary of Public Questions and Concerns Northern Avenue Corridor Improvements

The following is a summary of questions and concerns received during the course of the study, along with the applicable responses.

No.	CONCERN	RESPONSE
1	Regarding the proposed improvements at the former Alexander Henry High School site (232 Northern Avenue), concerns about integrating the proposed new elementary school.	New or reconfigured entrances can be reviewed by Traffic and Engineering staff under the development plans for the school. Renovations to the school may precede the implementation of Northern Avenue corridor improvements.
2	Would like to have some more consideration given to Northern Avenue being extended to Lake Street as some are already using the P-Patch as a by-pass.	Available information indicates that if Northern Avenue is connected to Lake Street, increased negative impacts are anticipated due to: increased vehicular traffic diverted from the existing arterial McNabb and Pine Streets; as well as disturbance to greenspace/existing trail facilities
3	If traffic counts don't warrant traffic signal at Pine/Pleasant than how do the counts justify creating a new access point into the P-Patch?	The additional road connection into the P-Patch has been developed to address resident concerns about perceived traffic congestion at the Pine Street/Pleasant Drive intersection.
4	Can mid-block pedestrian crossovers be installed along Northern Avenue?	The City is entertaining the possibility of implementing mid-block crossovers. Suitability will be confirmed during the detailed design phase.
5	Were roundabouts considered for any of the intersections within the Study Area?	Roundabouts were considered at various locations however they were found to be impractical to address the identified problems/opportunities.
6	Has an alternative proposal been made that incorporates the design of an intersection at Pine Street and Northern Avenue that prohibits north or south-bound through traffic (with the exception of emergency vehicles, transit and cyclists)?	Pine Street is an arterial route. Limiting through traffic at this intersection is not recommended.
7	A new access point to the P-Patch will result in	A traffic review completed for the Study Area

No.	CONCERN	RESPONSE
	additional traffic problems.	anticipates that a new access road into the P-Patch will have an overall neutral impact on the traffic operations.
8	A two-lane configuration would adequately accommodate current travel demands and allow for the additional space to be used to create a grade separated cycle lane, bi-directional path or a greened boulevard between the two lanes.	Traffic movement on a two-lane configuration would be frustrated due to the number and frequency of property access points. A continuous centre turn lane is recommended to maintain acceptable traffic flow.
9	Traffic calming measures (e.g. speed bumps, raised crosswalks, four-ways stop, etc.) should be considered along Northern Avenue.	The implementation of road diets similar to that proposed for Northern Avenue have been proven to result in a calming effect on traffic.
10	How will a new access into the P-Patch alleviate the egress issue for people heading downtown?	New access into the P-Patch is expected to reduce volumes at the Pine Street/Pleasant Drive intersection, shifting part of the volumes to the signalized Northern Avenue/Pine Street intersection.
11	A new access road into the P-Patch will result in negative impacts to adjacent properties.	Negative impacts will be mitigated through the use of traffic calming (stop signs) on the new road.
12	A lane reduction will bottleneck traffic and limit access to businesses along the corridor during construction.	Impacts during construction will be mitigated through the implementation of established best practices. The proposed road diet is a non-structural modification using line painting.
13	Will good access and safety be maintained at the Extencicare Maple View Long Term Care for emergency vehicles as well as those visiting the facility?	Access to the Maple View LTC facility will be maintained.
14	Concerned that a lane reduction along Northern Avenue will decrease the flow of traffic along the corridor and increase wait times at intersections.	The traffic study completed indicates that an acceptable level of service will be provided.
15	Concerned that an extension of Northern Avenue could lead to an increase in traffic along the side roads at the west end of the Study Area.	The recommendation is not to extend Northern Avenue.

No.	CONCERN	RESPONSE
16	The existing traffic signals at Northern Avenue and Willow Road do not have north-facing signal heads, causing confusion for Hub Trail users.	Modifications to the signals are recommended.
17	Consideration should be given to keeping Northern Avenue as narrow as possible to slow down traffic and make more room for bike lanes.	Lane widths will be finalized in the detailed design; however recommendations presented in the CIMA traffic study will be relied upon.
18	Bike boxes should be incorporated at the intersections identified in the TMP as cycling routes to improve safety for left turning cyclists.	Bicycle treatments at intersections will be addressed during detailed design.
19	It is possible that an extension of Northern Avenue may affect rare tree species.	The recommendation presented is to not extend Northern Avenue.