City of Sault Ste. Marie

January 2015

Transportation Master Plan

Final Report Executive Summary

Submitted by:
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EXECUTIVE SUMMARY

A. Introduction and Study Purpose

The City of Sault Ste. Marie's previous 2002 Transportation Master Plan (TMP) developed a plan for an integrated and balanced transportation system and identified priority improvements. It focused on enhancing accessibility for residents and workers, improving connectivity, and ensuring a healthy and active community in Sault Ste. Marie. It included key recommendations such as the construction of Carmen's Way in 2005 and the creation of a cycling network in the City known as the Hub Trail. The purpose of this study is to provide an update to the previous TMP in order to advance the implementation of the various transportation improvements while considering the current and future conditions of the community.

B. Study Approach and Consultation

This TMP study has been carried out through an open public process under the Municipal Class Environmental Assessment Guidelines. The following summarizes the public announcements and opportunities for public and agency input and participation in this study:

- The TMP study was initiated in **October 2012** through a Notice of Commencement published on the City's website.
- A study website, www.CitySSM-TMP.ca, was also created to enable the project team to provide information about upcoming public events, access to display materials for public meetings, council presentations, meeting minutes, comment forms and the submission of feedback.
- An online public opinion survey was also administered to provide another opportunity for the public to be engaged and for the project team to obtain the latest public views of the transportation system and travel choices within Sault Ste. Marie.
- Two rounds of public consultation in the form of open houses were held:
    - Public Open House #1 was held in November 2012 which introduced the problem and opportunity to the public
    - Public Open House #2 was held in January 2014 which presented preliminary recommendations

C. Problem and Opportunity

The City of Sault Ste. Marie is unlikely to experience significant population growth over the next 20 years and as a result significant traffic volume increases are unlikely. However, with the relocation of the hospital and the amalgamation of four secondary schools into two new schools, as well as ongoing commercial development, travel patterns are changing, particularly with increased pressures for travel to and from the northern part of the City. Furthermore, communities throughout Canada are increasingly focused on enhancing their ability to accommodate all travel modes to promote sustainable transportation systems.

The City will need to address changing travel patterns in the City and ensure road infrastructure continues to operate at a good level of service. In the coming years, the use of existing infrastructure needs to be maximized while encouraging an appropriate mix of transportation mode usage.

D. Planning Alternatives

Alternative planning strategies were developed to address the Problem Statement and to satisfy Phase 2 the Environmental Assessment process.

Three planning alternatives were identified:

1. **Do-Nothing** – do not build any improvements
2. **A Sustainable Approach** – assumes no capital improvements on the existing road network, but implementation of active transportation and transit network improvements
3. **A Balanced Approach** – invest in capital road improvements plus the implementation of active transportation and transit network improvements

Alternative 3 was selected because it benefits all transportation users in the City. Road network improvements throughout the City are still needed especially given harsh winter climate.

E. Recommended Strategies

To supplement the preferred "Balanced Approach" planning alternative, four key transportation strategies are identified which shall guide the City's decision making on transportation investments:

- *Strategy 1: Build multimodal networks*
- *Strategy 2: Maximize operational efficiency of existing roads and intersections*
- *Strategy 3: Provide safe and accessible network for all travelers*
- *Strategy 4: Promote environmental sustainability and community health*

Strategy 1: Build Multimodal Networks - Recommendations

Priorities:

- Provide needed capacity improvements; complete Black Road, Third Line, Second Line widening, and Sackville Road extension
- Invest in active transportation; continue with the implementation of the Cycling Master Plan and extension of the Hub Trail including proposed "Spoke" routes
- Build complete streets and consider "road diets" to meet the needs of all modes
- Consider a new transit transfer station in the north end of the City.
- Support for commercial vehicles; maintain network in conformance with MTO's Freight-Supportive Guidelines
- Support further study of a Highway 17 Bypass to be undertaken by the Ministry of Transportation as a separate EA study

Strategy 2: Maximize Operational Efficiency - Recommendations

Priorities:

- Monitor changes in traffic patterns and intersection operations; implement data collection and traffic monitoring system
- Consider building roundabouts instead of signalized intersections
- Consider conversion of one-way streets to two-way streets
- Consider road diets where provided capacity exceeds traffic levels
- Develop consolidated driveway and access control guidelines

Strategy 3: Provide Safe and Accessible Network - Recommendations

Priorities:

- Provide a safe pedestrian environment
- Establish minimum pedestrian crossing standards along the hub trail and high demand pedestrian corridors
- Maintain existing railway crossings
- Continue with the implementation of traffic calming measures
- Continue with the completion of the Hub Trail and spokes to provide cyclists with their own travel space
- Review the City's design guidelines to ensure roads, cycling facilities and sidewalks are built for all users including persons with disabilities

Strategy 4: Promote Environmental Sustainability - Recommendations

Priorities:

- Promote active transportation & transit use
- Actively promote the reduction in usage of single occupant vehicles
- Manage travel demand by providing and supporting non-auto travel choices (investing in transit and cycling)
- Increase density and promote mixed-use developments in downtown and along key arterial roads

F. Towards Complete Streets

An important recommendation of this report is the introduction of the Complete Street road design standards to accommodate multiple modes and to recognize the various functions of the street right-of-way. This approach seeks to maximize the use of the right-of-way. Private automobiles should continue to be provided with the necessary capacity for reasonable mobility, while at the same time allowing the street to be used for other purposes and transportation modes.

The premise of Complete Streets is **"Creating Places Where People Want to Be"**. This philosophy is supported by five themes (the "Five Cs") to ensure that mobility goals are balanced with the goals for building community and protecting the environment.

- **Community** – No plan or project can truly be successful without engaging the community and supporting community goals.
- **Choices** – Communities realize that cycling, walking and transit are critical components of the transportation system.
- **Capacity** – Capacity for private automobiles and trucks must continue to be addressed, balancing roadway capacity with mobility needs across modes.
- **Calming** – Planning and design of streets will encourage appropriate driving behaviours and speeds.
- **Connection** – Providing connections between sites, neighbourhoods, modes, and jurisdictions is crucial to maintaining healthy transportation systems and communities.

Proposed Road Classification System

To facilitate varying needs for different types of arterial streets, the City should consider further dividing its current arterial road class into subclasses with distinct design standards for arterials with differing characteristics. The following table summarizes proposed road classes for the City.

Road Classification	Road Sub-class	Typical Adjacent Land Use Types								Examples
		Residential		Commercial		Industrial		Institu-tional	Rural Area	
		Low Density	Medium -High Density	Large Format Retail	Local Commer-cial	Business Park	Heavy Industrial			
Urban Arterial	Major Arterial		x	x		x	x	x		Wellington Street, Great Northern Road, Second Line, Carmen's Way, Trunk Road
	Urban Boulevard	x	x	x	x	x	x	x		Bay Street, Queen Street, Wallace Terrace, MacDonald Ave
Urban Collector	N/A	x	x	x	x	x		x		Northern Ave, North Street, Goulais Ave, Sackville Road
Urban Local	Residential Street	x	x		x					Elizabeth St, Lake St, Prentice Ave
	Industrial Street			x		x	x	x		Industrial Park Crescent, Yates Ave
Rural Arterial	N/A	x			x		x	x	x	Second Line west of Leigh's Bay Road
Rural Collector	N/A	x			x				x	Fourth Line, Old Garden River Road, Allen's Side Road
Rural Local	N/A	x			x				x	Base Line, Old Goulais Bay Road

Complete Streets Policies

Recommended policies for specific Complete Streets treatments and priorities by road class and by mode are summarized in the following tables.

Pedestrian Component

Complete Streets Components Summary	Urban Arterial		Urban Collector	Urban Local	
	Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day
Sidewalk/Pathway Width (m)	≥3.0	≥3.0	≥1.5	≥1.5	≥1.5
Separated Sidewalks	●	■	●	■	□
Curb Letdowns	●	●	●	●	●
Pedestrian Priority Street	♦	♦	♦	♦	□
Curbless Street	♦	♦	♦	♦	□
Signaled Mid-Block Crossings	■	■	□	○	□
Marked Mid-Block Crossings	○	■	■	□	■

Legend:
● Required
■ High Priority (Include if conditions permit)
□ Low Priority (should be considered)
○ Appropriate in Limited Circumstances
♦ Not Recommended

The pedestrian mode is the only mode that everyone uses. The pedestrian mode predominantly refers to walking, but also considers people requiring mobility assistance such as wheelchairs and mobility scooters. Most trips involve a pedestrian component, even if the trip is between parking a car and walking to the door of the destination. Pedestrian facilities need to connect people with key activity centres. Activity centres are destinations and as such, should be considered "pedestrian-first" zones. The pedestrian connections to important destinations should exist, and be of good quality. This not only includes providing adequate design, but also placing priority on pedestrian facility maintenance and educating the public about the importance the pedestrian mode.

Cycling Component

Complete Streets Components Summary	Urban Arterial: Major Arterial (10,000 – 40,000 veh/day)	Urban Arterial: Urban Boulevard (5,000 – 20,000 veh/day)	Urban Collector: Collector (<10,000 veh/day)	Urban Local: Industrial Street (<10,000 veh/day)	Urban Local: Residential Street (100– 2,000 veh/day
Conventional Bike Lane	◉	◉	■	■	□
Shared Pathway (off-street, i.e. Hub Trail)	●	●	□	◉	◉
Bicycle Friendly Street	♦	♦	◉	♦	■
Green Lanes (protected bike lanes via landscaped barrier, curbs, etc., typically on-street)	◉	◉	■	■	□
Cycle Tracks (protected two-way bike lanes, on or off-street)	♦	◉	□	♦	◉
Marked Wide Curb Lanes	◉	◉	■	■	□

Legend:
● Required
■ High Priority (Include if conditions permit)
□ Low Priority (should be considered)
◉ Appropriate in Limited Circumstances
♦ Not Recommended

Like walking, cycling can be most easily encouraged within a compact, mixed use urban form, and requires good public education and facility maintenance. It is important to understand that not all cyclists can be treated in the same way. Highly experienced and confident cyclists move at much higher speeds and require different facilities than novice and recreational cyclists. Complete streets should accommodate varying levels of experience and confidence, and provide facilities that allow individual cyclists to evolve. The City has already taken steps towards encouraging active transportation with the Hub Trail, and is encouraged to continue that progress with the proposed spoke routes.

Transit Component

Complete Streets Components Summary	Urban Arterial		Urban Collector	Urban Local		Legend: ● Required ■ High Priority (Include if conditions permit) □ Low Priority (should be considered) ○ Appropriate in Limited Circumstances ♦ Not Recommended
	Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day	
Local Bus Route	□	■	□	□	□	In order to encourage transit use and allow for efficient and reliable transit operation, streets need to be designed with transit service in mind. Land use is always a factor in transit use. Higher density development, with good pedestrian connection to transit routes is critical to successful transit operation. Key transit destinations need to be located on transit corridors and site layouts should seek to minimize the walking distances between transit stops and building entrances. Proximity of employment to transit is of particular importance in encouraging transit use. Employment nodes should be located so they can be easily served by transit.
High Frequency Bus Route	■	□	○	○	♦	
Bus Stop Pull Outs	■	□	□	○	♦	
Bus Priority	□	■	□	○	♦	

Private Automobile Component

Complete Streets Components Summary	Urban Arterial		Urban Collector	Urban Local	
	Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day
Posted Speed (km/h)	60	50	40	40	40
Traffic Calming	♦	□	□	□	■
Commercial Access	○	□	□	●	□
Residential Driveways	♦	□	□	○	●
Median	●	●	□	○	♦
Two-way Left Turn Lanes	♦	♦	□	○	○

Legend:
● Required
■ High Priority (Include if conditions permit)
□ Low Priority (should be considered)
○ Appropriate in Limited Circumstances
♦ Not Recommended

Complete Streets should not be mistaken as an approach to discourage automobile use. The necessary roadway capacity needs to be provided, but it should be provided in a manner that is sensitive to the surrounding environment and consistent with the multiple functions of the street. This may mean some slowing of travel speeds in areas of high pedestrian and other street activity. The complete streets approach also acknowledges that capacity can be provided in many ways. Mobility continues to be the priority function on arterial streets; other activities will be accommodated within the large rights-of-way provide for arterial streets. On local streets, particularly in residential areas, cars are expected to share the street space with other users, and as a result, streets are designed for slower travel speeds.

Goods Movement Component

Complete Streets Components Summary	Urban Arterial		Urban Collector	Urban Local		Legend: ● Required; ■ High Priority (Include if conditions permit); □ Low Priority (should be considered); ◉ Appropriate in Limited Circumstances; ♦ Not Recommended
	Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day)	
Truck Route	●	□	◉	■	♦	Movement of goods and other industrial traffic is important to the economic vitality of Sault Ste. Marie. Trucks need to be accommodated on industrial streets, and on those streets that lead to and from industrial areas. In these areas, wider lanes and more generous curb radii should be provided. Commercial vehicles are not restricted to industrial areas. Commercial areas rely on trucks for deliveries and even in residential areas there is a need to accommodate a limited amount of commercial vehicle activity.
Loading Zones	♦	♦	♦	□	♦	
Minimum Curb Lane Width (m)	3.5	3.5	3.4	4.5	3.5	

G. Summary of Recommendations

Table G-1 summarizes all recommended activities and infrastructure improvements identified through the Transportation Master Plan process report, and categorizes each into short term, medium term and long-term priorities.

Table G-1: Summary of Recommendations and Timing

Item #	Recommendation Item:
	Short Term (up to 5 years by 2020)
1	Council adoption of the 2014 Transportation Master Plan
2	Cycling Master Plan Update
3	Traffic Impact Study (TIS) policy guidelines
4	Arterial Roads Access Management Policy
5	Adoption of seasonal usage by-law for on-street cycling lanes
6	Pursue reinstatement of the MTO Connecting Link Program
7	Continue with the implementation of the Cycling Master Plan and extension of the Hub Trail including proposed "Spoke" routes
8	Change Korah Road truck route classification from Class A to Class B
9	Monitor changes in traffic patterns and intersection operations; implement data collection and traffic monitoring system.
10	Transfer the City's transportation data to the TES software
11	Consider building roundabouts instead of intersections where new intersections are built or reconstructed
12	Further gauge public interest in conversion of one-way streets to two-way streets, and undertake feasibility study if sufficient public interest.
13	Undertake further location screening and environmental assessment process for the implementation of road diets at the following locations: 1. Wellington Street East (Trunk Rd to Texas Ave) 2. Bennett Boulevard (Texas Ave to Boundary Rd) 3. Northern Avenue East (North St to Pine St) 4. Wallace Terrace (Korah Rd to Brookfield Ave) 5. Goulais Avenue (Second Line W to Korah Rd) 6. Bay Street (Andrew St to Pim St) 7. Queen Street (Pim St to Gravelle St) 8. McNabb Street from Great Northern Road to Black Road Identify and screen other potential road diet locations.
14	At the Great Northern and Second Line intersection: ▪ Protect for double left-turn lanes southbound, eastbound, and northbound ▪ Protect for right-turn lanes for all approaches

Item #	Recommendation Item:
15	Short-term pedestrian priorities for implementation: ▪ Establish minimum pedestrian crossing standards along the hub trail and high demand pedestrian corridors ▪ Establish pedestrian crossing guideline policy recommendations as per Error! Reference source not found. ▪ Provide Zebra stripes along the Hub trail and major intersections ▪ Install pedestrian countdown signals Retain all existing railway crossings
16	Continue with the implementation of traffic calming measures
17	Review the City's design guidelines to ensure roads, cycling facilities and sidewalks are built for all users including persons with disabilities
18	Actively promote the reduction in usage of single occupant vehicles, and active transportation and transit usage
19	Implement updated road classifications and complete street road design standards
20	Review traffic operations issues as identified by the public during the various consultation events (as summarized in Appendix A).
21	Lobby for Highway 17 Bypass with MTO
22	Update Official Plan Schedule D
	Mid Term (up to 10 Years or by 2025)
23	Update Transportation Master Plan
24	Build complete streets and consider "road diets" to meet the needs of all modes
25	Increase density and promote mixed-use developments in downtown and along key arterial roads (on-going)
26	Consider a new transit transfer station in the north end of the City, and other transit service improvements to meet shifts in demand
27	Complete Environmental Assessment studies and construct the following road improvements: ▪ Black Road from McNabb Street to Second Line (EA currently underway) ▪ Third Line from the Sault Area hospital to Black Road (EA currently underway) ▪ Second Line widening from 2 to 5 lanes from Pine Street to west of Black Road (EA is complete and widening is underway) ▪ Northern Avenue Extension to Black Road ▪ Sackville Road Extension to Third Line (EA is complete and work is scheduled in the five-year plan for 2017) ▪ Bay Street Extension under the Sault Ste. Marie International Bridge ▪ Queen Street East of Pim Street Road Diet (road diet is underway , scheduled to open in the fall of 2014)
28	Undertake planning and EA studies to identify need and justification for: 1. Reid Street extension to St. Georges from Second Line and removing the light at St. Georges and McNabb and to the new intersection with Reid Street

Item #	Recommendation Item:
	2. Four-laning of Second Line from Black Road to the new section on top of Second Line hill would make the route (a truck route) less congested and safer, especially during peak periods.
	Long Term (10 to 20 years or by 2030/2035)
29	Consider a new transit transfer hub/ station in the north end of the City, and other transit service improvements

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1. INTRODUCTION

1.1 Study Background and Purpose

The City of Sault Ste. Marie (City), one of the oldest settlements in North America and the third largest city in Northern Ontario, is a uniquely located and naturally gifted community of approximately 75,000 'Saultites'. Situated on the eastern end of Lake Superior on the St. Marys River, its unique location and natural beauty has attracted residents from all walks of life as well as an expanding tourism industry. Moreover, the City enjoys an important competitive advantage to reach major mid-western American markets through its linkage to the United States via the International Bridge. The City's natural and transportation resources have shaped the basis for economic growth, and will continue to do so in the future.

A Transportation Master Plan (TMP) study was conducted for the City in 2002, which resulted in various recommendations relating to areas such as transportation infrastructure and traffic operations. The 2002 TMP developed a plan for an integrated and balanced transportation system and identified priority improvements. It focused on enhancing accessibility for residents and workers, improving connectivity, and ensuring a healthy and active community in Sault Ste. Marie. The purpose of this study is to provide an update to the previous TMP in order to advance the implementation of the various transportation improvements while considering the current and future conditions of the community.

1.2 Why Is a Transportation Master Plan Needed?

Since the 2002 TMP, various new City planning initiatives have been released such as the 2007 Cycling Master Plan update, the 2011-2014 Corporate Strategic plan, as well as an update of the City's Official Plan which is currently underway. On a provincial scale, several Ministry of Transportation initiatives in other jurisdictions have also been released, as well as a 2005 update to the Provincial Policy Statement. In light of these new planning initiatives, this study – the City's Transportation Master Plan Update 2013 – is a platform to move forward with the implementation of the transportation vision defined in the various transportation initiatives, particularly the previous 2002 TMP and the City's Official Plan.

Although the City of Sault Ste. Marie is unlikely to experience significant increases in population and traffic volumes over the next 20 years, the City's travel patterns are changing due to ongoing commercial development as well as the relocation of the hospital and two schools. Moreover, communities across Canada are increasingly focusing on sustainable and multi-modal transportation. This TMP is a practical guide for developing and planning for the City's transportation needs until the year 2031 in an orderly and economically efficient fashion. The study addresses existing and future auto, transit, cycling and pedestrian traffic needs within the City and is developed to satisfy all domestic and commercial needs with a well-functioning traffic system and connection to the United States. This report builds upon the transportation objectives and supports the strategies developed by the Official Plan and other City planning initiatives.

1.3 Goals and Objectives of the Study

The primary goal of the study is to update the 2002 TMP and address several transportation-related issues which either require attention, evaluation, or the need to develop City-wide policies. These issues relate to various areas of transportation such as roads, cycling and pedestrian needs, traffic and intersection operations in key corridors, active transportation, traffic calming, demand management and supply management. **Exhibit 1-1** illustrates the various transportation issues that fall within the scope of the TMP.

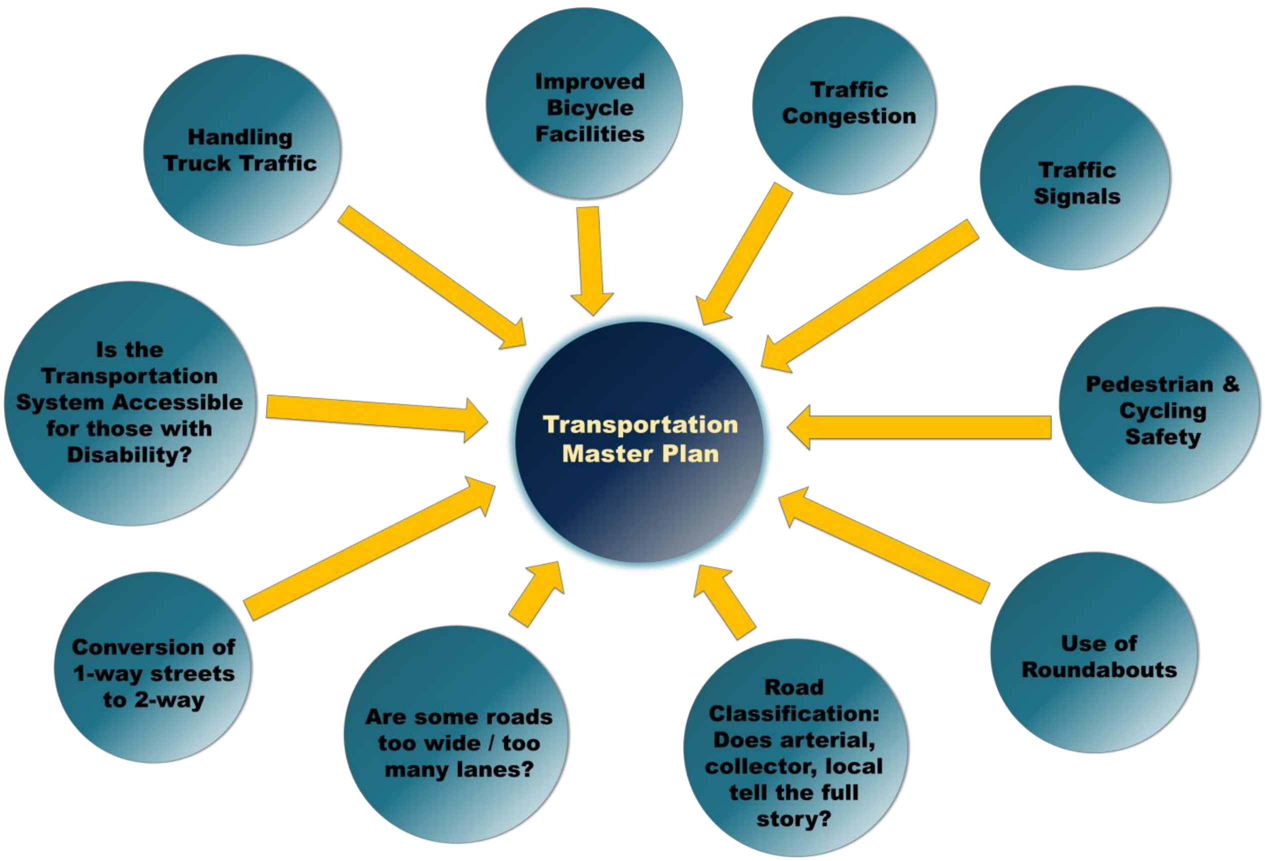

Exhibit 1-1: TMP Transportation Issues

1.3.1 Interdependent Transportation, Economic, Social, and Environmental Goals

The TMP considers a comprehensive, system-wide approach that includes, in addition to its transportation goals, the economic, social and environmental objectives of the City. The following key points illustrate the importance of ensuring such interdependence:

- **The various goals should be mutually supportive** – Transportation goals will not be achieved unless other goals are achieved (and vice-versa). The various goals also influence each other. For example, economic vitality depends, in part, upon adequate transportation services but the demand for travel is in turn driven to some degree by economic growth.

- **The nature of passenger and goods travel is highly complex and variable** – Municipal government alone cannot meet all these needs cost-effectively and in accordance with today's constraints on public finances. Coordination with other governmental bodies, the ability to seek and attract funding partners, and a careful valuation of the cost of growth becomes critical.
- **We cannot build our way out of congestion** – The need to develop and apply new transportation solutions geared at increased network efficiency, higher return on investment, and halting urban sprawl are pressing. Designing an integrated mobility system capable of addressing the needs of person travel and goods movement is essential.
- **The needs and expectations of society are changing** – New population driven factors have emerged and created new challenges for policy makers. Issues triggered by the aging population, increased growth pressure, and environmental protection have to be faced, resolved, and assimilated.
- **The need to protect our natural heritage is critical** – Transportation is known to be a significant source of air contaminants and of greenhouse gas emissions attributed to climate change and health problems. Decreasing auto dependence and shifting travel to more efficient and cleaner transportation modes is vital.

1.3.2 Sustainable Transportation Planning Approach

The TMP builds on the approaches and ideas conveyed in the ***Sustainable Planning Guidelines*** report (developed by Transport Canada and the Transportation Association of Canada), is supported by the Province of Ontario's ***Places to Grow Act,*** and adheres to the Municipal Class Environmental Assessment process. This multilayered planning process ensures that the appropriate transportation investments, policies, and actions can be verified, proposed, accepted, and implemented both to accommodate the City's growth and to support goals of sustainability, economic vitality, and healthy communities.

The TMP process incorporates, to various degrees, the 12 key principles identified by Transport Canada for sustainable transportation planning as featured in **Exhibit 1-2**.

Key principles for Sustainable Transportation Planning	
Sustainable Communities & Transportation Systems	**Sustainable & Effective Transportation Planning**
Principle 1: Integration with land use planning	*Principle 7:* Strategic approach
Principle 2: Environmental health	*Principle 8:* Implementation guidance
Principle 3: Economic and social objectives	*Principle 9:* Financial guidance
Principle 4: Modal sustainability	*Principle 10:* Performance measurement
Principle 5: Transportation demand management	*Principle 11:* Public involvement
Principle 6: Transportation supply management	*Principle 12*: Plan maintenance

Exhibit 1-2: Key Principles for Sustainable Transportation Planning, Transport Canada

1.4 TMP Study Initiation and Process

This TMP study has been carried out through an open public process under the Municipal Class Environmental Assessment Guidelines (October 2000, as amended in 2007 and 2011) so that the study results can properly serve as direct input to any subsequent Environmental Assessment (EA) studies for specific infrastructure projects. The study addresses Phases 1 and 2 of the of the five-phase Municipal Class EA process. Phase 1 intends to identify problems and/or opportunities whereas Phase 2 aims to identify and evaluate alternative solutions, consider environmental implications, and consult with the public and affected agencies. Phases 3 through 5 are carried out through subsequent EA studies. **Exhibit 1-3** illustrates the TMP Process.

The TMP study was initiated in **October 2012** through a Notice of Commencement published on the City's website. A presentation of the study process and objectives were also presented to the public at and Open House held in November 2012.

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City of Sault Ste Marie Transportation Master Plan Study

NOTICE OF STUDY COMMENCEMENT

The City of Sault Ste Marie has initiated the Transportation Master Plan (TMP) Study. It will guide the development of the City's long-term transportation network in compliance with the provincial Policy Statement, and the City's Official Plan. It reflects the City's desire to develop a sustainable transportation system with a strong focus on efficient use of existing infrastructure, active transportation and transit.

This notice signals the commencement of the TMP Study. This study will be carried out through an open public process in accordance with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process (MEA, October 2000 as amended in 2011) which is an approved process under the Environmental Assessment Act. The TMP study will be carried out in two stages:

- Stage 1 will assess the current state of the transportation system and identify short term and quick implementation solutions; and
- Stage 2 will identify the transportation infrastructure needs and timing to accommodate planned growth in the City and will provide input for a potential Development Charges By-law and Official Plan updates.

A key component of the study will be consultation with stakeholders, regulatory agencies and the general public. Anyone with an interest in this study has the opportunity to get involved and provide input. Two Public Information Centres (PIC) will be held during the study to inform the process, present findings and receive public input. A Notice providing the time and location of the PIC will be published in local newspapers and posted on the study website.

An online questionnaire is provided to you as a mean to inform the TMP study process and ensure that your voice is heard and considered. The questionnaire is available at: www.surveymonkey.com/s/SSMTMP and will be accessible until November 30, 2012.

If you require additional information or would like to be placed on the project contact list, please visit us on the study website at www.cityssm-tmp.ca or contact one of the individuals below:

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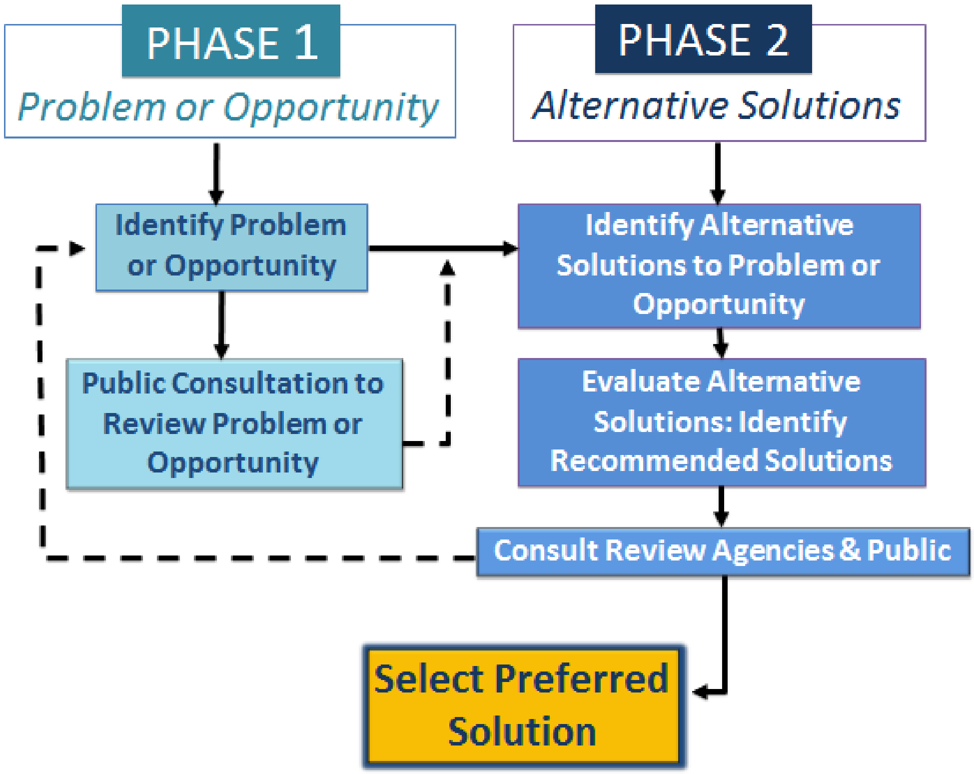


Exhibit 1-3: Transportation Master Plan Process

A study website, www.CitySSM-TMP.ca, was also created to enable the project team to provide information about upcoming public events, access to display materials for public meetings, council presentations, meeting minutes, comment forms and the submission of feedback. Contact information for the City and Consultant Project Manager was also provided so the public can reach our study team members to provide input and comment.

1.5 Public Consultation

For a TMP study, two rounds of public consultation are typically required and the interaction could be in the form of open houses, presentations, and Council meetings. The first consultation follows the problem and opportunity identification and the second follows the preliminary recommendations. Public Open House #1 was held in November 2012 while Public Open House #2 was held in January of 2014.

An online public opinion survey was also administered to provide another opportunity for the public to be engaged and for the project team to obtain the latest public views of the transportation system and travel choices within Sault Ste. Marie. Additional details of the public consultation and the survey carried out for the TMP study are provided in **Chapter 5**.

2. PLANNING FRAMEWORK

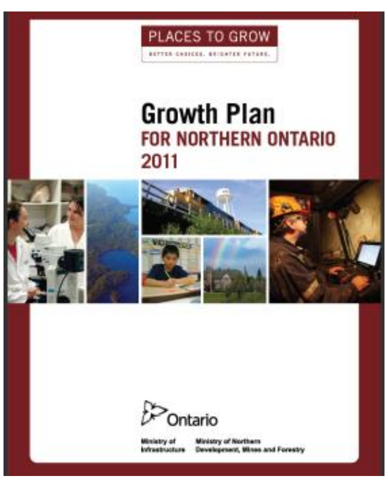
2.1 The Provincial Planning Context

The ***Ontario 2005 Provincial Policy Statement*** (PPS) is the statement of the government's policies on land use planning, and includes the planning of transportation systems and infrastructure. The PPS requires municipalities to develop transportation systems which are safe, energy efficient, and which facilitate the movement of people and goods and are appropriate to address projected transportation needs. It also requires efficient use of existing and planned infrastructure and improved connectivity within and among transportation systems and modes, as well as integrating transportation and land use considerations at all stages of the planning process.

Furthermore, the PPS strongly supports transit-oriented planning, intensification along urban nodes and corridors, mixed use developments, and compact urban form built around transit corridors and hubs. The PPS requires that planning activities for municipal infrastructure in Ontario aim at:

- Reduced reliance on private vehicles;
- Reduced environmental effects and greenhouse gas emissions; and
- More efficient use of existing infrastructure.

The PPS also requires municipalities to plan and protect corridors and rights-of-way for transportation and transit facilities to meet present and future transportation needs, and encourages the preservation and reuse of abandoned corridors wherever feasible.



The ***2011 Growth Plan for Northern Ontario***, prepared under the Places to Grow Act (2005), is an economic development plan, a labour market plan, an infrastructure investment plan, and a land-use plan which recognizes the interconnected contribution of people, communities, infrastructure and the environment to a successful and sustainable economy. The Growth Plan reiterates the directions of the 2005 PPS and calls for multi-modal transportation system planning integrated with land use planning with emphasis on opportunities to optimize capacity, efficiency, and safety of the transportation system. It also stresses the need to enhance connectivity among various transportation modes, to strengthen linkages between major hubs, and to reduce emissions and other environmental impacts associated with transportation.

The Growth Plan, which identifies Sault Ste. Marie as a municipality with a *strategic core area*, encourages municipalities to plan for these areas to function as vibrant, walkable, mixed-use districts able to:

- Attract employment clusters, including office and retail

- Accommodate higher densities
- Provide a broad range of amenities accessible to residents and visitors such as vibrant streetscapes with shopping, entertainment and lodging opportunities, transportation connections, and educational, health, social and cultural services.

The Master Plan will build upon both provincial policy documents.

2.2 The Municipal Planning Context

The ***2002 Transportation Master Plan*** presented a 20 year framework to develop Sault Se. Marie's transportation network in coordination with anticipated population and employment forecasts, changes in intra- and interregional traffic volumes, as well as other relevant planning studies that were being undertaken at the time. The study resulted in a number of specific recommendations for phased roadworks to meet future transportation needs such as road construction and road widening. Additionally, recommendations related to traffic operations such as intersection and lane reconfigurations, as well as general recommendations not associated with a timeframe, were also outlined in the TMP study report.

The need to update the previous TMP is evident in the wake of new development trends, growth management planning, and updates to various local and provincial planning documents to ensure that continuing transportation decisions and investment for an integrated transportation network can be made with confidence and with current best practices regarding sustainable transportation planning.

The City of Sault Ste. Marie completed its original ***Cycling Master Plan*** in 1995, which was later updated in 2007. The original plan was based on the concept that all roadways should be bicycle-friendly. While the 2007 update of the Cycling Master Plan maintained the same concept, it also recommended alternate pathways for less experienced cyclists cycling on major arterial roads. The Plan update provides general design considerations to make the community cycling-friendly and recommends design standards for specific cycling routes.

In addition to design considerations, standards, and engineering principles, the Cycling Master Plan also provides several recommendations related to the provision of education, enforcement, and encouragement. Some of the specific key recommendations outlined in the Cycling Master Plan update include:

- Reducing Queen Street, east of Pim Street to three lanes (an east lane, a west lane and a continuous left turn lane) with bicycle lanes on both sides;
- Improving and constructing paved shoulder lanes on Old Garden River Road and Landslide Road between Third Line and Fifth Line;
- Establishing a cycling route from Second Line and Carmen's Way to Korah Collegiate High School;

- Establishing a cycling route from Sackville Road to Industrial Park Road; and, establishing a connecting link between North Street and the (future) hub trail through the Fort Creek Conservation Area.

The City has also designed an extensive hub trail which the Cycling Master Plan combines with a system of cycling routes extending within and outside of the perimeter loop to create a comprehensive network of on and off-road trails, creating linkages between neighborhoods, destination points, and facilities that reflect the culture and community of the City. The Cycling Master Plan's hub trail and spoke routes are illustrated in Exhibit 2-2**.**

The ***2011-2014 Corporate Strategic Plan*** (CSP) is a comprehensive plan intended to guide the activities of various City departments reporting to City Council in such a way that will improve the quality of life of the community and that will support economic growth in a progressive, responsible, and sustainable manner. The CSP's framework has three strategic focus areas for improvement and development: Infrastructure, services, and quality of life. Exhibit 2-1 illustrates the CSP's framework highlighting the strategic directions for each of the three focus areas.

Strategic Plan Framework

STRATEGIC FOCUS AREAS

1 Developing Solid Infrastructure	2 Delivering Excellent Services	3 Enhancing Quality of Life

STRATEGIC DIRECTIONS

1.A. Environmental Leadership	2.A. Communications	3.A. Recreational/Cultural Infrastructure
1.B. Transportation Network Improvements	2.B. Process Improvement	3.B. Planning for the Future
1.C. Property Management and Development	2.C. Leadership and Staff Development	
	2.D. Technological Innovation	

Exhibit 2-1: Corporate Strategic Plan Framework

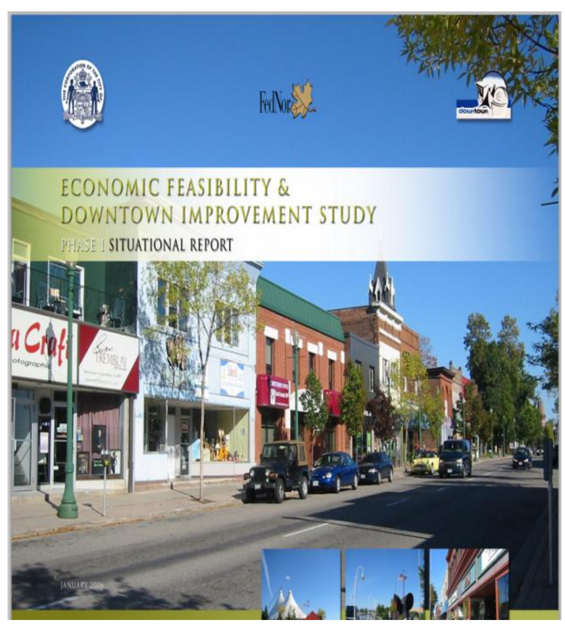
Regarding transportation infrastructure, the CSP outlines a number of projects and initiatives that:

- will support economic growth in the industrial and commercial areas while providing routes for commercial traffic;
- are intended to balance the travel needs of the City's residents and to provide them with a variety of travel choices; and
- will develop the transportation system based on the principles of safety, access, mobility and the environment.

The City conducted a ***Comprehensive Transit Operational Review of Existing Services with Ridership Growth and Asset Management Plan*** in 2006. At the time, the Province had announced its intention to invest two cents per litre of the provincial gas tax for public transit funding as a way to help municipalities develop sustainable transportation systems with public transit as a key component. A requirement to qualify for gas tax funding was for municipalities to submit a 10-year Asset Management Plan and a 5-year Transit Ridership Growth Plan to the Ministry of Transportation. This study was intended to be used to support the City of Sault Ste. Marie's submission for gas tax funding.

The study involved data collection, stakeholder consultation, policy framework development to determine gas tax revenue priorities, as well as a 5-year Ridership Growth Plan and a 10-year Asset Management Plan. Several recommendations were offered to grow ridership and ensure that the transit infrastructure is in place to accommodate future growth, such as conventional and specialized transit improvements as well as improvements to operational aspects such as fare policies. **Exhibit 2-3** illustrates the City's 2006 transit route network which was reviewed throughout this study.

Another transit review entitled ***2012 – 2016 Public Transit Operations Review*** was conducted in 2012. The 2012 review, which was also developed in consultation with stakeholders, was designed to grow ridership and ensure that the transit fleet and infrastructure is in place to accommodate growth. While the 2006 plan primarily focused on conventional transit (Sault Transit), the 2012 review focuses on specialized transit needs, particularly ParaBus operations, due to a growing proportion of residents entering retirement age and increased life expectancies. The 2012 review also updates the previous review's Sault Transit operations' service plan. The study provides several recommendations with respect to Sault Transit fare policy, route re-designs, alternate service delivery models, long term route restructuring, asset management, as well as a ParaBus Service and Financial Plan.



The Sault Ste. Marie ***Economic Feasibility & Downtown Improvement Study***, also known as the Downtown Development Initiative, is a study that was funded jointly by the Federal Economic Development Initiative in Northern Ontario (FedNor), the City of Sault Ste. Marie, and the Downtown Association. The intiative aims to recommend public infrastructure and amenity improvements, idenitfy the development potential of key sites, and promote improved public access to, and linkages between, civic, commercial and tourist amenities. The ultimate vision for the study is a rebuilt Downtown which ties together the social, physical and economic goals for community renewal.

A list of objectives was developed to be used as a platform for achieving the development vision; they are as follows:

1. More than a main street – a "true" neighbourhood;
2. A "24/7" neighbourhood;
3. The entertainment and cultural centre of the City;
4. A market place shopping "experience";
5. A well connected place;
6. A safe place; and
7. An authentic place.

The Downtown Improvement Initiative is split into three phases:

- Phase 1 – Foundation Report outlining constraints to and opportunities for effective downtown regeneration;
- Phase 2 – Community Improvement Plan (CIP) and Strategy Development; and
- Phase 3 – "Roll-out" implementation of the Community Improvement Plan and 12-month Action Plan.

The first two phases of the study have been completed and are avaiable for review on the City website. The Phase 1 report was completed in January 2006 and provided a situational analysis of social, physical and economic conditions in Downtown Sault Ste. Marie, including the analysis of recent and planned transportation infrastructure projects such as a new truck route/corridor (under construction at the time) and a planned multi-modal logistic hub facility to reroute container freight and border crossing traffic congestion to the United States.

The Phase 2 report builds on the findings of the Phase 1 situational analysis and develops a physical Development Plan which suggests infrastructure and amenity improvements, as well as a Community Improvement Plan (CIP) which presents various creative approaches to addressing the problems facing the economic development of the Downtown. The CIP was approved by City Council on April 16, 2007. The City of Sault Ste. Marie is undertaking an update of its ***Official Plan*** (OP) with the purpose of providing direction for the management of the City's physical development in a sustainable and economically efficient manner, and with the ultimate goal of ensuring the City's long term-vitality by promoting the community's physical, environmental and social health. The OP is intended to guide future built form and to set the goals, policies and implementation strategies required for creating a strong, livable, and sustainable community. The OP update is developed to adhere and support the policies contained in the 2011 Growth Plan for Northern Ontario and to be consistent with the 2005 Provincial Policy Statement.

The OP states that the City's role as a major transportation hub should be expanded with the development of a multi-modal facility, a deep water port, and improved road, rail and air infrastructure. The Plan's Schedule D discusses transportation and outlines policy statements relating to:

- Street Classification
  - Arterial Streets: Urban & Rural
  - Collector Streets: Urban & Rural
  - Local Streets: Urban & Rural
- Commercial Traffic
- Signage
- Future Road Widenings
- Modal Shift
  - Public Transit
  - Pedestrian travel
  - On & Off Road Bicycle Routes and Facilities
  - Recreational Trails
- Parking
- New Development Proposals

Exhibit 2-4 presents the City of Sault Ste. Marie's existing and proposed road network as illustrated in the Official Plan's Schedule D.

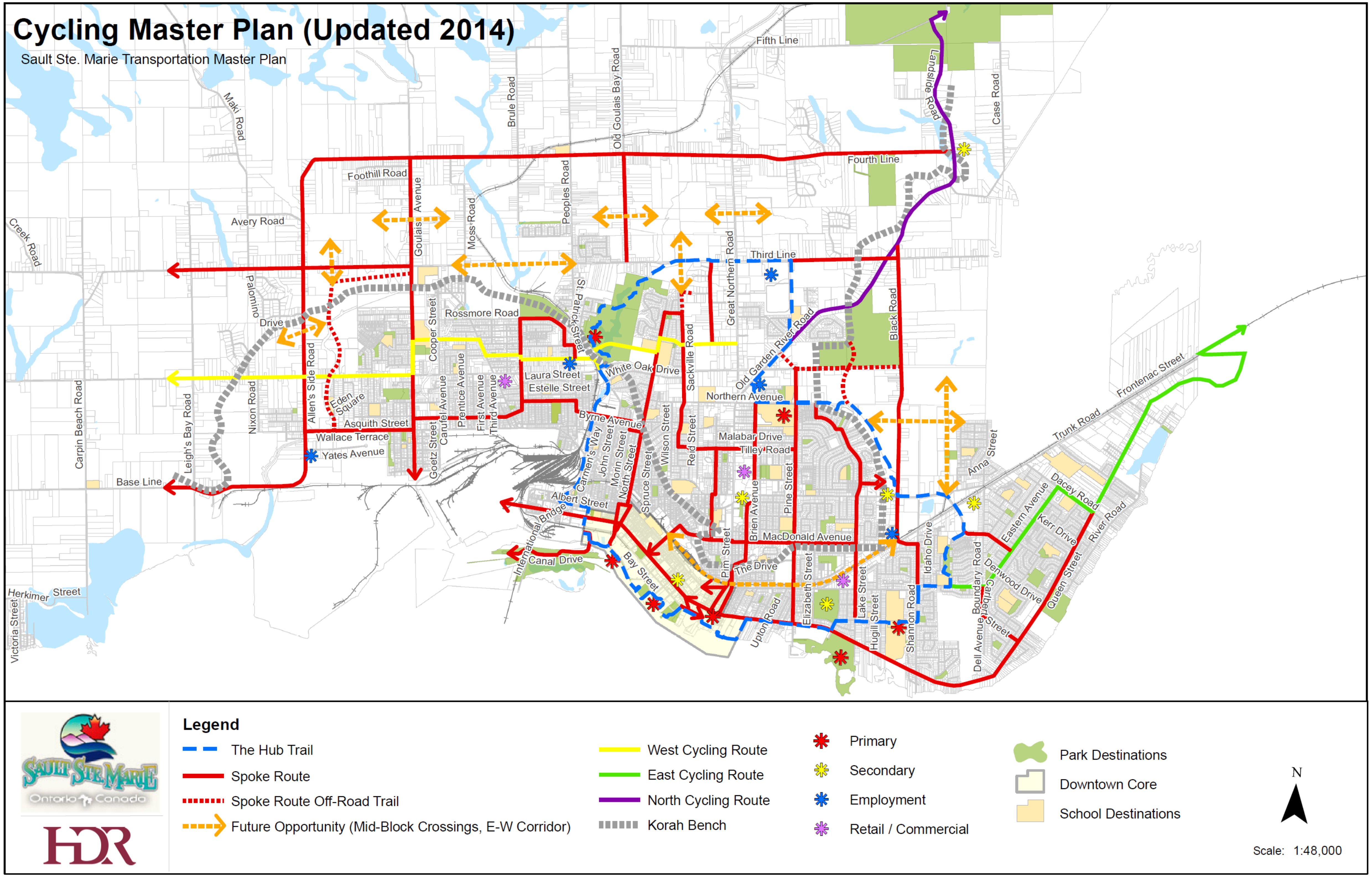


Exhibit 2-2: Cycling Master Plan Hub Trail and Spoke Routes

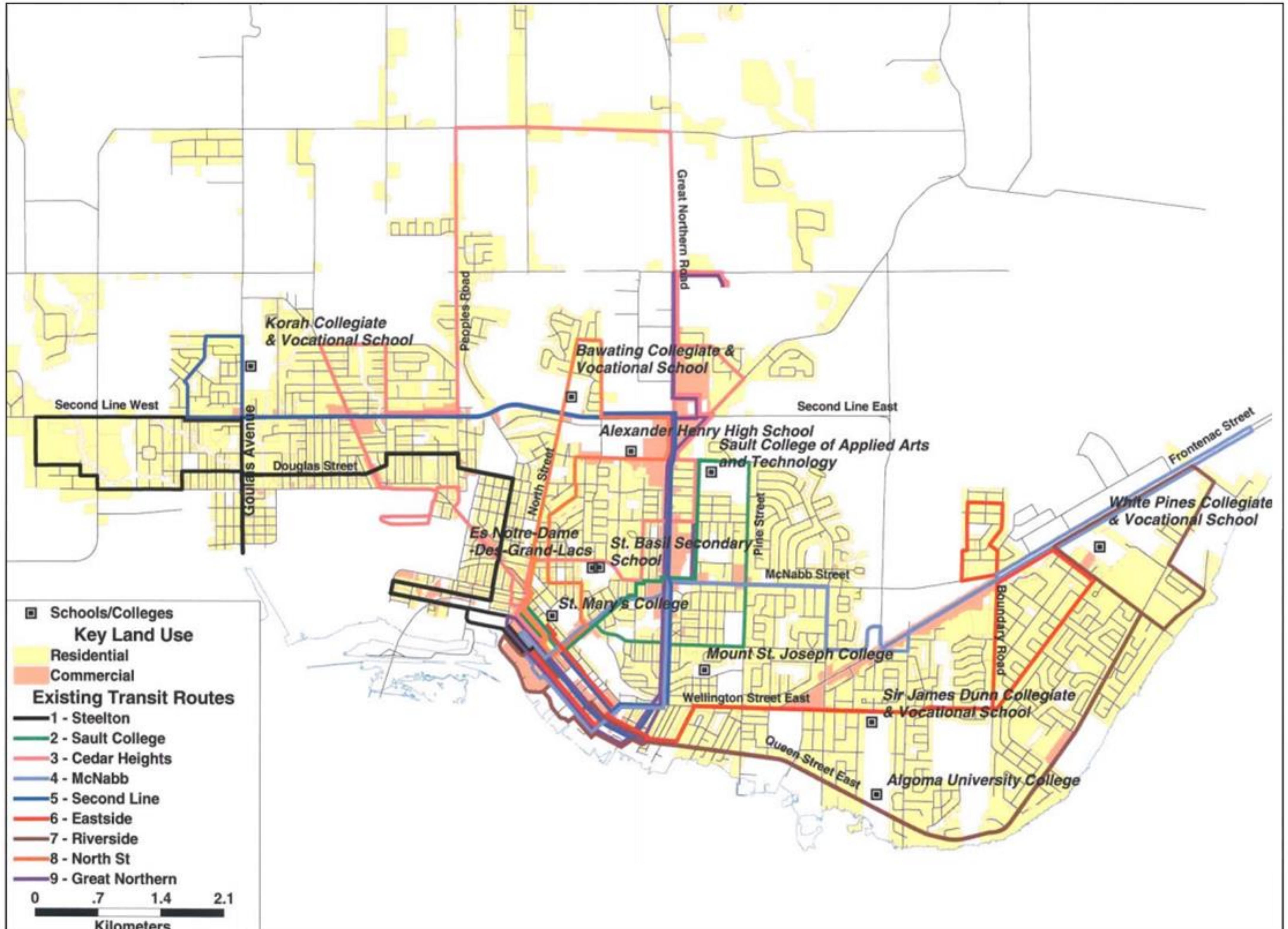


Exhibit 2-3: Sault Ste. Marie Existing 2006 Transit Route Network

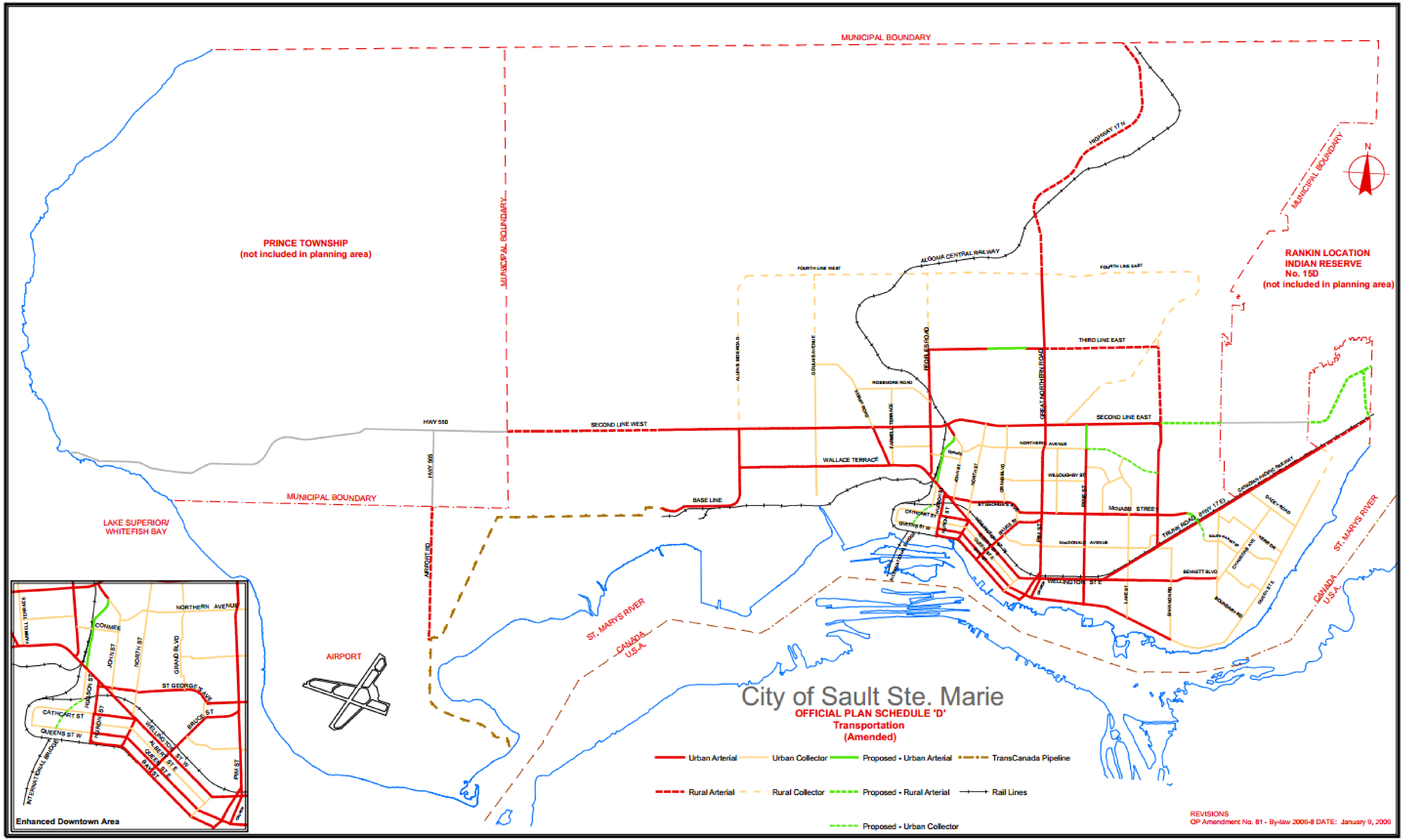


Exhibit 2-4: City of Sault Ste. Marie Official Plan Schedule D Street Classifications

3. TRANSPORTATION SYSTEM TODAY

An understanding of the current transportation system is essential to addressing the problems and opportunities within the City. This chapter documents Sault Ste. Marie's existing transportation infrastructure, its characteristics and influencing factors, and travel conditions observed on the existing transportation network in the City of Sault Ste. Marie.

3.1 Road Network

Sault Ste. Marie's existing road network is comprised of urban and rural arterial, collector and local streets, as illustrated in **Exhibit 3-1**. The rural street designation is applied to streets located in the outskirts of the City, typically north of Third Line, west of Allen's Side Road, and east of Queensgate Boulevard in the downtown and Great Northern Road in the northern part of the City. The City's arterial streets are typically designed to accommodate large traffic volumes over extended distances and can be up to 36 meters in width as per the Official Plan. Collector streets, on the other hand, are designed to facilitate the movement of traffic from residential, commercial and industrial areas to and from the arterial street network, and can be up to 26 metres in width. Finally, local streets are designed to safely accommodate traffic movement within residential areas and can be up to 20 meters in width.

The Trans-Canada Highway has, in recent years, been rerouted to bypass the City's downtown and central business district. Highway 17B, part of the Trans-Canada Highway, currently connects Sault Ste. Marie to neighboring municipalities to the north and east of the City. The highway runs northerly along Great Northern Road from Second Line and easterly along Trunk Road from Black Road. The City has enjoyed connecting link status on over 25 kilometres (approximately 35%) of major arteries, and the accompanying annual grant, for decades.

Table 3-1 lists the total road lengths for each of the six types of streets within the study area. As can be seen, approximately 70% of the City's streets are considered urban, while the remaining 30% are considered rural roads. Furthermore, the majority of the City's roads are local (both urban and rural), accounting for just over 70% of total road length, while the remaining 30% is split almost equally between arterial and collector roads. The large majority of streets within the study area fall within the City of Sault Ste. Marie's jurisdiction and are generally in good condition.

Table 3-1: Existing Road Lengths by Type

Road Type	Road Length (km)	Fraction of Total
Rural Arterial	14.5	2.6%
Rural Collector	20.5	3.7%
Rural Local	131.4	23.9%
Urban Arterial	67.7	12.3%
Urban Collector	54.4	9.9%
Urban Local	261.3	47.5%
Total	**549.9**	**100%**

Exhibit 3-2 shows the total number of lanes on the existing road network in the City. It can be seen that the majority of high capacity roads are major arterials such as Trunk Road, Wellington Street, McNabb Street and Second Line in the east-west direction, and Great Northern Road and Pim Street in the north-south direction.

Exhibit 3-3 illustrates the posted speeds on the existing road network. As can be seen, the majority of roads have a 50 km/h posted speed limit, with most high-speed roads being arterials except for Old Garden Road, which is the only collector with a 60 km/h posted speed limit.

Exhibit 3-4 illustrates the location of signalized intersections in Sault Ste. Marie. As can be seen, the large majority of signalized intersections are located within the urbanized area of the City, whereas rural intersections are typically stop-controlled due to low traffic volumes.

3.2 Truck Routes

The City has designated truck routes identified on its urban arterial roads, These are distinguished by Class A routes which allow trucks at all times, and Class B routes which allow trucks between the hours of 7 AM to 8 PM Monday to Saturday. Trucks are restricted to the Perimeter Truck Route around the Core Area of the City, and only allowed in the daytime on Great Northern Road, Pim Street, and Wellington Street. It is worth noting that the construction of Carmen's Way in 2005 successfully removed a significant amount of truck traffic from the Downtown and Core Area. The City Truck Route map as per Schedule N-1 of the Official Plan is provided in **Exhibit 3-5**.

3.3 Active Transportation Network

The City's existing active transportation network consists of sidewalks throughout the majority of the urbanized area, the hub trail multi-use pathway system which circles the City, and finally pedestrian routes along the Downtown waterfront area. In total, 332 km of sidewalks and 23.5 km of Hub Trail are maintained by the City. No on-road cycling lanes currently exist in the City. The existing active transportation elements are illustrated in **Exhibit 3-6**.

3.4 Transit System

Sault Ste. Marie Transit currently operates 10 bus routes in a hub and spoke system with the Downtown Terminal operating as its only hub. Current annual ridership is approximately 2 million. The Sault Ste. Marie Transit route map is illustrated in **Exhibit 3-7**.

3.5 Existing Traffic

The City has collected daily traffic data at multiple locations, and based on the available data, existing daily traffic volumes were mapped and illustrated in **Exhibit 3-8**.

The major traffic flows in the City are summarized as follows:

- East-west along Second Line across the top of the City
- East-west along Lyons Avenue and Wellington Street through the Downtown, to Trunk Road
- East-west through the core area along Northern Avenue and McNabb Street
- East-west on Trunk Road leading to Wellington Street and along the TransCanada Highway east of Black Road
- North-south on Great Northern Road and Pim Street
- North-south on Bruce Street leading into the Downtown
- North-south on Black Road for the TransCanada Highway portion

Traffic volumes especially at the intersection of Great Northern Road and Second Line have grown significantly in recent years due to a shift in retail development to this area as well as the relocation of the Sault Area Hospital to Great Northern Road close to Third Line.

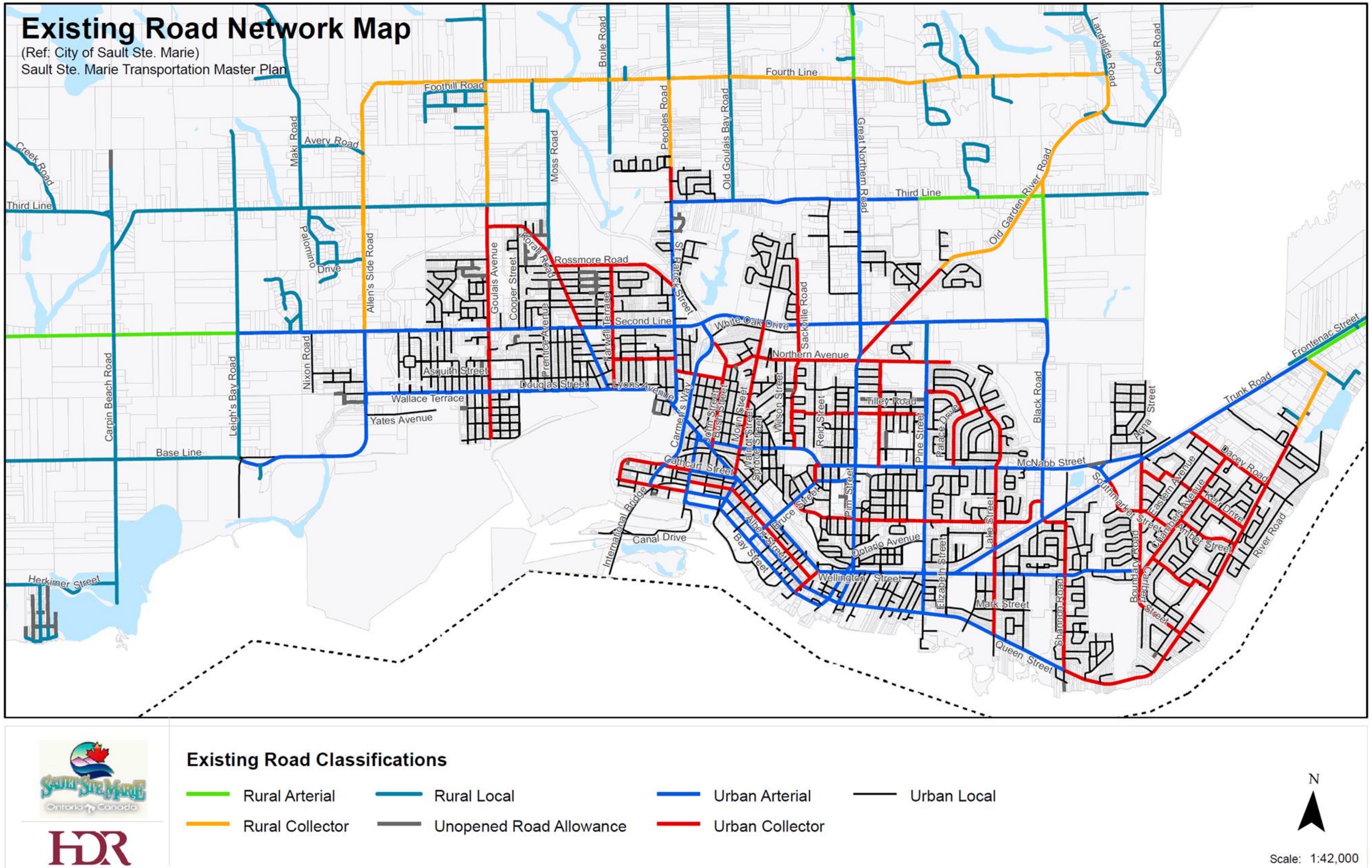


Exhibit 3-1: Existing Road Classifications

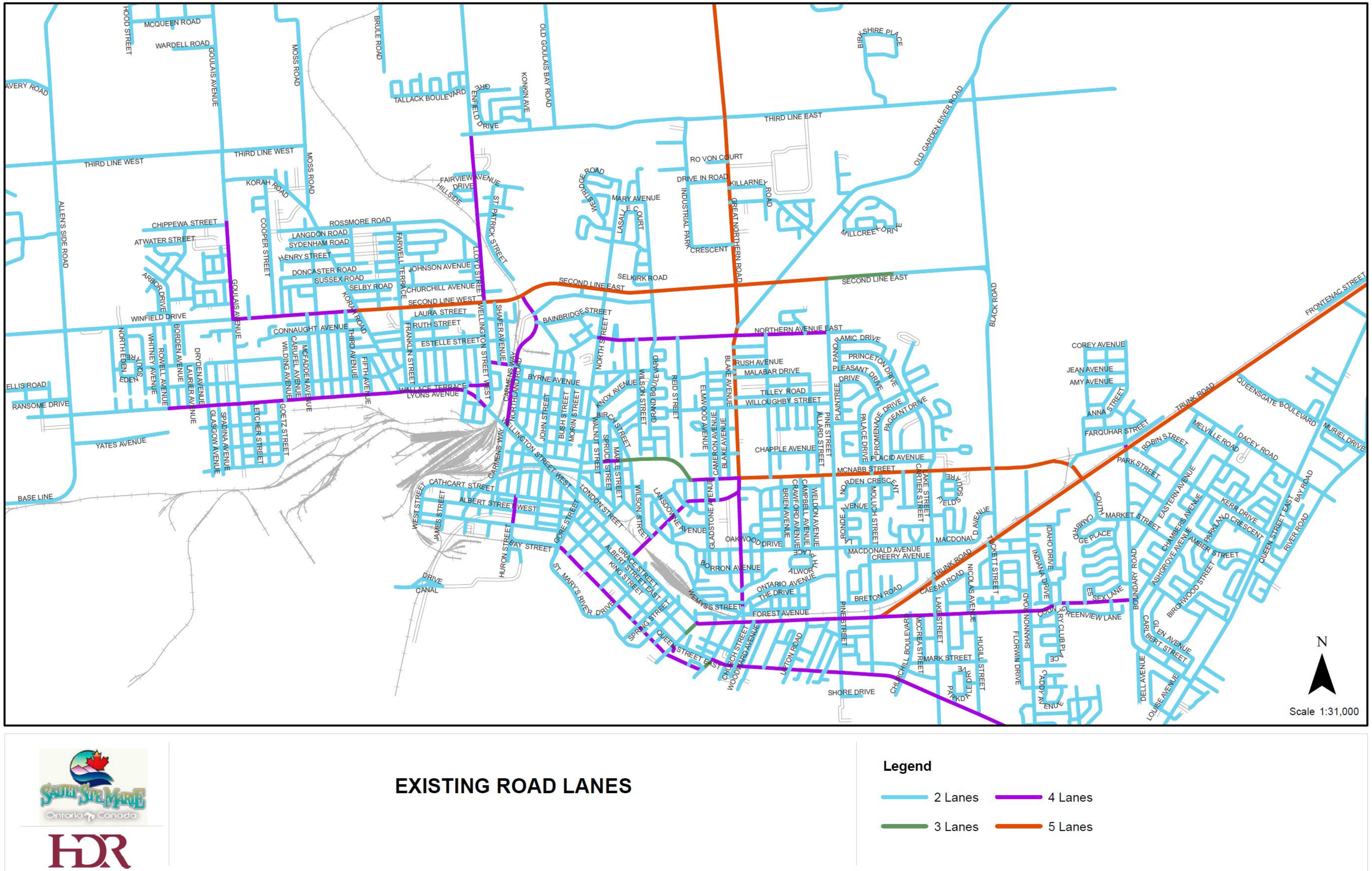


Exhibit 3-2: Existing Road Network Number of Lanes

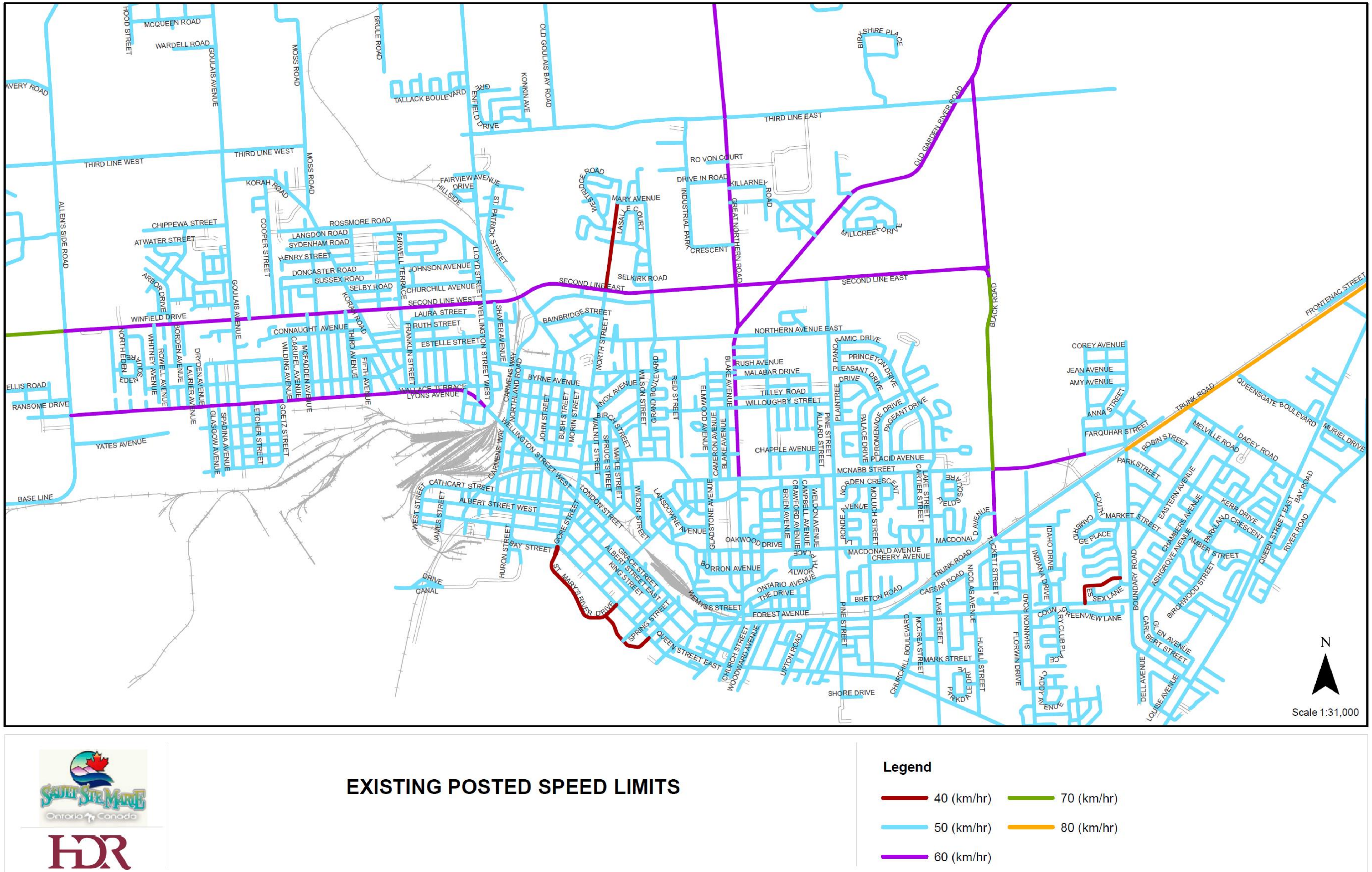


Exhibit 3-3: Existing Road Network Posted Speeds

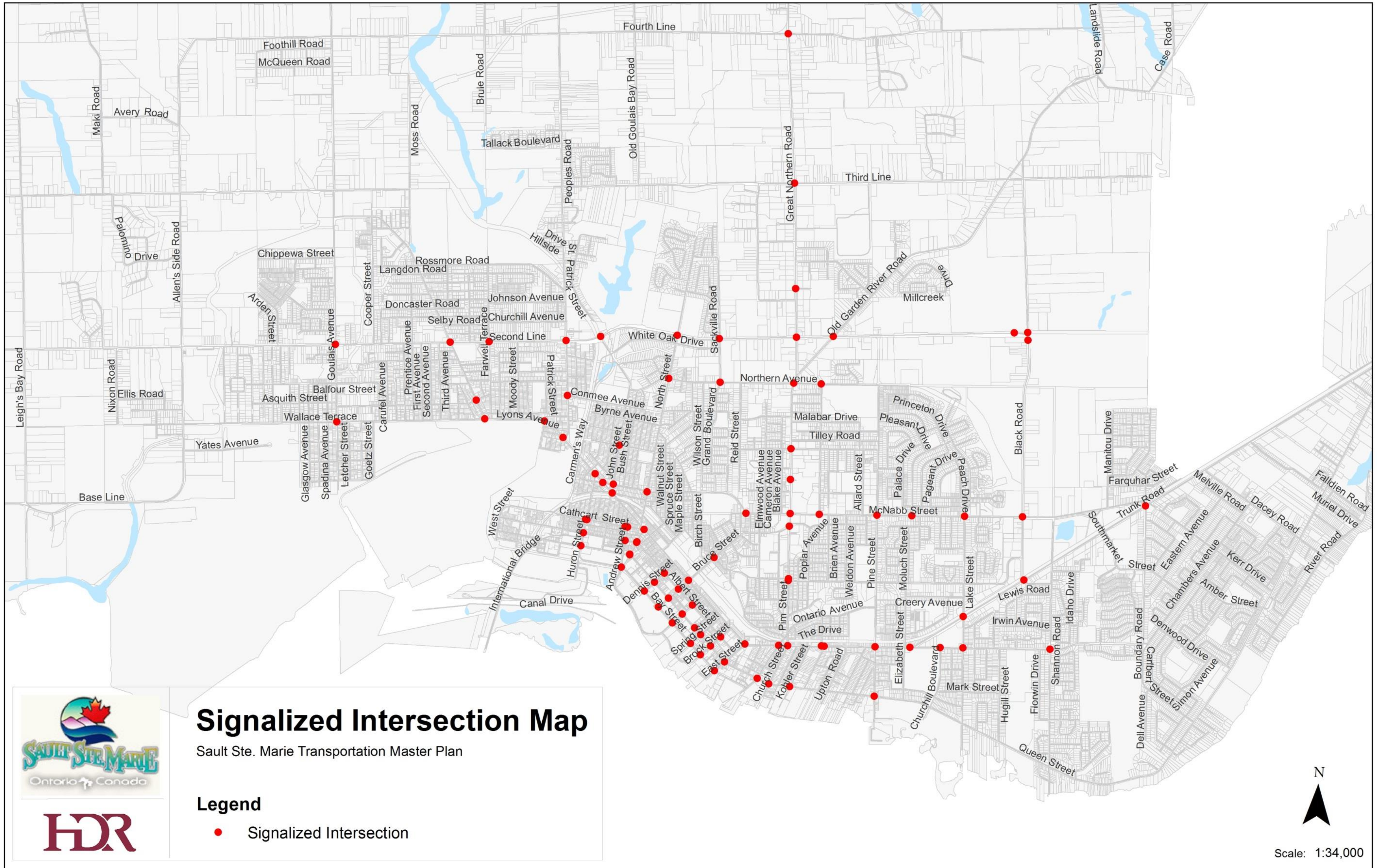


Exhibit 3-4: Signalized Intersections

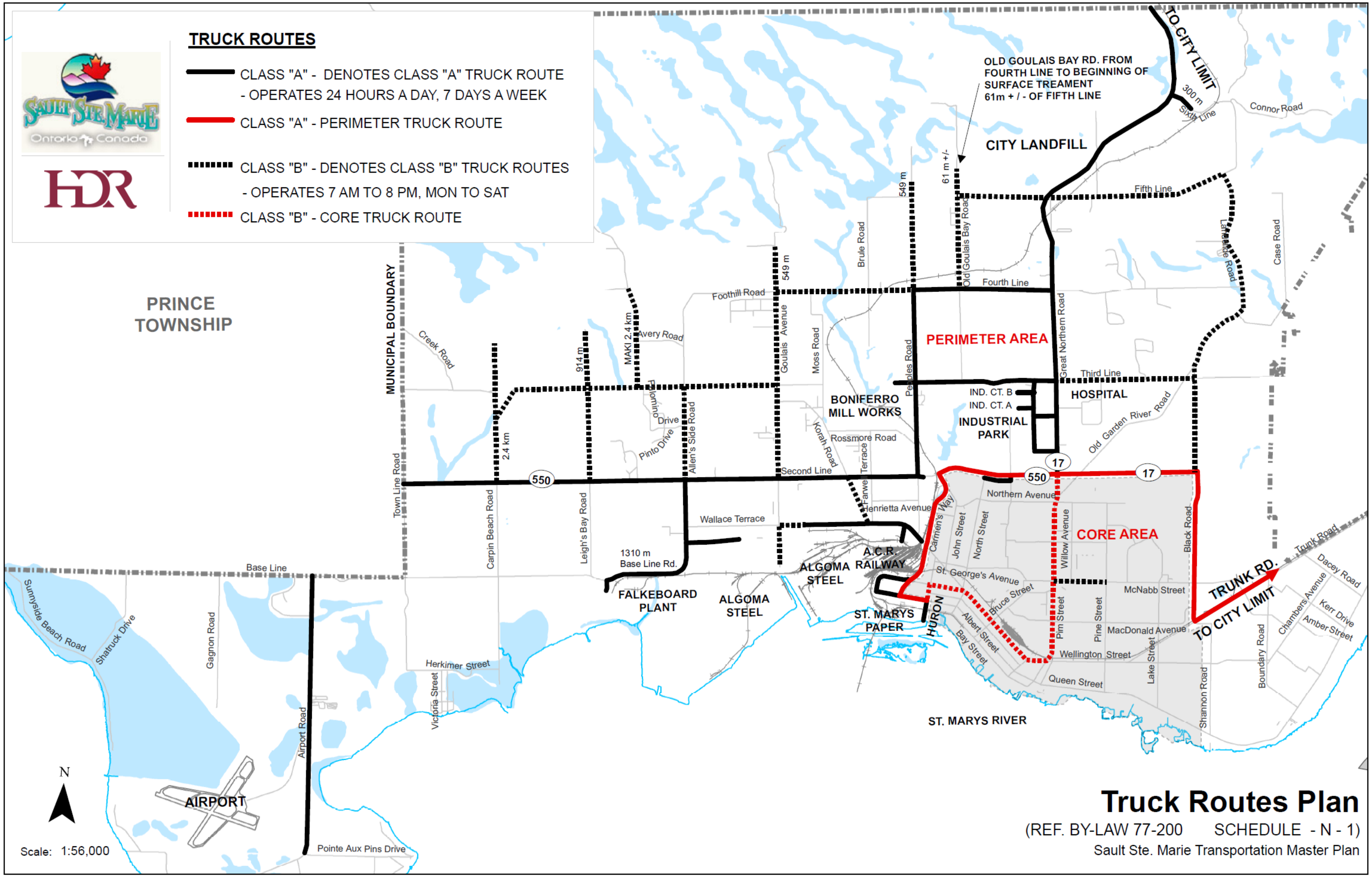


Exhibit 3-5: Designated Truck Routes

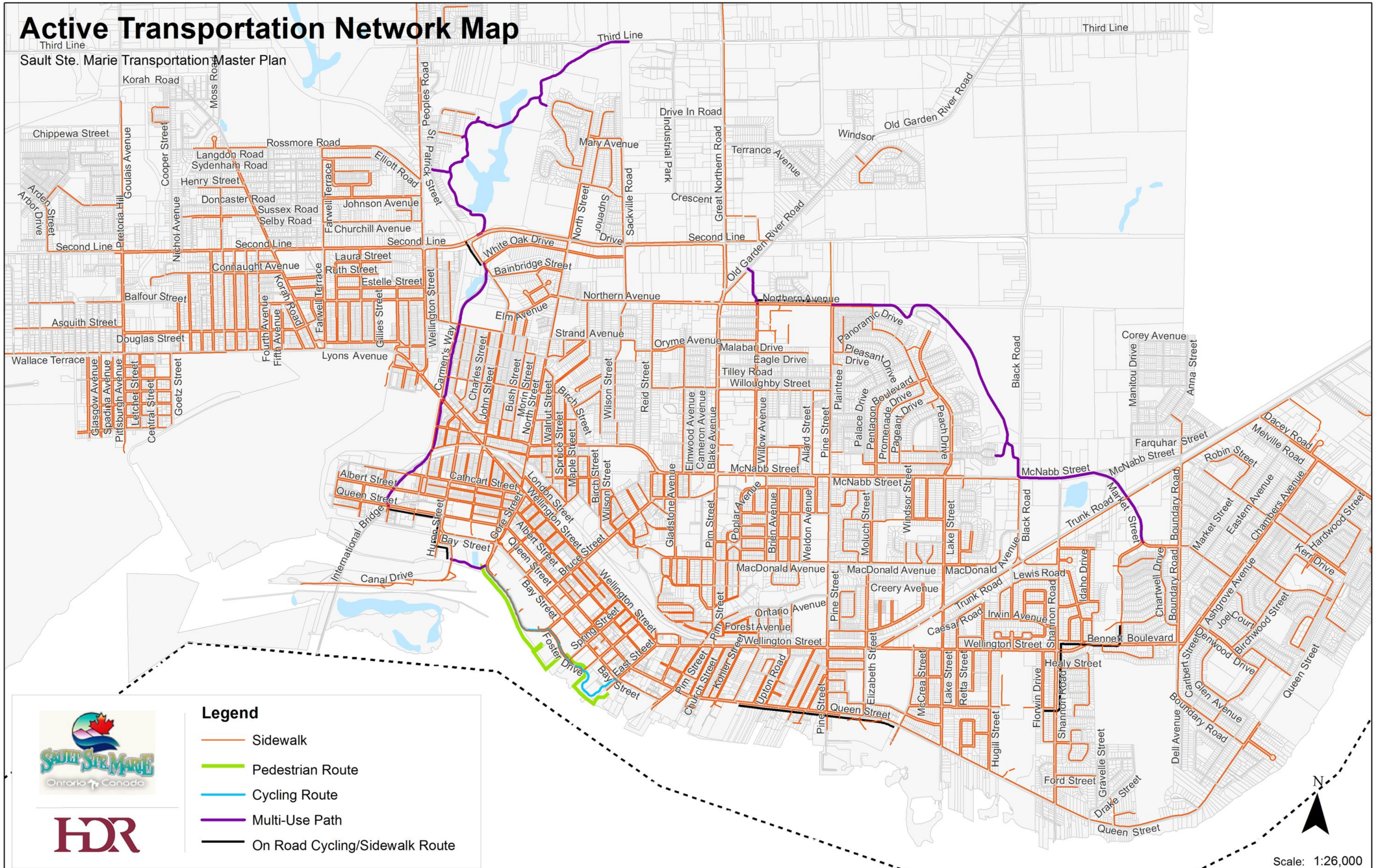


Exhibit 3-6: Existing Active Transportation Network

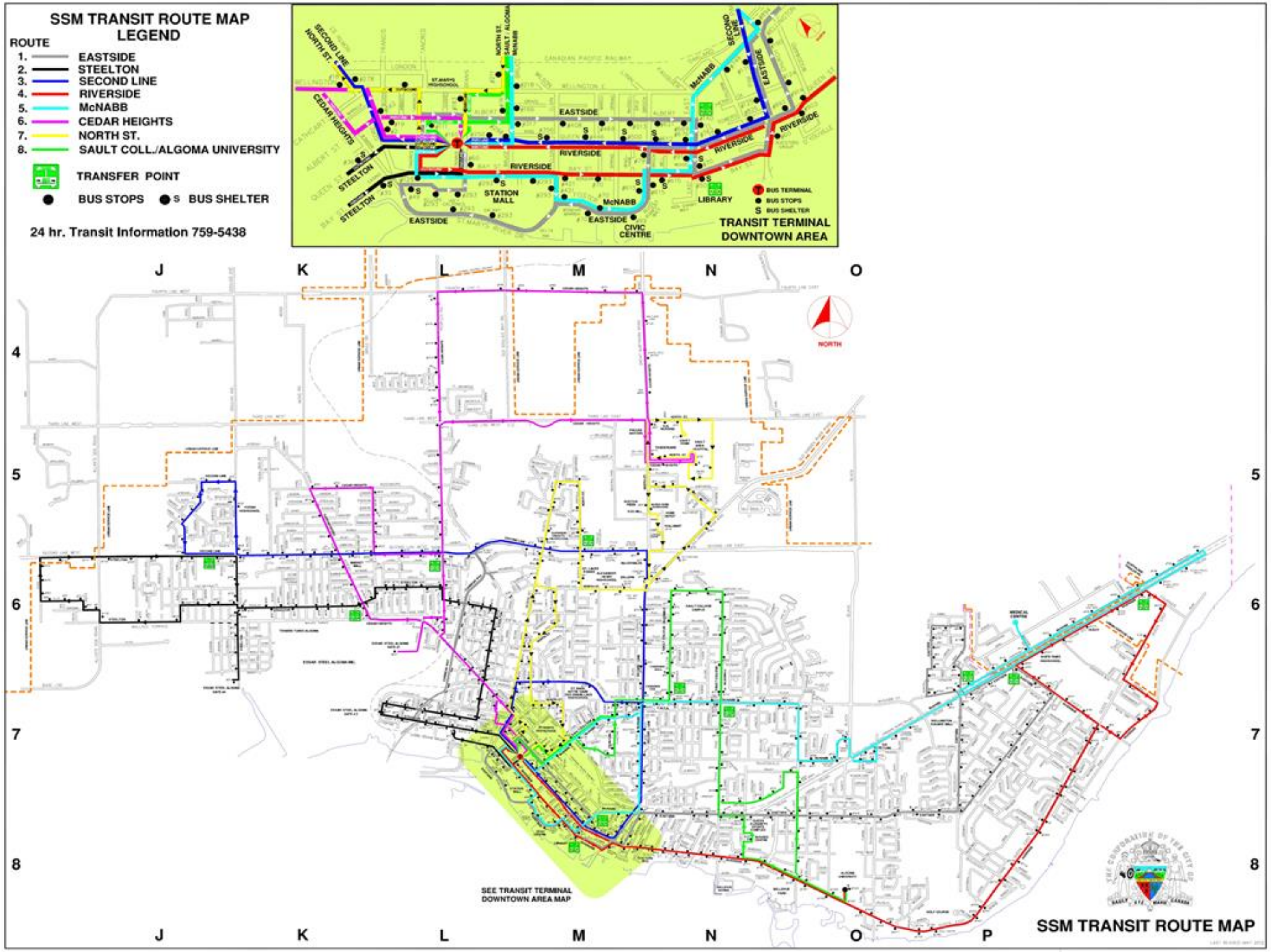
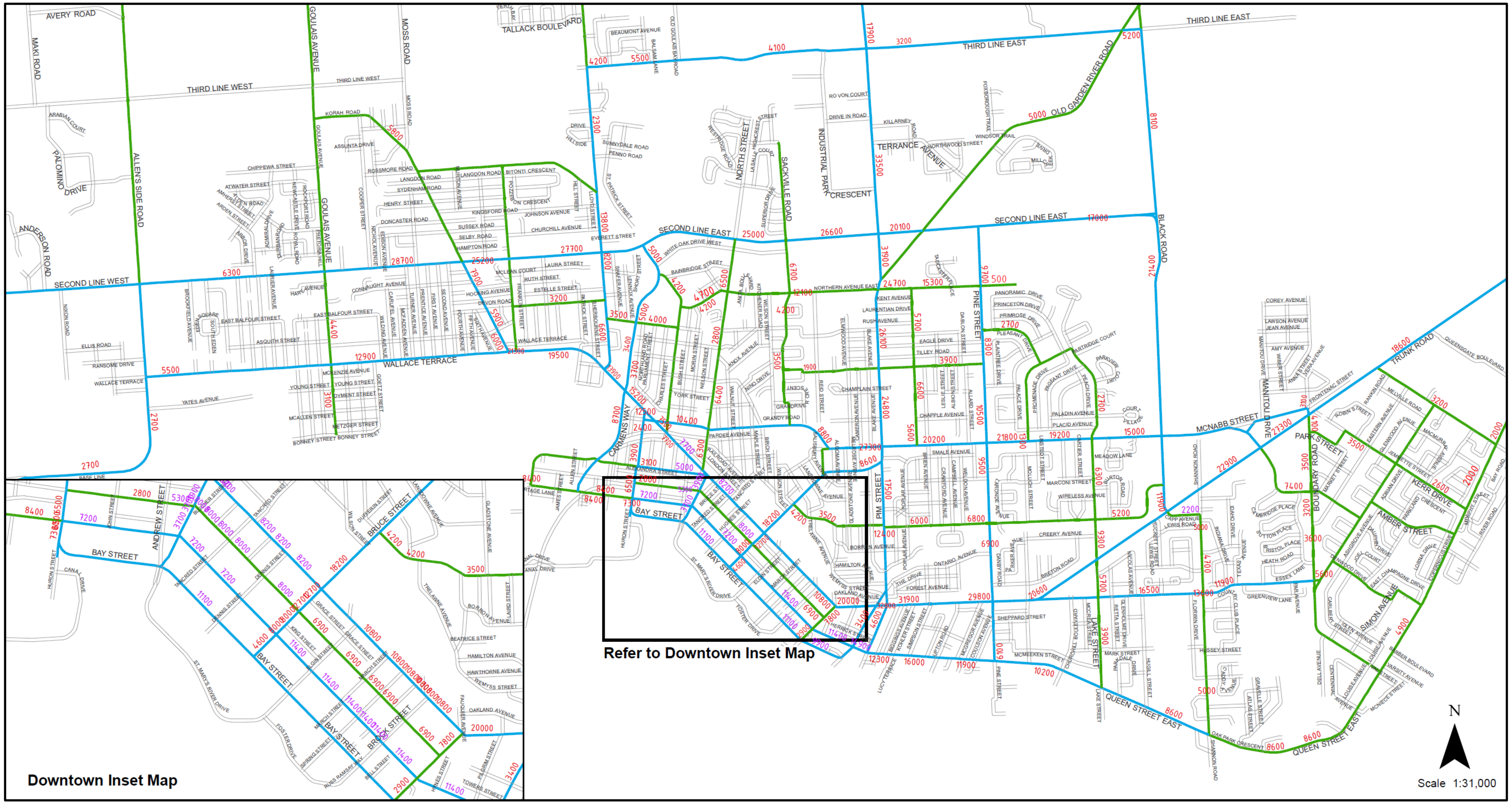


Exhibit 3-7: Existing Public Transit Network



EXISTING DAILY TRAFFIC VOLUMES & ROAD CLASSIFICATION
(2011-2012 VOLUMES)

Legend

Arterial Street	0000* Average Daily Traffic (Bi-Directional)
Collector Street	0000* Average Daily Traffic (Single-Direction)

Traffic volumes are rounded to the nearest hundredth

Exhibit 3-8: Existing Daily Traffic Volumes

4. THE COMMUNITY AND THE ENVIRONMENT

In addition to an understanding of Sault Ste. Marie's existing transportation system, the City's demographic, geographical and development patterns must also be considered in order to appropriately address its various transportation issues and needs. This chapter outlines Sault Ste. Marie's population, land use, and economic patterns as well as its environmental and cultural features.

4.1 Population Demographics

Sault Ste. Marie's population has remained relatively constant over the last decade. **Exhibit 4-1** illustrates census information from Statistics Canada showing the City's population trends over the last decade. As can be seen, the City's population has grown to 75,141 persons in 2011 from 74,566 in 2001, representing overall growth of 0.77% over the ten year period, which is less than 0.1% per annum. Population projections, taken from the Official Plan Review Population and Household Projections Presentation of Council in September 2008 and illustrated in **Exhibit 4-2**, show a forecasted population of 82,500 for the year 2026. More specifically, the forecasts indicate that the proportion of senior citizens is increasing whereas the employed labour force is decreasing. This is due to the City's aging population and the lack of workers to fill future job vacancies created by retirements. Given the relatively low birth rates and high death rates, population growth in Sault Ste. Marie is conditional upon the community's ability to attract migrants to fill job vacancies, as shown in **Exhibit 4-3.** The Growth Plan for Northern Ontario, which identifies Sault Ste. Marie as an economic hub with a strategic core area, outlines various initiatives to create employment opportunities and attract workers and immigrants to communities in Northern Ontario.

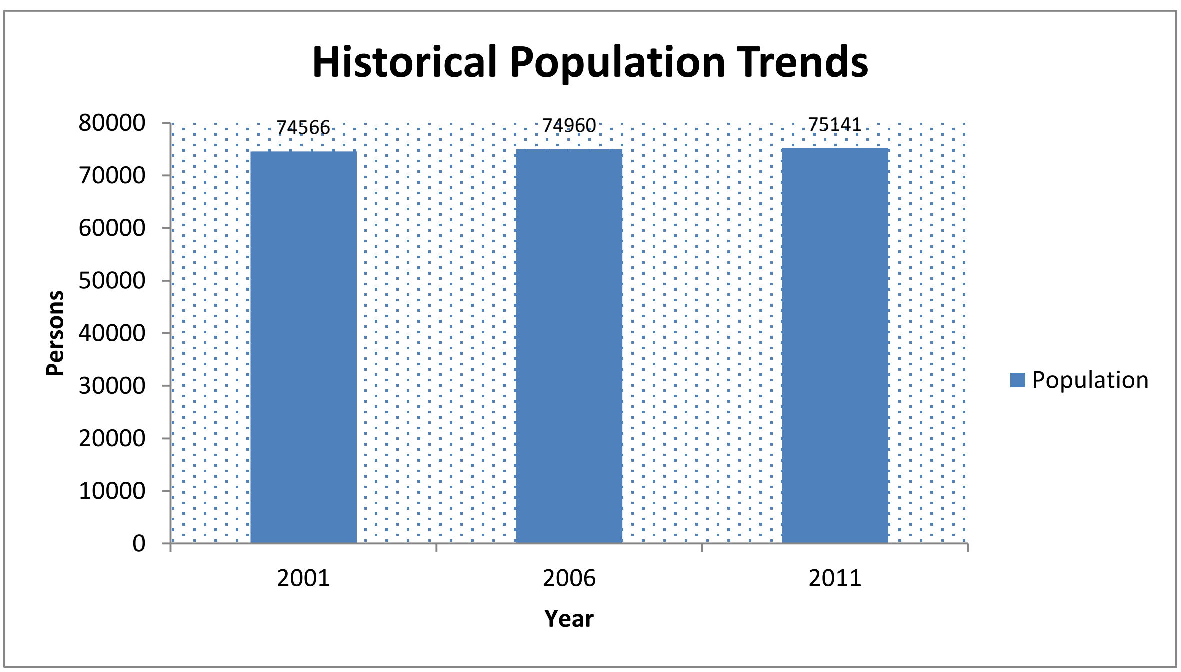


Exhibit 4-1: 2001 - 2011 Population Growth

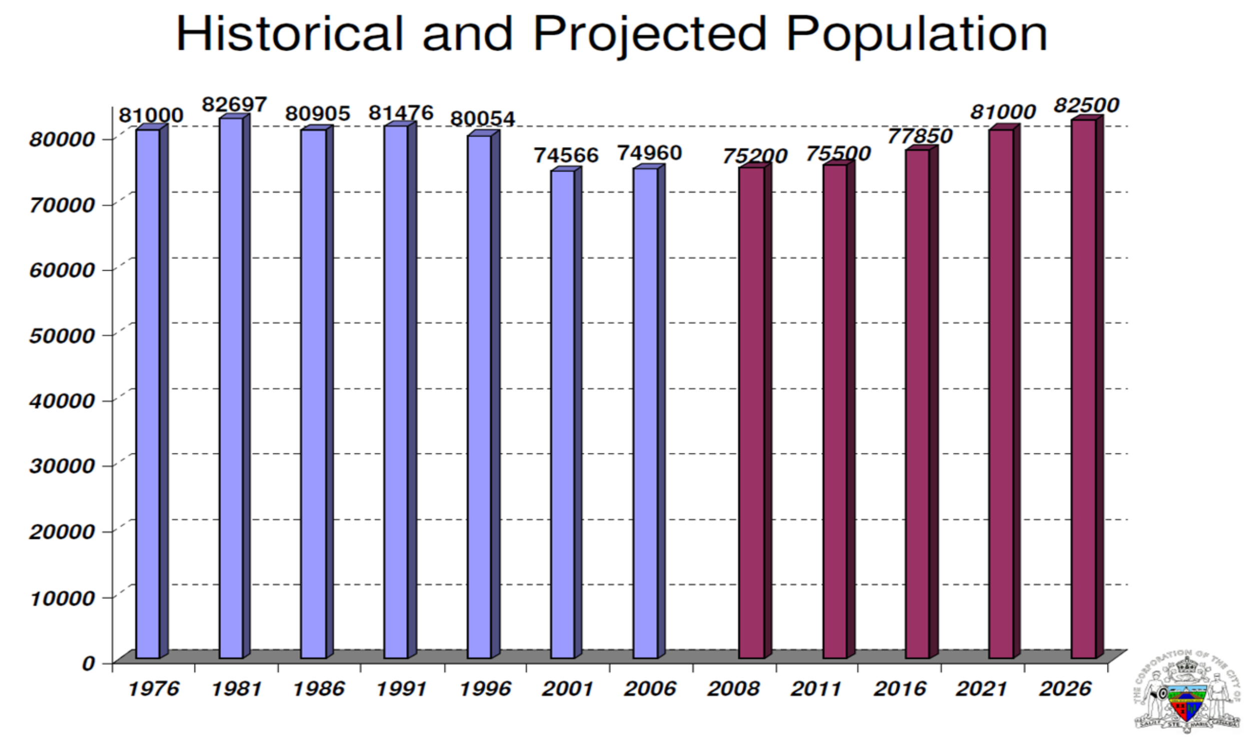


Exhibit 4-2: Historical and Projected Population

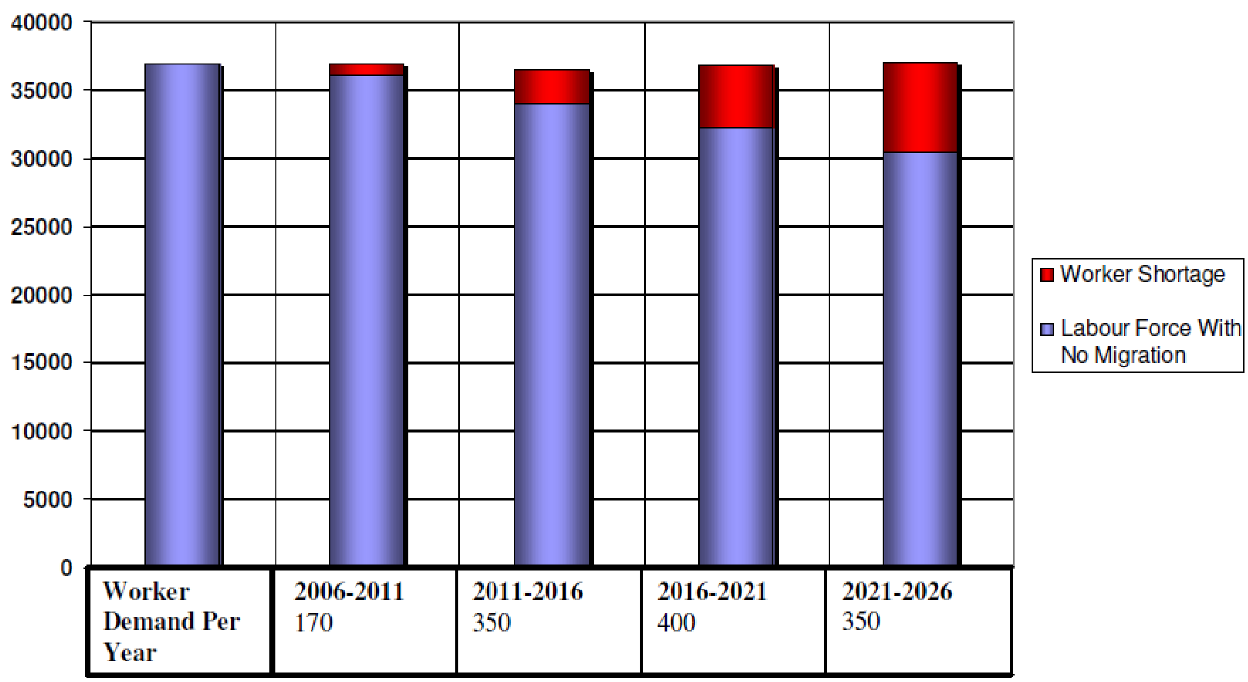


Exhibit 4-3: Labour Force Projections

4.2 Land Use Patterns

Land use and transportation are inexorably connected; every land use designation has respective transportation implications and every transportation action also affects land use. Therefore, it is important to understand Sault Ste. Marie's land use patterns in order to efficiently plan its transportation system. **Exhibit 4-4** illustrates the City's land use designation as per the Official Plan's Schedule C.

4.2.1 Commercial

The majority of commercial areas within the City are concentrated in the downtown area and along Pim Street, Great Northern Road, Trunk Road, and Second Line. Commercial land use includes businesses involved in various sectors such as retail, finance, insurance, real estate, business, government, educational, health, social services, accommodation, entertainment, food and beverage, and others.

In addition to being a commercial hub, the City's downtown area acts as the primary administrative, business and cultural centre of the community; it also contains a small but established residential area.

Within the last 10 years, there has been increasing commercial, retail, and social development in the northern section of the City, particularly along Great Northern Road. This has stemmed from big box developments along the corridor and more recently the opening of the new Sault Area Hospital in 2011 as well as two new schools. These changing development patterns have resulted in increased pressure on the transportation system in the north end of the City.

4.2.2 Industrial

Industrial land use within Sault Ste. Marie includes businesses engaged in various industries such as manufacturing, forestry, transportation, construction, communication, power generation and other utility and wholesale trade industries.

The biggest industry and major economic force in the area is steel production, particularly the Essar Steel Algoma company (formerly Algoma Steel) which is a primary steel manufacturer that employs approximately 3,500 of the City's residents.

With its ideal location near the Boreal Forest, the City has a large forestry industry with a number of pulp, paper and wood-processing companies as well as an industrial base to support the forestry sector with various capabilities such as fabricating, machining, metalworking, tool & die, light metal stamping, research and development, engineering and technical services.

In its position as a transportation focal point due to the presence of the International Bridge, the City also supports a large trucking and transportation service industry and has become an important regional centre for health, education and government services.

Another key industry in the City is in the power generation sector; Sault Ste. Marie calls itself the alternative energy capital of North America as it has a number of power generation facilities with a wide-range of energy sources such as wind, solar, hydroelectric, cogeneration, etc.

The majority of industrial lands in Sault Ste. Marie are concentrated in the south-western and northern outskirts of the City's Urban Settlement Area (defined in the Official Plan's Schedule C).

4.2.3 Institutional

The institutional land use designation encompasses lands used for major public or semi-public purposes such as hospitals and medical centres, educational institutions (such as schools, colleges and universities), retirement homes, and major governmental institutions. The majority of institutional land uses are located in the eastern half of the City. As noted above, the opening of the new Sault Area Hospital as well as two new schools has shifted some travel and development to the northern part of the City.

4.2.4 Rural Area

The City's rural area designation includes all of the municipality's land which falls outside of the Urban Settlement Area. Rural land uses mainly include agricultural uses, forestry, mining, quarrying and aggregate removal, landfill sites, golf courses, riding academies, and others.

4.3 Cultural Heritage

The City's Official Plan states:
"*Each major theme in Canadian History is represented in the history of Sault Ste. Marie. Throughout the City, there are several locations and structures that serve as a link to this past. These sites are part of the City's cultural heritage and should be preserved for the benefit of local residents and visitors…*"

Cultural heritage resources can include any location of historical, contextual, architectural, archaeological, or scenic value and can take the form of districts, landscapes, buildings, structures, monuments, remains, and many others. The Sault Ste. Marie Municipal Heritage Committee advises City Council regarding the cultural heritage value or interest of properties within the Municipality and recommends that significant properties be designated under the Ontario Heritage Act. The conservation of heritage buildings and sites helps stabilize and enhance the character of the community, and thus any transportation recommendations must consider the preservation of cultural heritage.

Exhibit 4-5 illustrates the various cultural heritage locations within Sault Ste. Marie, which include various heritage properties/sites as well as the locations of history plaques (as per the Municipal Heritage Committee); descriptions of these cultural heritage locations can be found on the City's website. Additionally, **Exhibit 4-6** illustrates locations of archaeological potential within the City.

4.4 Natural Heritage and Resources

Sault Ste. Marie is considered a naturally gifted community. The natural beauty of the region has created a significant tourism industry. Furthermore, the City's position as a natural resource centre will continue to provide the basis for economic growth. These natural resources include minerals and mineral aggregates, forested areas, as well as sourcewater, wellhead and groundwater recharge protection areas. In addition to its natural resources, the City also has significant natural areas such as wetlands and natural habitats for fish, deer and rare or endangered species. **Exhibit 4-7** below illustrates Sault Ste. Marie's natural heritage features as per the Official Plan's Schedules A and B.

4.5 First Nations

Sault Ste. Marie is currently bordered to the east by the Rankin and Garden River First Nation reserves. The Rankin reserve (No. 15D) is a 15.5 km^2 reserve with a population of approximately 570 (in 2006); it gets its name from the Rankin Mining Company, which owned this property until it was purchased by the Batchewana First Nation people in 1939. The Garden River reserve (No. 14) is a 207 km^2 reserve for the Ojibwa First Nation people, with a population of approximately 1,110 (in 2011).

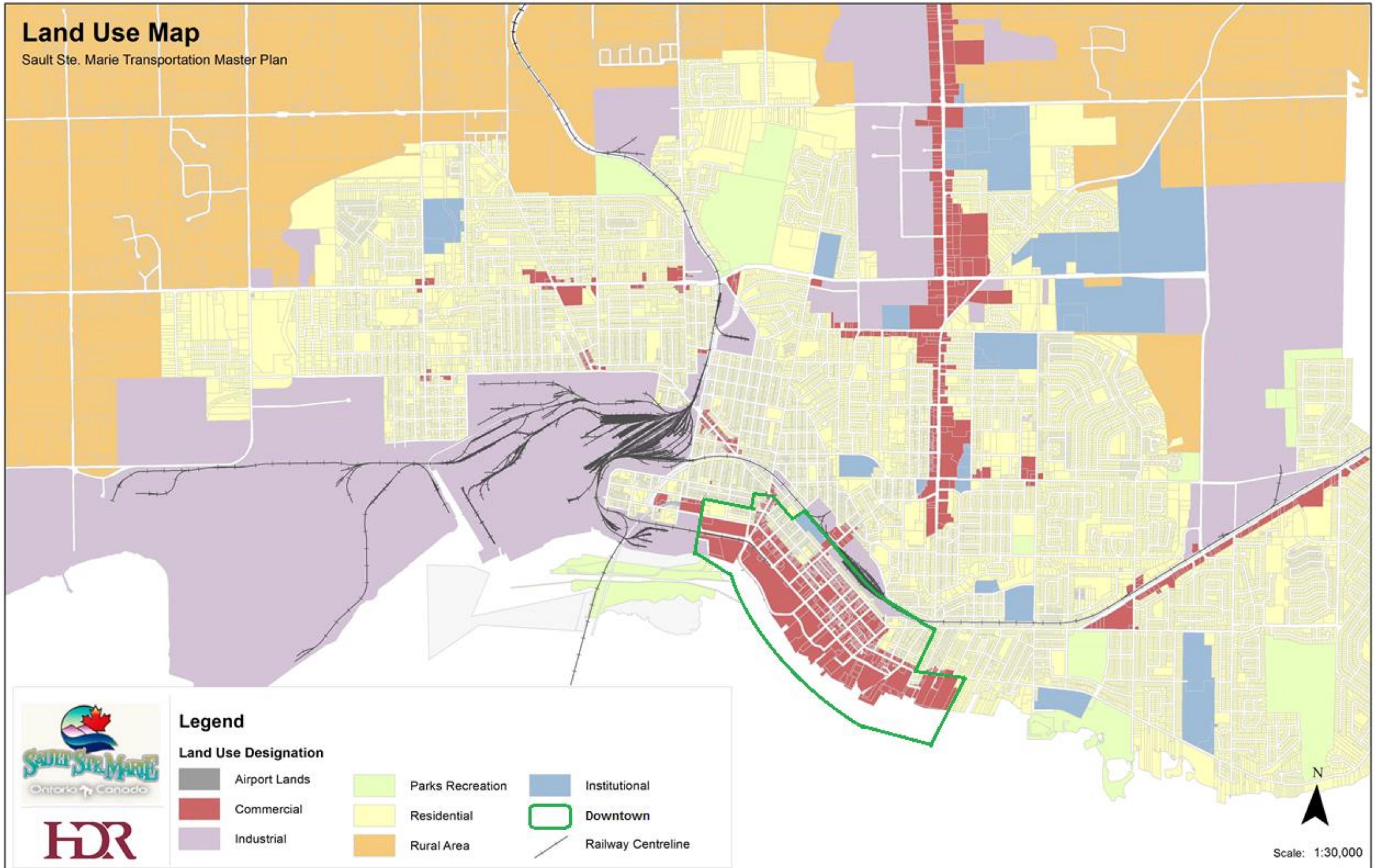


Exhibit 4-4: Official Plan Land Use Designation

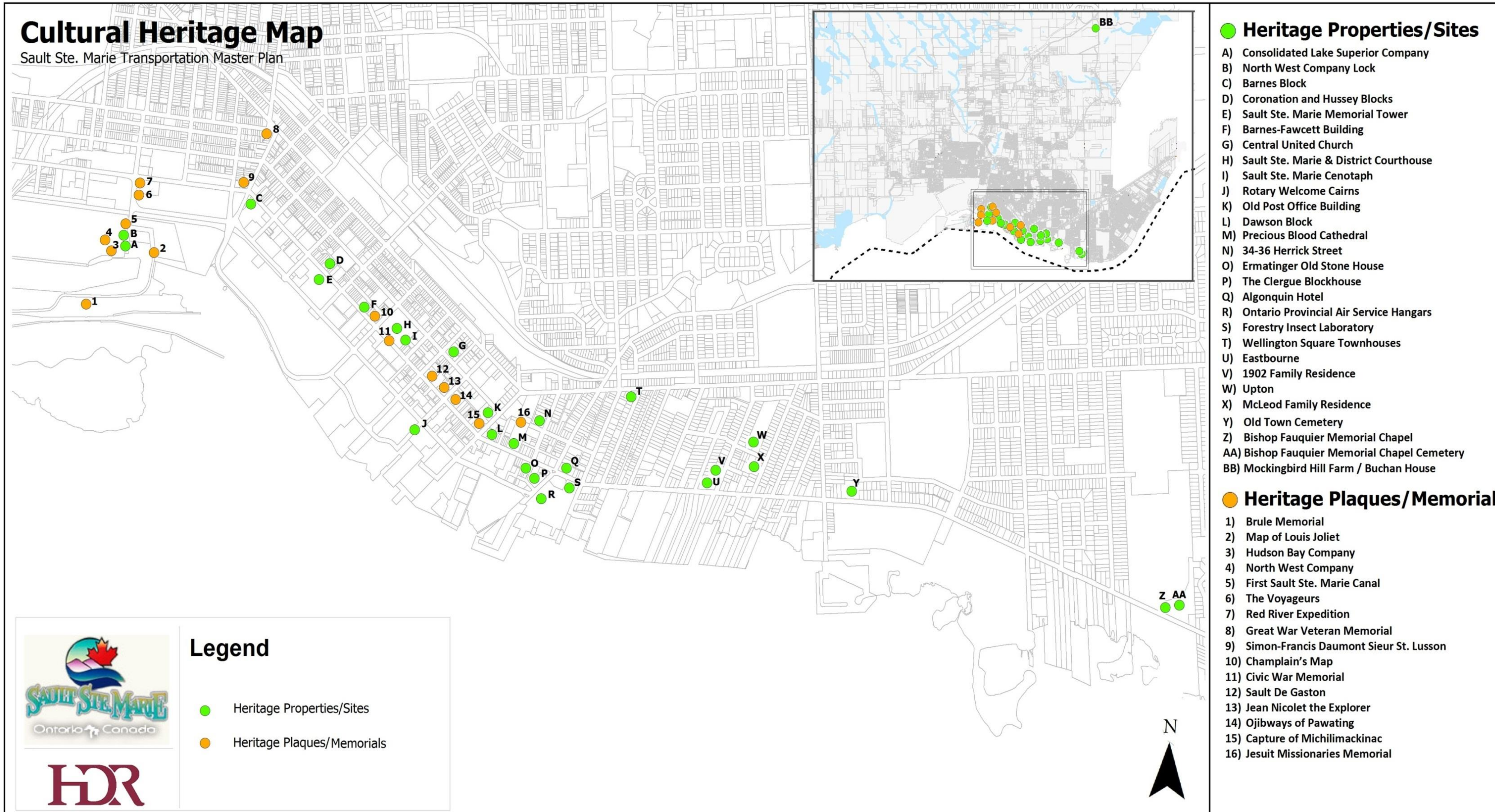


Exhibit 4-5 – Official Plan Cultural Heritage

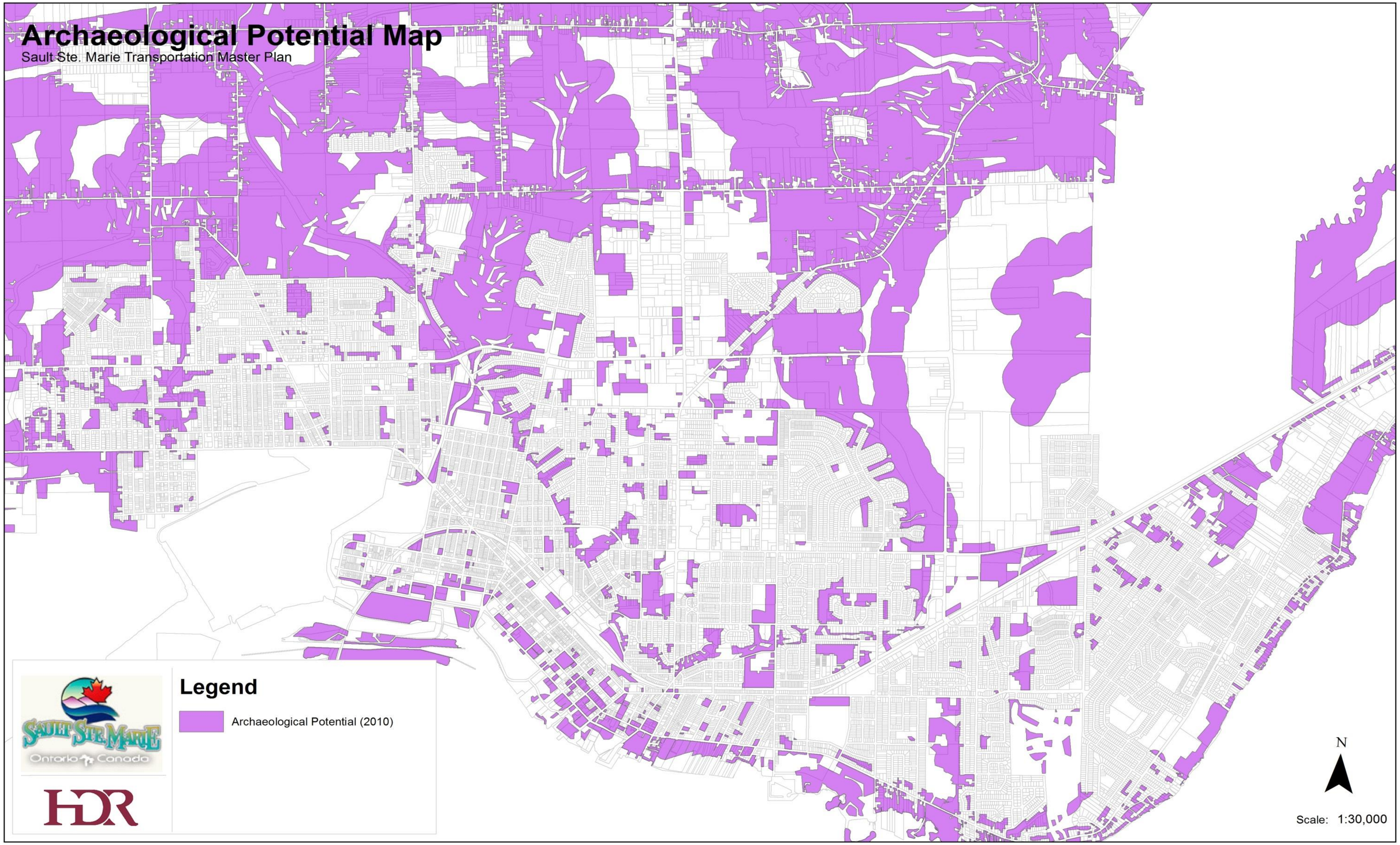


Exhibit 4-6 – Official Plan Archaeological Potential

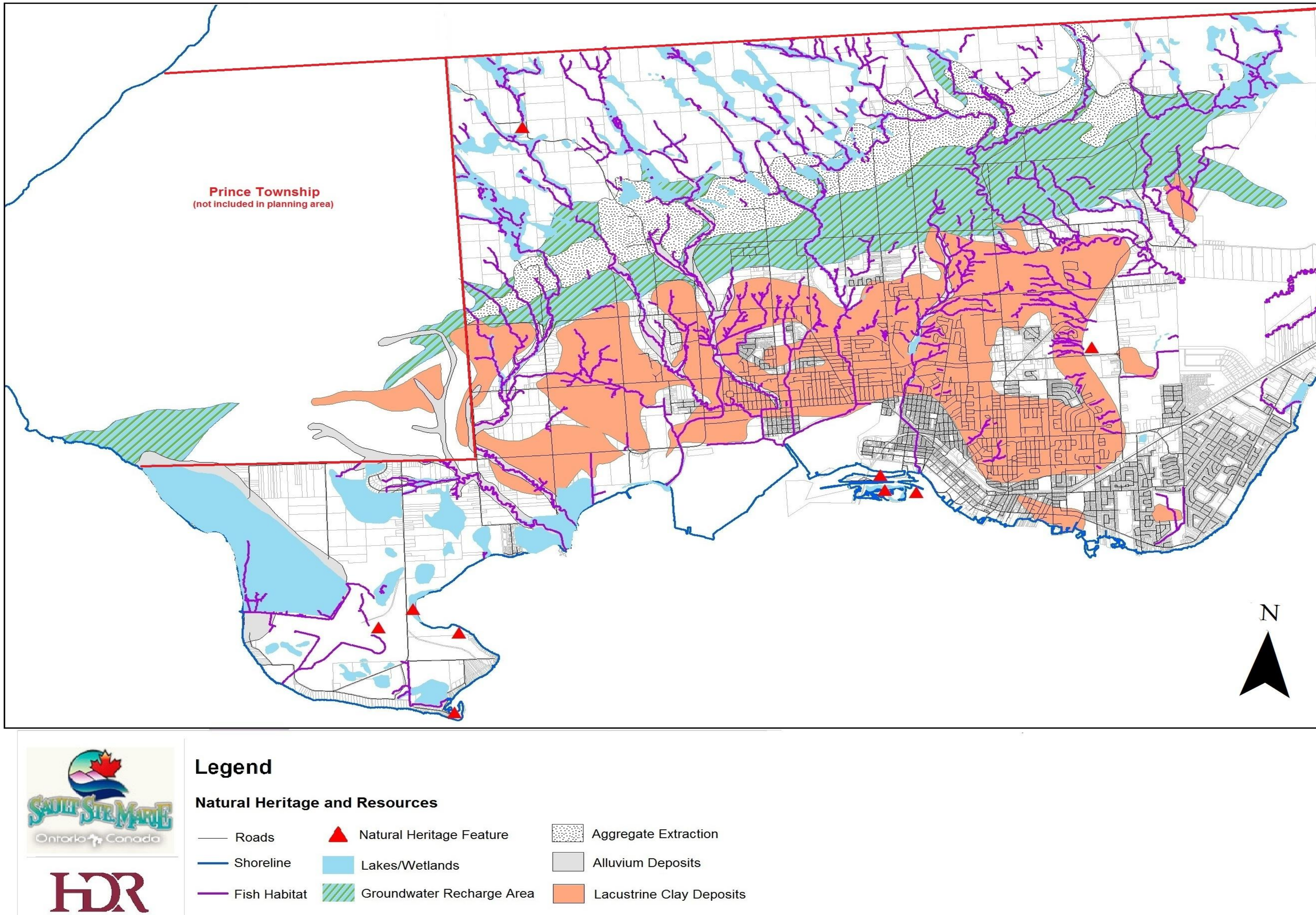


Exhibit 4-7 – Official Plan Natural Heritage and Resources

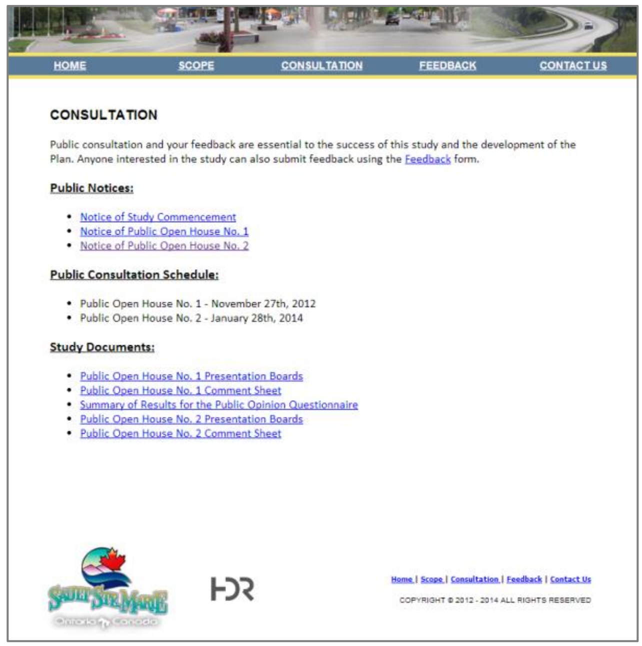
5. PUBLIC FEEDBACK

A key component of the Transportation Master Plan study is consultation with stakeholders, regulatory agencies, and the general public. Public consultation is designed to:

- Provide an open line of communication with the public, other municipalities, and agencies
- Provide information to the public as a basis for engaging in active dialogue with the public and ensuring public participation
- Seek the public's input on the identification of issues, the development of alternative solutions, and the selection of the preferred alternative
- Ensure that the plan has general support from the community

In this study, the public consultation process involved:

- Public notices of study commencement and public open houses
- Information dissemination and feedback opportunities provided through the study web site
- A public opinion questionnaire to understand the transportation needs and concerns of the City's residents
- Two public open houses held at the City Hall in November 2012 and January 2014
- Study website including all presentations and display materials from the public open houses



Details on the public consultation process are provided in **Appendix A**.

5.1 Findings of the Public Opinion Questionnaire

A voluntary TMP public questionnaire was conducted through the study website from September to December, 2012 (and publicized at the first public open house). The survey was intended to reflect the desires of the residents with respect to the development of the City's long-term Transportation Master Plan, particularly with regards to current issues with the transportation network and opportunities for active transportation and public transit improvement, and was open to all citizens from the community who were interested in participating. A copy of the questionnaire and a detailed assessment of the survey results are provided in **Appendix A** to this report. A summary of the results, including excerpts from the detailed assessment, is provided in the following sections.

A total of 1,066 survey responses were received, which represent approximately 1.4% of the City's population. Although this response rate does not provide a statistically accurate representation of all citizens' opinions, it does capture general public views on transportation issues in the City.

Partial survey findings were presented at the Public Open House #1 which was held in late November 2012. The online questionnaire was still available for the public to respond to for 2 weeks following the first open house. A review of the subsequent survey responses did not significantly change the survey findings presented at the open house.

5.1.1 General Transportation Issues

Survey respondents were asked to rank the importance of six transportation issues: road congestion, traffic signal coordination, unsafe driving, cycling paths, pedestrian crossings, and sidewalks. Based on the responses provided, driving-related issues were the top ranked issues by respondents with road congestion, poor traffic signal coordination, and unsafe driving ranked as the top three most important issues of concern. A summary of these responses is illustrated in **Exhibit 5-1.** In addition to ranking the issues of concern, many respondents also provided additional feedback regarding issues such as accessibility (for persons with a disability), cycling facilities, safety, traffic operations/road conditions, traffic signals, transit accessibility/operation, walking facilities and other considerations.

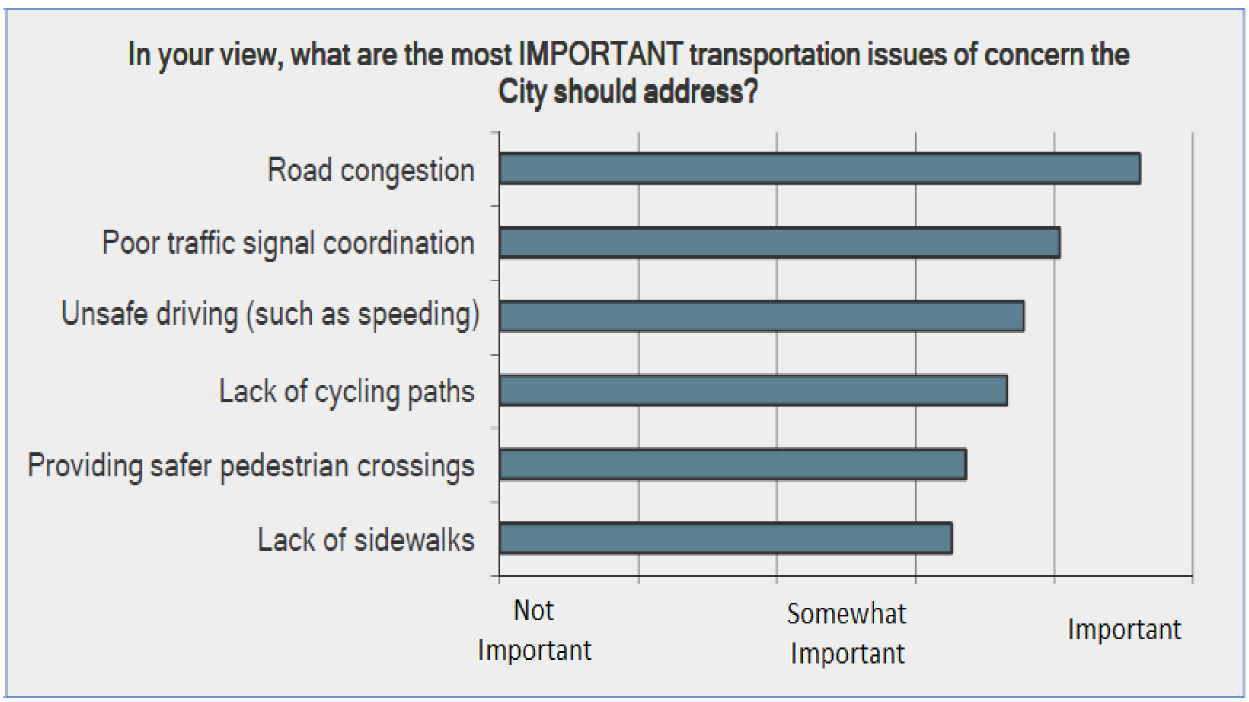


Exhibit 5-1: Importance of Transportation Issues

The majority of survey respondents also provided feedback regarding what they believed the guiding principles of the City's TMP should be. The top rated principles, as shown in **Exhibit 5-2**, were improving the operation and coordination of signalized intersections and making walking and cycling safer, which have both been reaffirmed in the detailed responses received throughout the questionnaire. On the other hand, the principles which received the least support were investing in transit and making transit service more frequent and better connected, as well as adding capacity for cars and investing in new roads. Individual responses were also provided which fall under the following categories: accessibility (for persons with a disability), cycling facilities, traffic operations/road conditions, traffic signals, transit accessibility/ operation, safety, walking facilities, and other considerations.

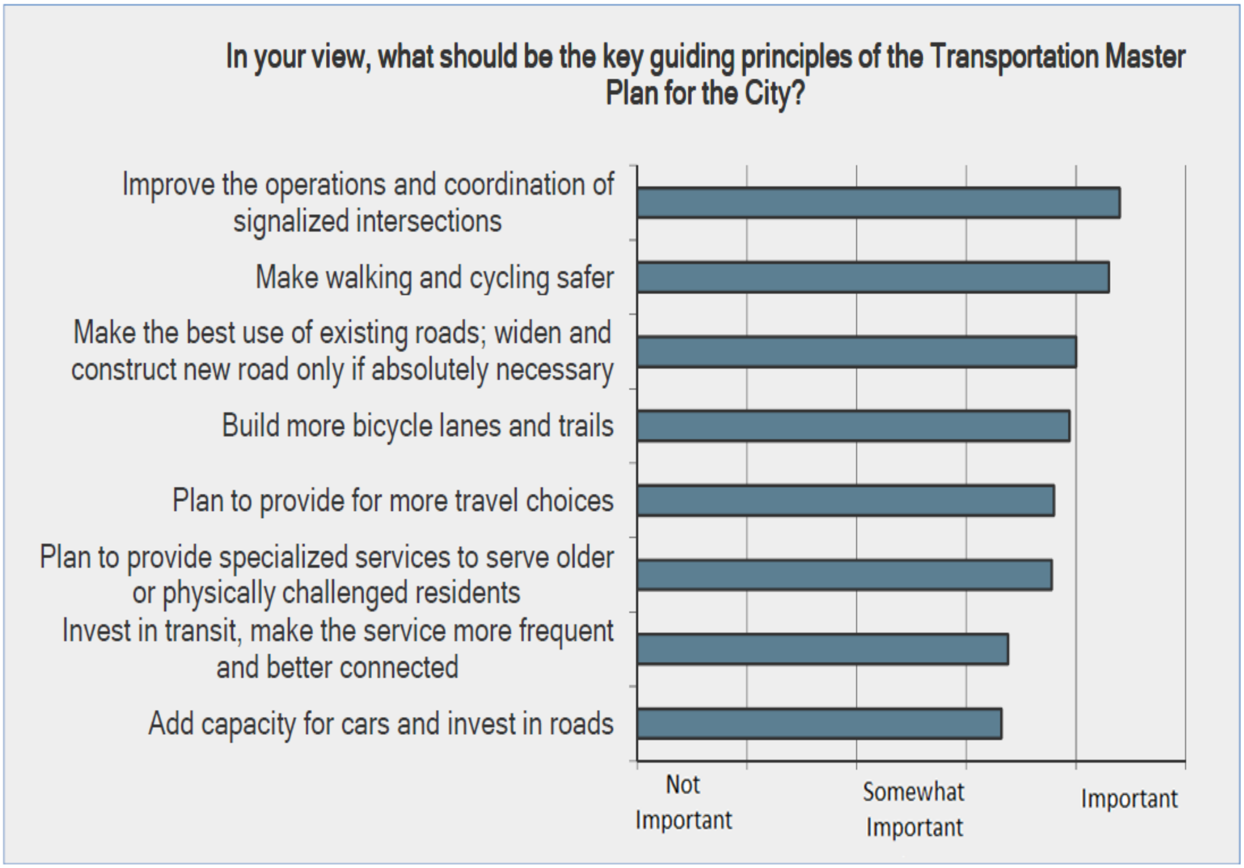


Exhibit 5-2: Key Guiding Principles for the TMP

5.1.2 Road Network

Respondents specifically identified main groups of concerns regarding the existing road network, including:

- Poor roadway maintenance
- Congestion
- Speeding
- Poor pavement markings and signage
- Road safety

5.1.3 Transit and Active Transportation

Almost all survey respondents provided an answer to whether they would consider taking transit, walking, or cycling. Reponses were split with roughly two thirds of respondents being likely to consider transit and active transportation. A summary of responses is illustrated in **Exhibit 5-3**.

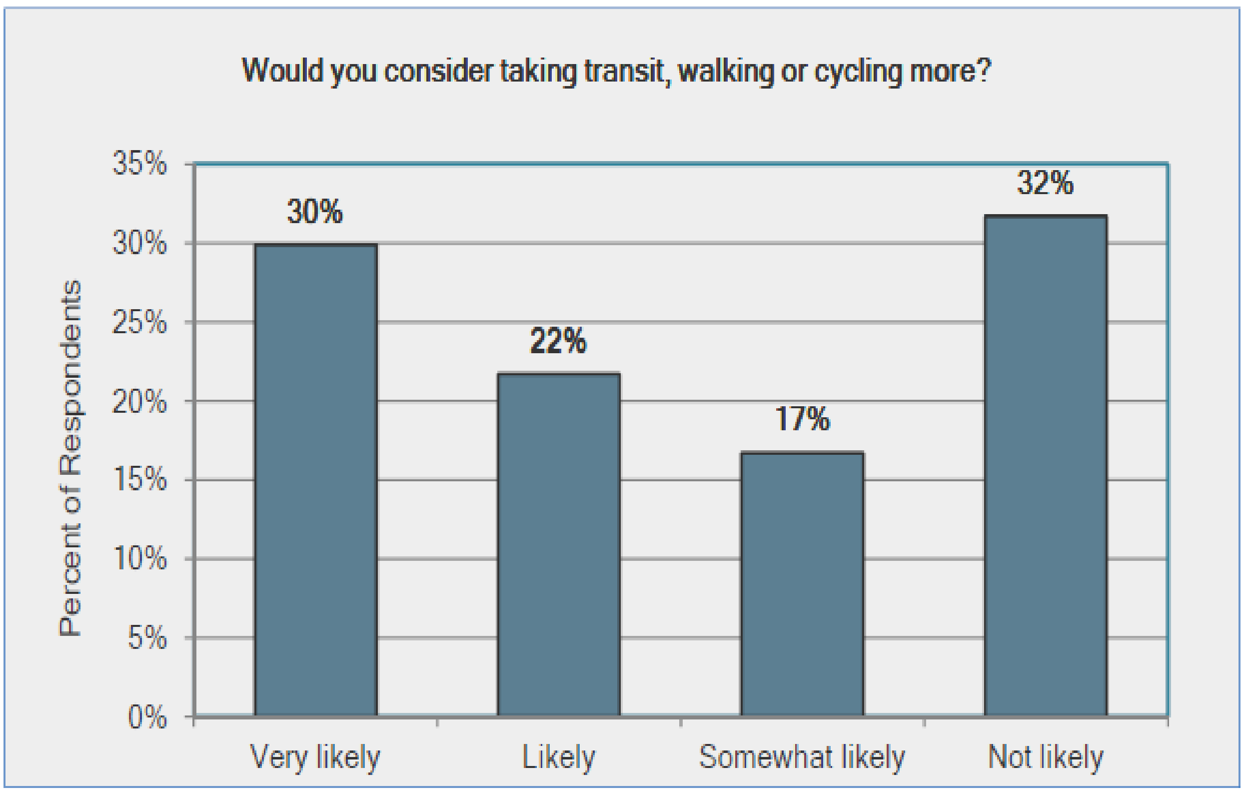


Exhibit 5-3: Willingness to Use Transit and Active Transportation

When asked to rate the importance of certain changes to the existing transportation network that would be required to induce more use of transit, walking, or cycling, respondents ranked separated bicycle lanes as the most important changes. Second to this was better sidewalk quality. More bicycle racks, shorter bus travel times, and frequent transit services ranked at the lower end of changes required. A summary of these responses is illustrated in **Exhibit 5-4**. Nearly one-fifth of the respondents also provided additional comments regarding accessibility (for persons with a disability), cycling facilities, safety, transit accessibility/operation, transit service coverage, traffic operations and road conditions, weather/seasonal, pedestrian facilities, and other considerations.

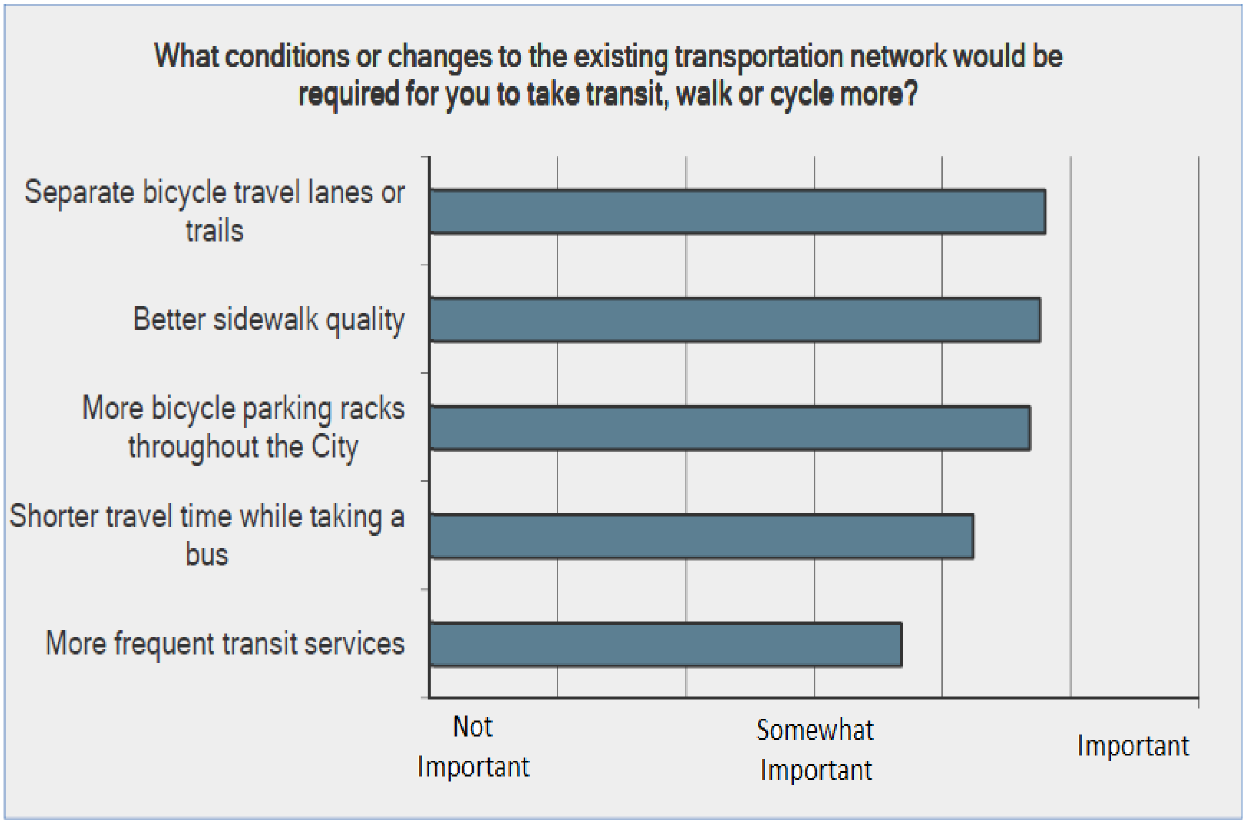


Exhibit 5-4: Conditions to Induce More Use of Transit and Active Transportation

Survey respondents were also asked what additional recreational or commuter cycling routes should be considered for Sault Ste. Marie, with the majority of responses favoring a combination of urban and recreational cycling routes. A summary of responses is illustrated in **Exhibit 5-5**. Many respondents provided other considerations for cycling infrastructure which fall under the following general categories: rural and urban connectivity, cycling route operations, hub trail issues, specific route recommendations, and other comments such as 'no action required'.

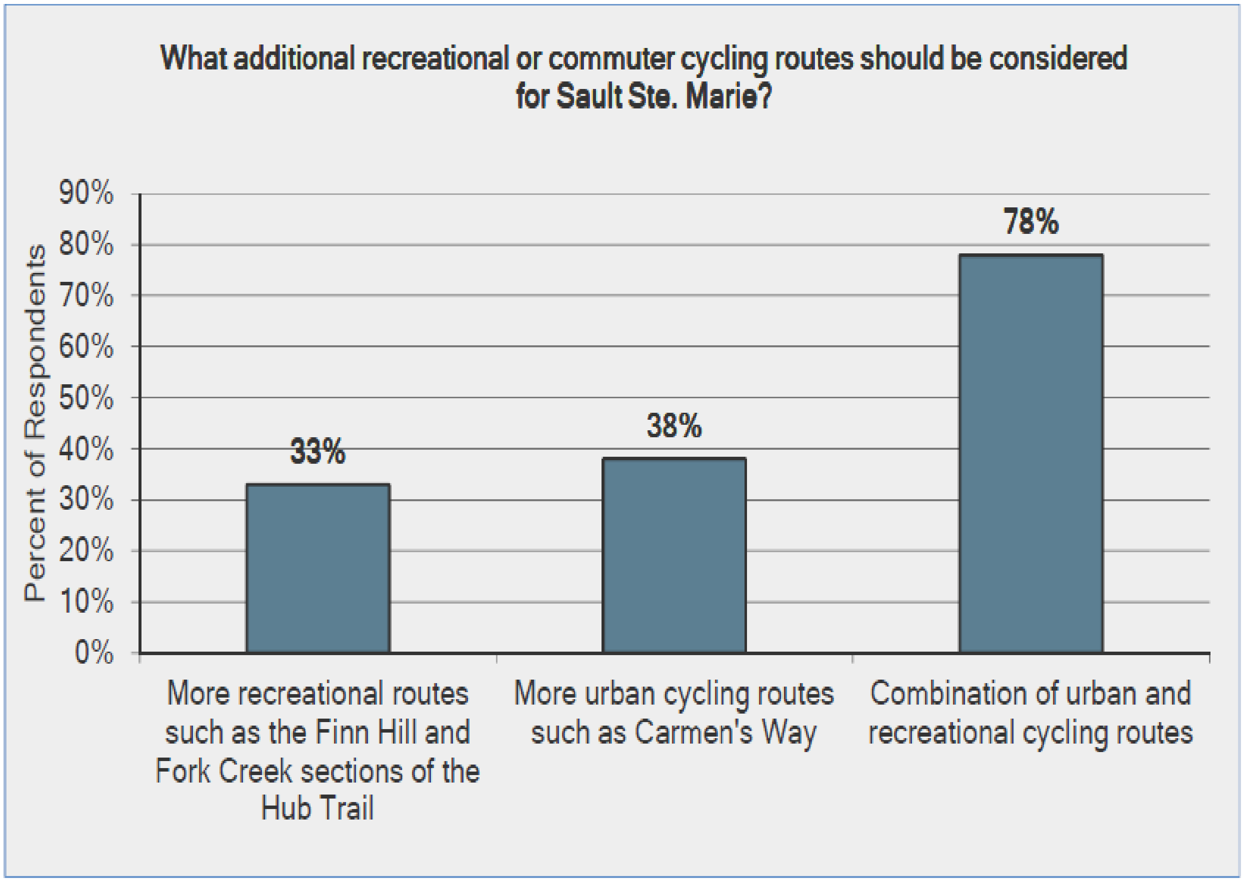


Exhibit 5-5: Additional Cycling Routes

5.2 Public Open House Consultation

Two public open house consultation sessions were held at the City of Sault Ste. Marie offices to gather valuable public input on the proposed Transportation Master Plan. Public notices, sign-in sheets, handouts, comment forms, and the display boards are documented within **Appendix A** to this report.

The objective of the first Public Open House was to present information to the public on existing traffic conditions within the City, the findings from the TMP online questionnaire, the TMP study process and schedule, and to present and gain input on the Problem and Opportunity Statement.

The objective of the second Public Open House was to present and solicit feedback on the problem statement, transportation network alternatives, preliminary recommendations, potential changes to traffic policies, and selection of a vision statement.

Comments and input received from the two events were considered while developing the framework of the study and formulating study recommendations which follow in subsequent chapters of this report.

6. PROBLEM AND OPPORTUNITY STATEMENT

The City of Sault Ste. Marie is unlikely to experience significant population growth over the next 20 years and as a result significant traffic volume increases are unlikely. However, with the relocation of the hospital and the amalgamation of four secondary schools into two new schools, as well as ongoing commercial development, travel patterns are changing, particularly with increased pressures for travel to and from the northern part of the City. Furthermore, communities throughout Canada are increasingly focused on enhancing their ability to accommodate all travel modes to promote sustainable transportation systems.

The City will need to address changing travel patterns in the City and ensure road infrastructure continues to operate at a good level of service. In the coming years, the use of existing infrastructure needs to be maximized while encouraging an appropriate mix of transportation mode usage.

7. FUTURE CONDITIONS

7.1 Projected Population

The City's population has remained relatively constant over the last 13 years oscillating between 74,000 and 75,000 persons. In 2011 the recorded City population was at 75,140. The expected population growth documented in the Official Plan will see the number of residents increasing by 10% to 82,500 by 2026 (as seen in **Exhibit 7-1**). This increase is dependent on the City's ability to attract new migrants.

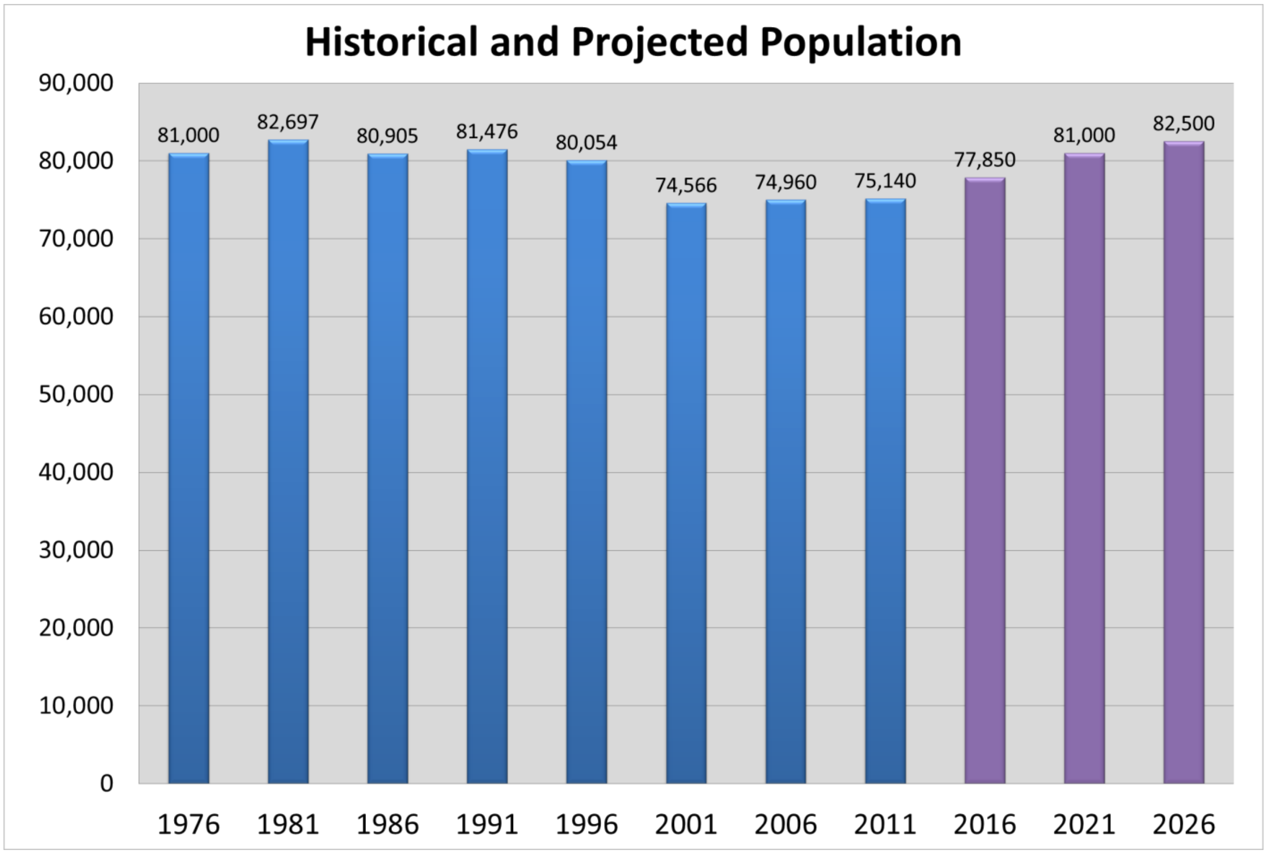


Exhibit 7-1: Population and Household Projections for the City of Ste. Marie, 1976-2026

Source: Official Plan Review Population and Household Projections Presentation of Council, September 22, 2008

7.2 Background Traffic Growth

The stability of the population is reflected in relatively low variation in background traffic observed on arterial roads across the City. Background traffic growth calculated from a City's traffic count database ranging back to 2004/2005 is on average **1%** for arterials running in the east-west direction and **-2%** (i.e. decay in background traffic) for arterials running in the north-south direction.

To simplify the calculation and to reflect the overall stability in population levels, 0% growth was assumed for overall background traffic growth in the TMP technical analysis.

7.3 Development Related Traffic Growth

The City's Planning and Development Department estimates that residential, industrial/commercial and retail development will occur in various areas of the City within the next 20 years. This new development will be spurred by the increase in population discussed previously (10% increase by 2026) and by shifts and reallocation of the existing City residents. It is anticipated that within the next 20 years the City will grow by an additional 2,180 residential units, 265,000 square feet of gross floor area (GFA) in commercial space, 222 acres of industrial use including 67 acres for a future multi-modal transfer facility, and an increase in institutional uses. The approximate location of the future development is illustrated in **Exhibit 7-2**, along with a proposed traffic zone system for future demand modelling. A detailed listing of 29 separate developments proposed in the City is provided in **Appendix K**.

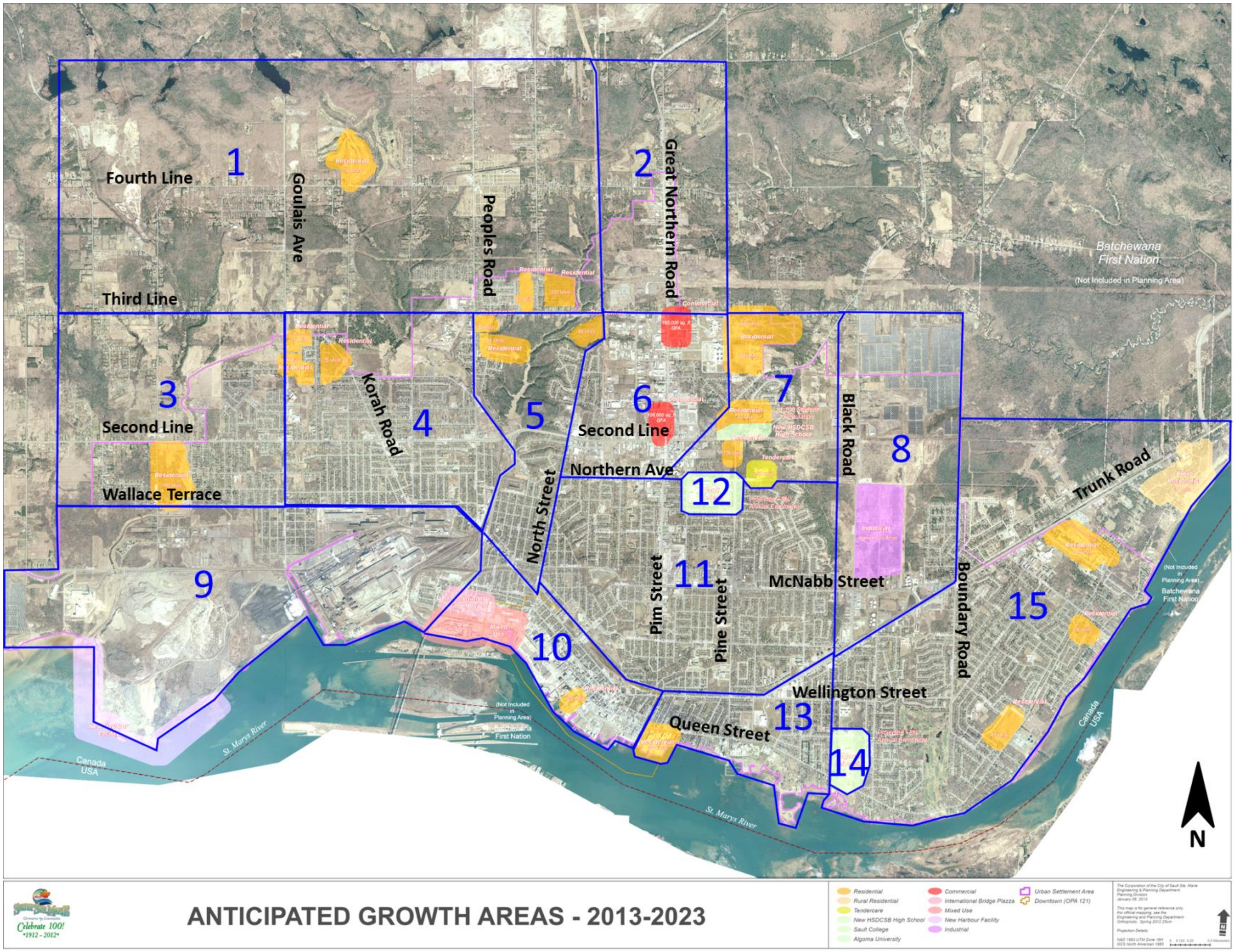


Exhibit 7-2: Anticipated Growth Areas

Auto travel demand generated by these new developments for the three horizon periods of interest (10 year, 20 year, and 20+ year period) was forecasted through a high-level analysis under the Urban Transportation Modelling System (UTMS) framework. The land use growth assumptions for each horizon year, as described above, were used as inputs to the Institute of Transportation Engineers (ITE) Trip Generation Manual (9^{th} ed.) to determine the number of trips generated by each development type. See **Appendix K** for detailed trip generation rate calculations for each development area for each horizon year. Note that a horizon period of 30 years was assumed for the 20+ year horizon period and growth in enrolment in institutions was assumed to be compounded for the development of land use forecasts.

The new development trips were assigned to a road network created in the EMME modelling package. The load incurred on the road network by additional demand is similar for the three horizon periods of interest. Notably, AADTs on Black Road and on Second Line east of Great Northern Road increase significantly (23% and 45% increases, respectively, for the 10-year horizon period, amounting to over 20,000 vehicles per day on both arterials). Similarly, certain sections of Old Garden River Road, Great Northern Road, Third Line experience significant increases in volumes as well.

7.4 Future Travel Demand

Additional volumes predicted by the EMME model were added to the existing volumes on the City's road network to yield total Annual Average Daily Traffic (AADT) volumes. AADT future demand maps were generated for each of the three horizon periods of interest (10 years, 20 years, and 20+ years). The highest growth in traffic is expected along the Black Road and Second Line corridors. This corridor will maintain its primary role as a connector between Trunk Road and Great Northern Road and is expected to carry a significant proportion of the provincial traffic.

Forecast traffic is illustrated for 10 year, 20 year, and 20+ year horizons in **Exhibit 7-3**, **Exhibit 7-4**, and **Exhibit 7-5**, respectively. A summary is provided in **Exhibit 7-6**.

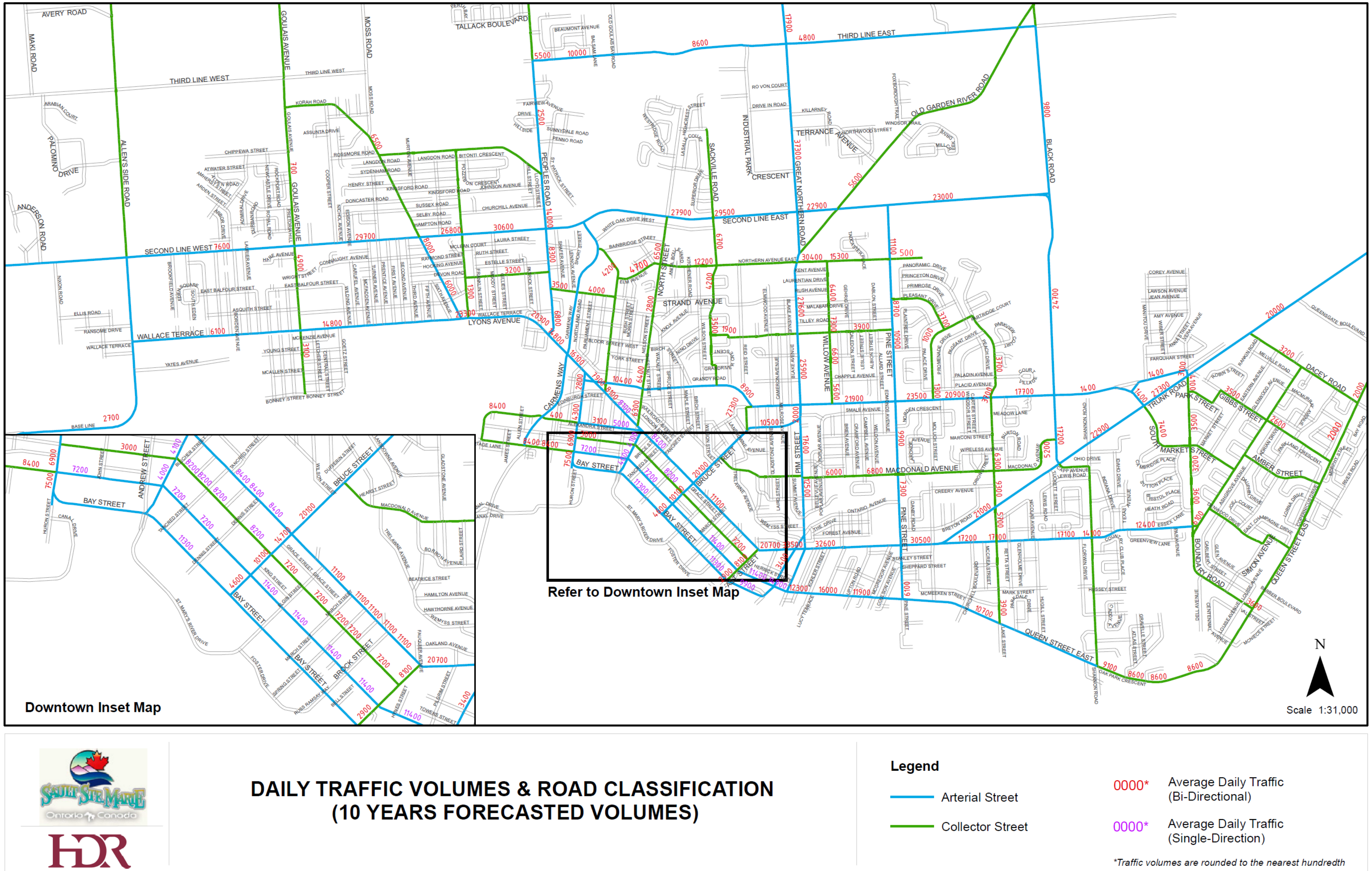
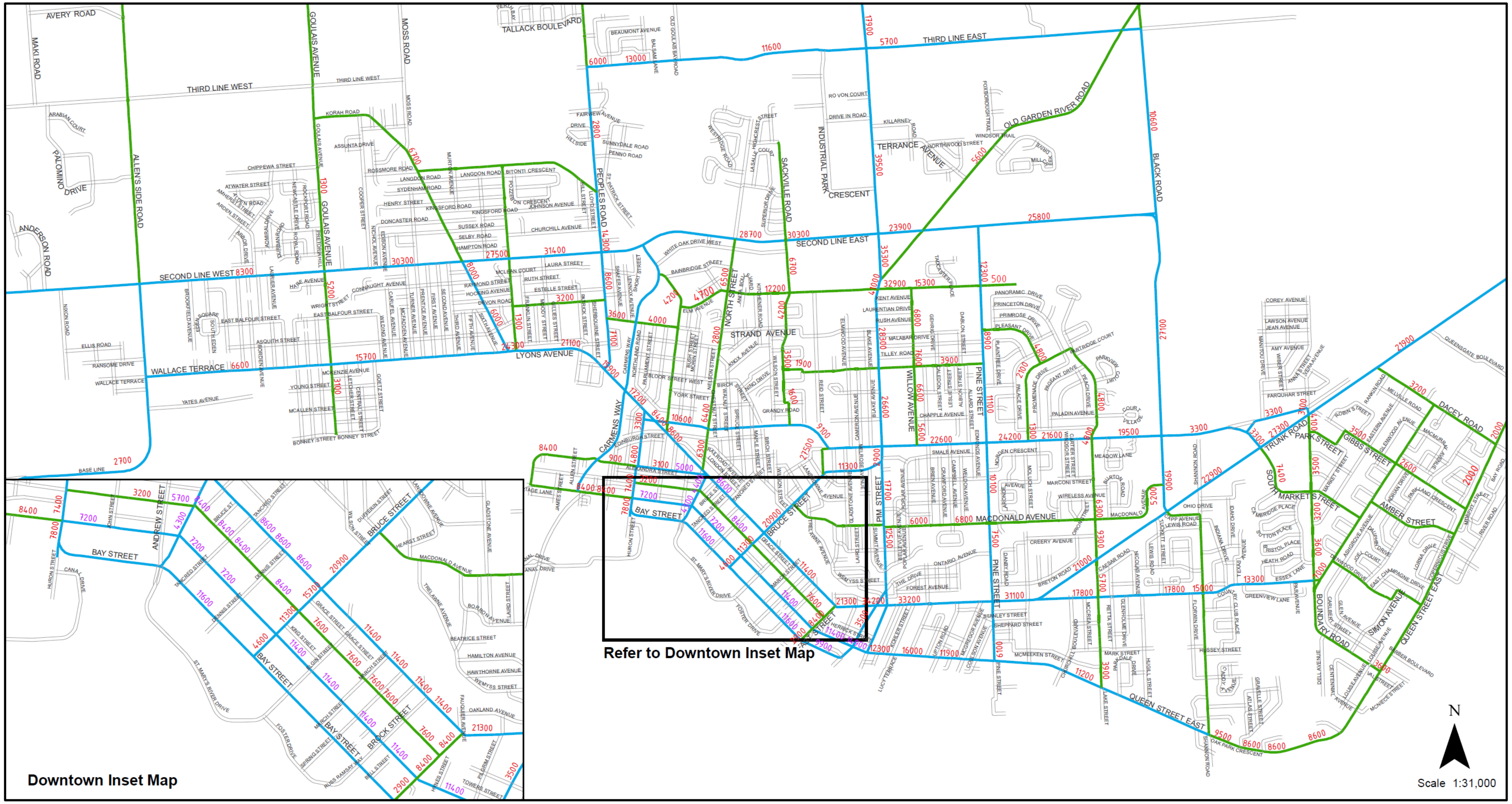


Exhibit 7-3: Estimated 10 year AADT Volumes by 2022



DAILY TRAFFIC VOLUMES & ROAD CLASSIFICATION (20 YEARS FORECASTED VOLUMES)

Legend

- Arterial Street
- Collector Street
- 0000* Average Daily Traffic (Bi-Directional)
- 0000* Average Daily Traffic (Single-Direction)

*Traffic volumes are rounded to the nearest hundredth

Exhibit 7-4: Estimated 20-Year AADT Volumes by 2032

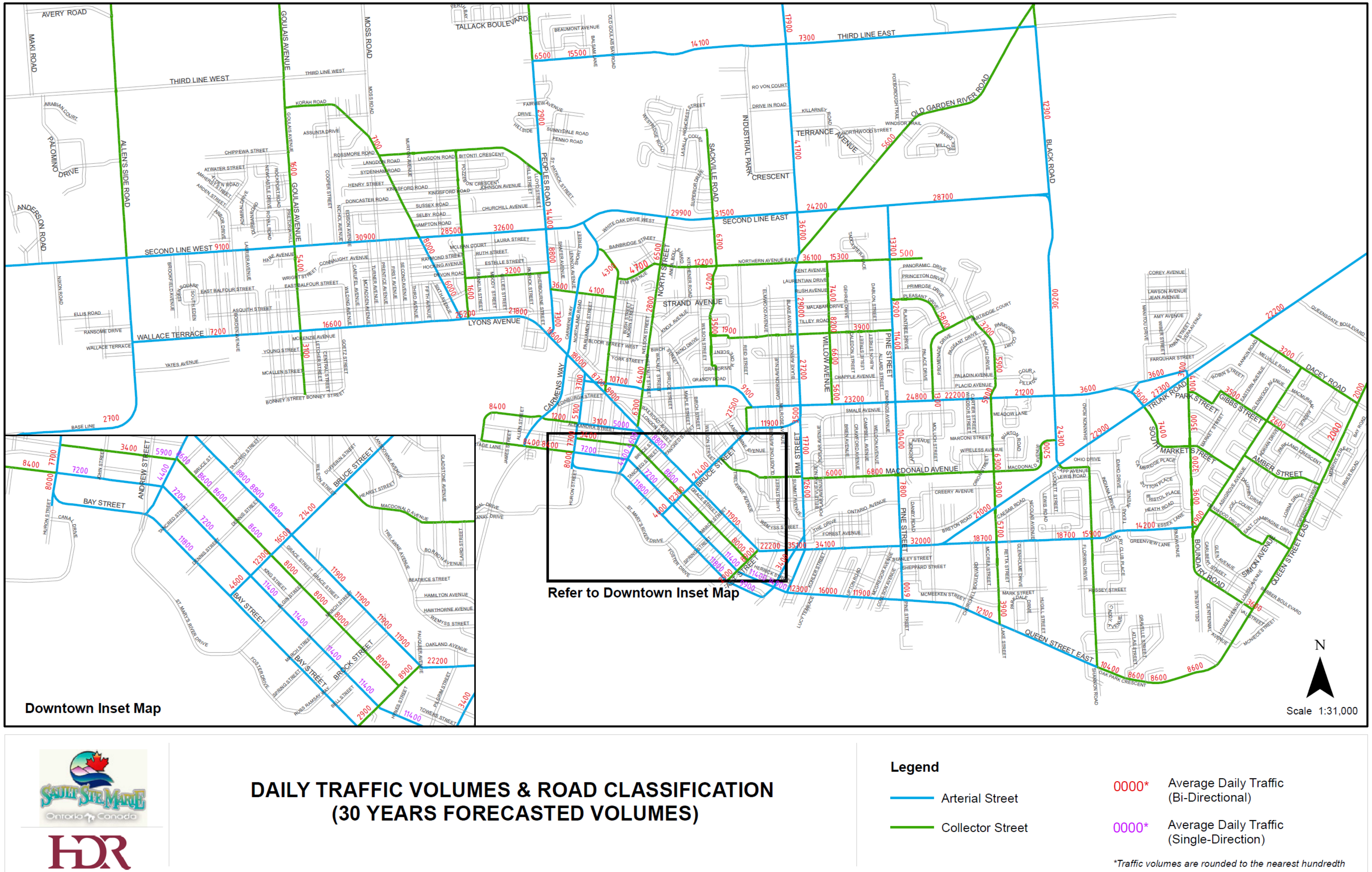


Exhibit 7-5: Estimated Beyond 20-Year AADT Volumes by 2042

Exhibit 7-6: Forecast Traffic Growth Summary

8. PLANNING ALTERNATIVES

Following the requirements of Phases 1 and 2 of the EA process, the study assessed three long-term alternative transportation planning alternatives including the "Do Nothing" alternative. The transportation planning alternatives were evaluated for future travel demands, against a set of Evaluation Criteria to gauge their ability to address the challenges identified in the Problem Statement.

8.1.1 Alternative 1 – Do Nothing

Alternative 1 or the "Do Nothing" alternative reflects the current condition of the roadway network carried over to the horizon year without any roadway capacity or active transportation improvements. There are no expansions or additions to the arterial road network or Provincial highway system. The network of collector road and the transit service improvements reflects the current status quo. The existing road, active transportation and transit maps are described in **Section 3** and illustrated in **Exhibit 3-2**, **Exhibit 3-6**, and **Exhibit 3-7**.

8.1.2 Alternative 2 – A Sustainable Approach

Alternative 2 assumes no capital improvements on the existing road network, but implementation of active transportation based on the City's Cycling Master Plan to improve the existing cycling network along with improvements to the transit network. As such, the Alternative 2 road network would be as per existing conditions and consistent with **Exhibit 3-2**.

The proposed cycling network includes the Hub Trail (almost complete) and a series of recommended on and off-road trails connecting destination points throughout the City. A "next steps" plan to the Hub Trail and cycling network was developed in May 2014 and has undergone some minor revisions since the adoption of the Cycling Master Plan in 2007. The latest Cycling network plan, which would be completed under this alternative, is illustrated in **Exhibit 8-1**.

Investment in transit improvements is also included in Alternative 2. Potential route adjustments identified through discussions with City and Sault Transit staff are illustrated in **Exhibit 8-2**. These routes along with the location of a potential new transit transfer station are subject to further study.

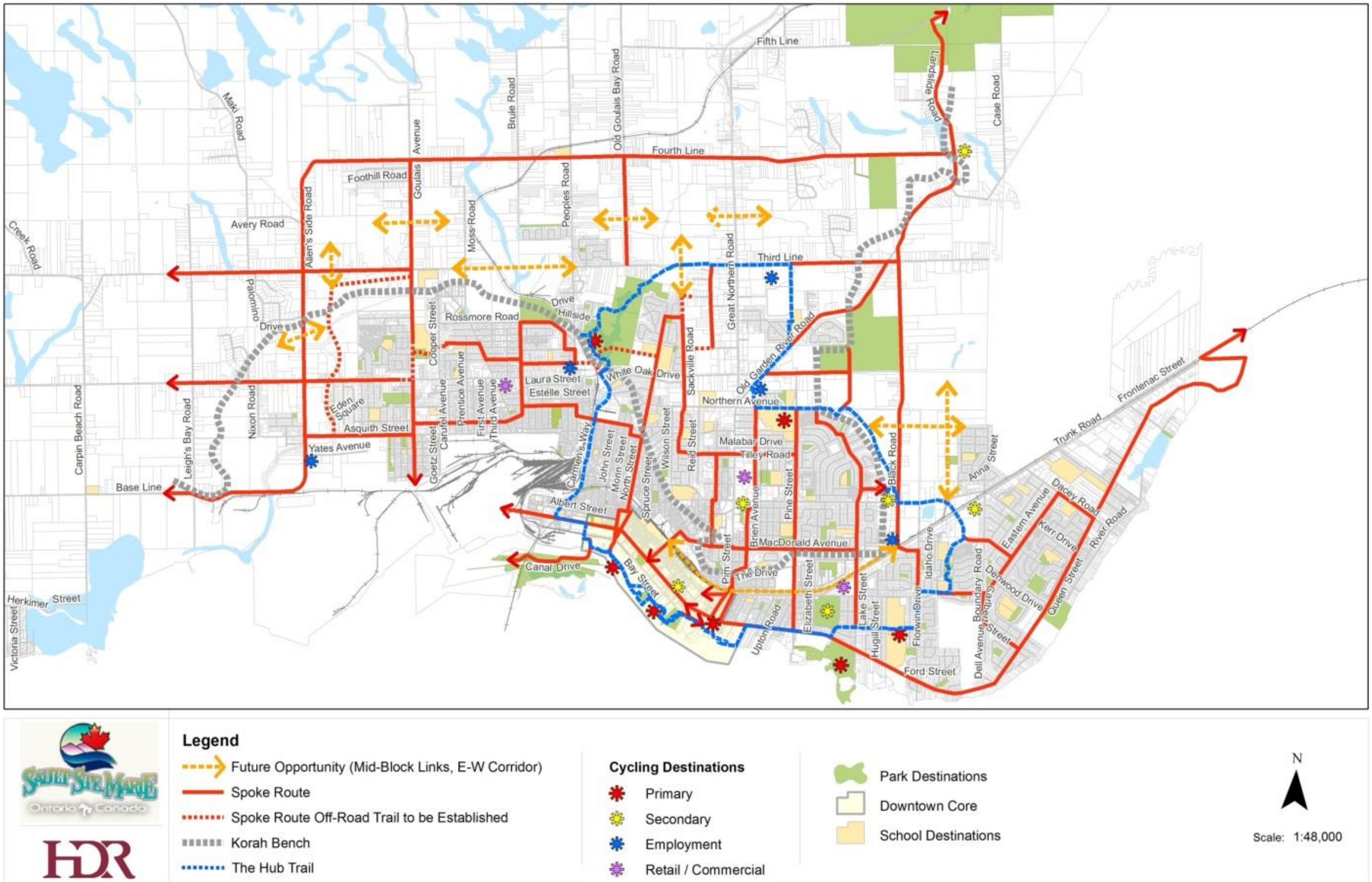
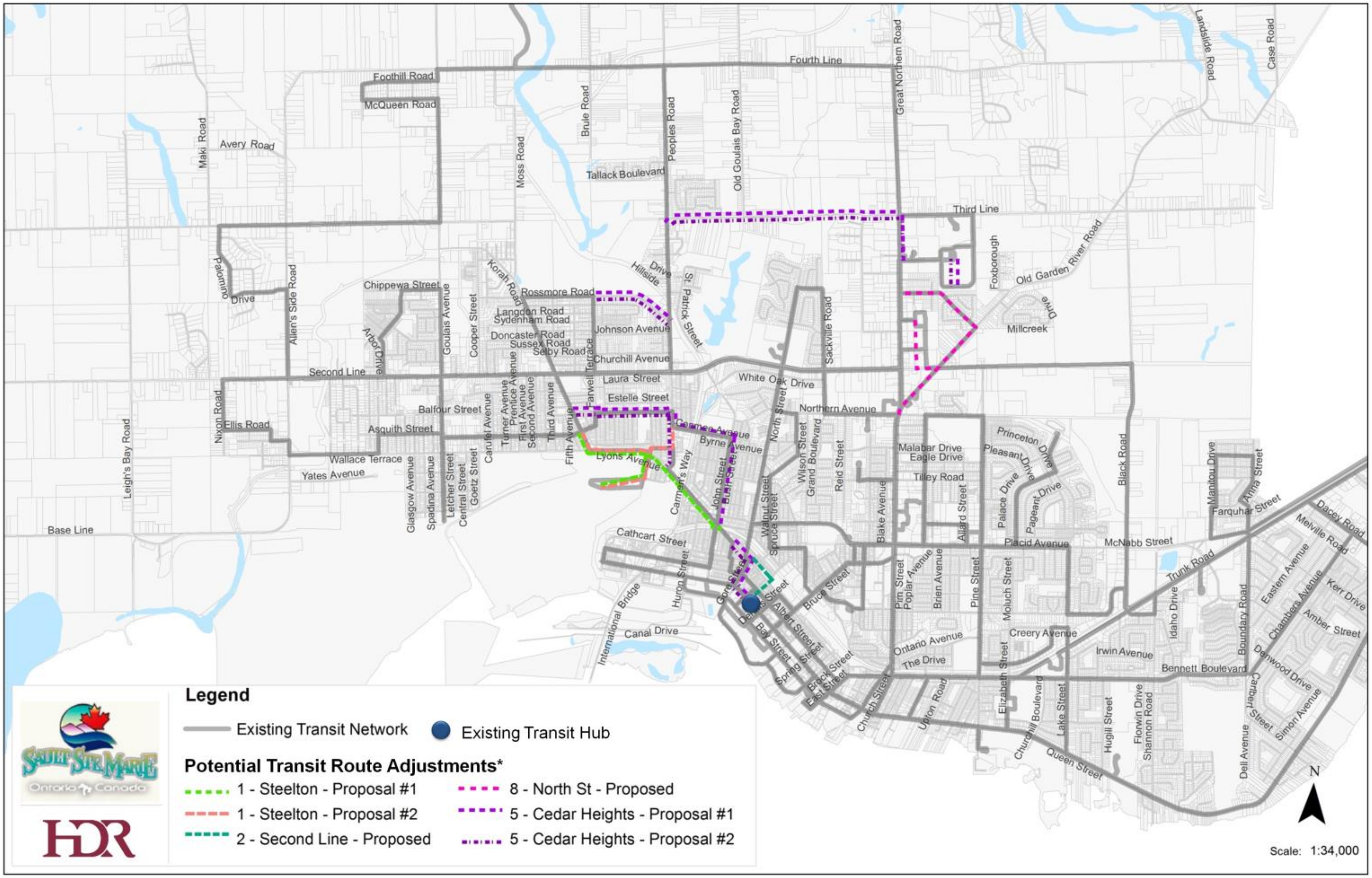


Exhibit 8-1: Recommended Cycling Network



*Subject to further study

Exhibit 8-2: Potential Transit Route Adjustments

8.1.3 Alternative 3 – A Balanced Approach

Alternative 3 includes active transportation and transit improvements described as part of Alternative 2, plus road improvements including the following:

- Highway 17 Bypass (need and justification of which would be determined by the Ministry of Transportation in a separate Environmental Assessment study)
- Black Road from McNabb Street to Third Line
- Third Line from the Sault Area hospital to Black Road
- Second Line widening from 2 to 5 lanes from Pine Street to Black Road
- Northern Avenue Extension to Black Road
- Bay Street Extension under the Sault Ste. Marie International Bridge
- Queen Street East of Pim Street Road Diet
- Extend Sackville north to Third Line

These road improvements are identified in **Exhibit 8-3** and discussed in further detail in **Section 9.1.1**.

The active transportation and transit networks would be consistent with Alternative 2 and are illustrated respectively in **Exhibit 8-1** and **Exhibit 8-2**.

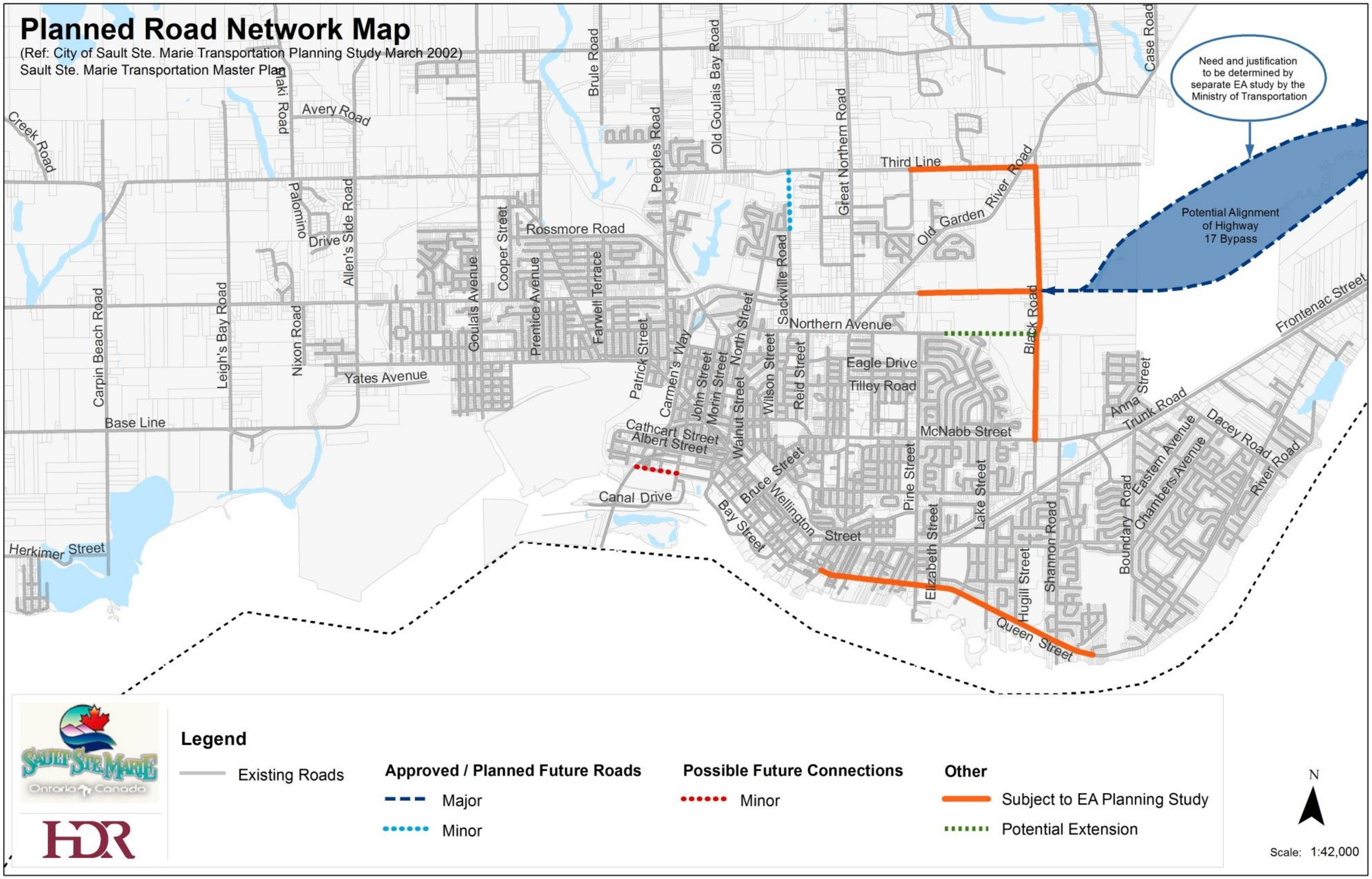


Exhibit 8-3: Recommended Road Improvements

8.2 Evaluation Methodology

Selection of the preferred Planning Alternative is based upon a set of criteria that includes consideration for transportation service, impacts on the natural, policy, and socio-economic environments, public support, and the financial implications.

Table 8-1 summarizes the detailed evaluation criteria that will be used to assess the benefits and dis-benefits of each of the three planning alternatives considered for the Sault Ste. Marie TMP.

Table 8-1: Evaluation Criteria

Evaluation Criteria
Transportation Service
The preferred transportation solution will be sustainable and multi-modal. Particularly, the network shall encourage increased usage of more sustainable modes of travel, such as active transportation including walking and cycling, transit, and reducing single occupant vehicle (SOV) trips while continuing to ensure sufficient capacity for automobiles and commercial trucks. ▪ **Minimizes travel delay at key intersections** ▪ **Provides sufficient road capacity and network connectivity** ▪ **Provides multi-modal opportunities**
Natural Environment
The preferred solution must minimize adverse impacts on natural environment and resources. ▪ **Minimizes impact on natural environment areas, natural resources, and air quality**
Policy Environment
The preferred solution must support City's and Provincial policy goals of building sustainable, efficient and multi-modal transportation. ▪ **Ensures compatibility with provincial Policy Statement** ▪ **Meet's the City's Official Plan objectives**
Economic Environment
The recommended solution must support local economy by providing accessibility and network connectivity for existing and future businesses, goods and services. ▪ **Supports the existing and future business community** ▪ **Maximizes land development potential and provides opportunities for planned growth**
Cost
The preferred solution must effectively use existing transportation infrastructure and minimize capital and maintenance costs. ▪ **Minimizes capital and maintenance costs and impacts to the residential tax base**

8.3 Recommended Planning Solution

The three planning alternatives were assessed against the evaluation criteria. The outcome of the evaluation is summarized in **Table 8-2** and **Table 8-3**, and it shows that Alternative 3 – A Balanced Approach satisfies the most criteria and is thus the preferred alternative.

As summarized in **Table 8-2** and **Table 8-3**, Alternative 3 provides the greatest benefit to the overall transportation system. While Alternative 1 minimizes impacts to the natural environment and costs, it does not make any improvements to existing transportation service, does not benefit the continued growth of the community, and does not support current planning policies of the City. Alternative 2, while providing significant benefits to active transportation and transit services, does not fully benefit all transportation users. Road network improvements throughout the City are needed, and the importance of such improvements is only fully realized in Alternative 3.

Table 8-2: Detailed Evaluation of Planning Alternatives

Criteria	Alternative 1 Do Nothing	Alternative 2 A Sustainable Approach	Alternative 3 A Balanced Approach
Transportation Service			
Minimizes travel delay at key intersections	Does not improve intersection capacity.	Minimal impact to intersection capacity for vehicles.	Proposed road improvements will improve travel delay at key intersections, particularly the Sackville Road extension which will offload the busy Second Line and Great Northern Road intersection.
Provides sufficient road capacity and network connectivity	Does not address any existing road capacity or connectivity issues.	Minimal impact to road capacity. Implementation of the full Cycling Master Plan (CMP) provides strong multimodal network connectivity.	Provides road capacity and network connectivity.
Provides multi-modal opportunities	Does not provide multi-modal opportunities beyond existing conditions.	Provides opportunities for both active transportation and transit.	Provides opportunities for both active transportation and transit.
Natural Environment			
Minimizes impact on natural environment	Least impact on natural environment.	Construction of active facilities, transit infrastructure will have some environmental impacts.	Construction of active facilities, transit infrastructure and new roadway will have the most extensive natural environment impacts.
Policy Environment			
Ensures compatibility with the Provincial Policy Statement	Does not meet the Provincial Policy Statement goals of improving the transportation system to reduce reliance on	Meets the goals of the Provincial Policy Statement except for the support for goods movement to address projected transportation	Meets all of the goals of the Provincial Policy Statement.

Criteria	Alternative 1 Do Nothing	Alternative 2 A Sustainable Approach	Alternative 3 A Balanced Approach
	private vehicles, environmental impacts, and more efficient use of existing infrastructure.	needs.	
Meet's the City's Official Plan objectives	Does not meet the City's objectives.	Supports the approved CMP.	Supports the CMP and road improvements at the north end of the City will alleviate congestion issues.
Economic Environment			
Supports the existing and future business community	Does not support growth in the business community.	Investing in the active transportation network and the transit network will support the business community in localized areas.	Investing in all of active transportation, transit, and roads will strongly support the existing and future business community.
Maximizes land development potential and provides opportunities for planned growth	Does not support land development and planned growth.	Minimal support for new land development and growth.	Strongly supports new land development and potential growth.
Cost			
Minimizes capital and maintenance costs and impacts to the residential tax base	No cost or impact to the City.	Moderate cost to the City.	Highest cost to the City.

Table 8-3: Summary Evaluation of Planning Alternatives

	Alternative 1	Alternative 2	Alternative 3
Transportation Service	★	★★	★★★
Natural environment	★★★	★★	★
Policy Environment	★	★★	★★★
Economic and Community	★	★★	★★★
Cost	★★★	★★	★
Findings:	Not Recommended	Not Recommended	**Preferred**

9. RECOMMENDED STRATEGIES

To supplement the preferred “Balanced Approach” planning alternative, four key transportation strategies are identified which shall guide the City’s decision making on transportation investments:

- *Strategy 1: Build multimodal networks*
- *Strategy 2: Maximize operational efficiency of existing roads and intersections*
- *Strategy 3: Provide safe and accessible network for all travelers*
- *Strategy 4: Promote environmental sustainability and community health*

9.1 Strategy 1: Build Multimodal Networks

Sault Ste. Marie’s Transportation Network will be multimodal, where residents will have the option to walk, cycle, take transit, or drive to school, to work, or to anywhere in the City. The City shall continue to invest in active transportation and construct the spoke routes to the successful Hub Trail. On-road bicycle lanes shall be assessed in detail and implemented where feasible. Road diets are a cost-effective means to reconfigure existing streets to accommodate a variety of travel modes without significant impact to rights-of-way, and one method to create space for on-road bicycle lanes. Individual Class EAs may be required for future road diets.

The Sault Downtown needs to be supported by an improved transportation network that accommodates all travel modes and promotes mixed-use development that will maintain its vibrancy. Meanwhile, a new transit transfer station in the north end of the City would provide residents with an improved means to connect to the new developments occurring in the north end.

Investments in active transportation and transit must still be balanced by road network improvements and support for goods movement. New corridors where needed must support growth and shall be considered as multi-modal corridors.

Priorities:

- Provide needed capacity improvements; complete Black Road, Third Line, Second Line widening, and Sackville Road extension
- Invest in active transportation; continue with the implementation of the Cycling Master Plan and extension of the Hub Trail including proposed “Spoke” routes
- Build complete streets and consider “road diets” to meet the needs of all modes
- Consider a new transit transfer station in the north end of the City.
- Support for commercial vehicles; maintain network in conformance with MTO’s Freight-Supportive Guidelines

9.1.1 Road Improvements

Traffic growth in the City has become more focused to the north where new commercial developments are being built and thus causing a shift in travel patterns. This was first identified in the Sault Ste. Marie Transportation Planning Study in 2002. While many of the road projects recommended in the study were built, a number of items were put on hold due to the City's population growth decline since the completion of the study. Although the need and timing for some of the outstanding items have changed, the City has identified a few projects to be carried forward for future consideration as the need arises in the future.

The road improvements carried forward are identified in **Exhibit 8-3**, and include:

- Highway 17 Bypass
- Black Road from McNabb Street to Third Line
- Third Line from the Sault Area hospital to Black Road
- Second Line widening from 2 to 5 lanes from Pine Street to west of Black Road
- Sackville Road Extension to Third Line

Additional road improvements were identified by the City and are also included in **Exhibit 8-3**. These include:

- Northern Avenue Extension to Black Road
- Bay Street Extension under the Sault Ste. Marie International Bridge
- Queen Street East of Pim Street Road Diet

The need for each of these improvements is addressed from a network level perspective, and these are summarized in **Table 9-1**.

Table 9-1: Need for Road Improvement Recommendations

Road Improvement	Need for Improvement
Highway 17 Bypass	Discussed in detail in section 9.1.1.1.
Black Road from McNabb Street to Third Line	In combination with Third Line improvements - to reduce demand on Second Line and Great Northern
Third Line from the Sault Area hospital to Black Road	In combination with Black Road improvements - to reduce demand on Second Line and Great Northern
Second Line widening from 2 to 5 lanes from Pine Street to west of Black Road	Widening to accommodate projected future traffic growth from development in the surrounding area and Highway 17 traffic.
Northern Avenue Extension to Black Road	Improve network connectivity, support potential development, and reduce demand on Second Line.
Sackville Road Extension to Third Line	Provides an alternate route to Great Northern Road, offloading the congested Great Northern and Second Line intersection.
Bay Street Extension under the Sault Ste. Marie International Bridge	Network continuity and to serve area development.
Queen Street East of Pim Street Road Diet	Improve roadway utilization for all travel modes.

9.1.1.1 Highway 17 Bypass

Highway 17 / Trans-Canada Highway currently follows a circuitous route through the City of Sault Ste. Marie. Westbound traffic passing through the City must travel south along Trunk Road then north along Black Road to reach Second Line and vice versa for eastbound traffic. The existing route from Second Line and Black Road to the eastward curve in Highway 17 is approximately 9 km in length. A direct connection between the same points would be about half that distance at 4.5 km. The proposed bypass is illustrated in **Exhibit 9-1**.

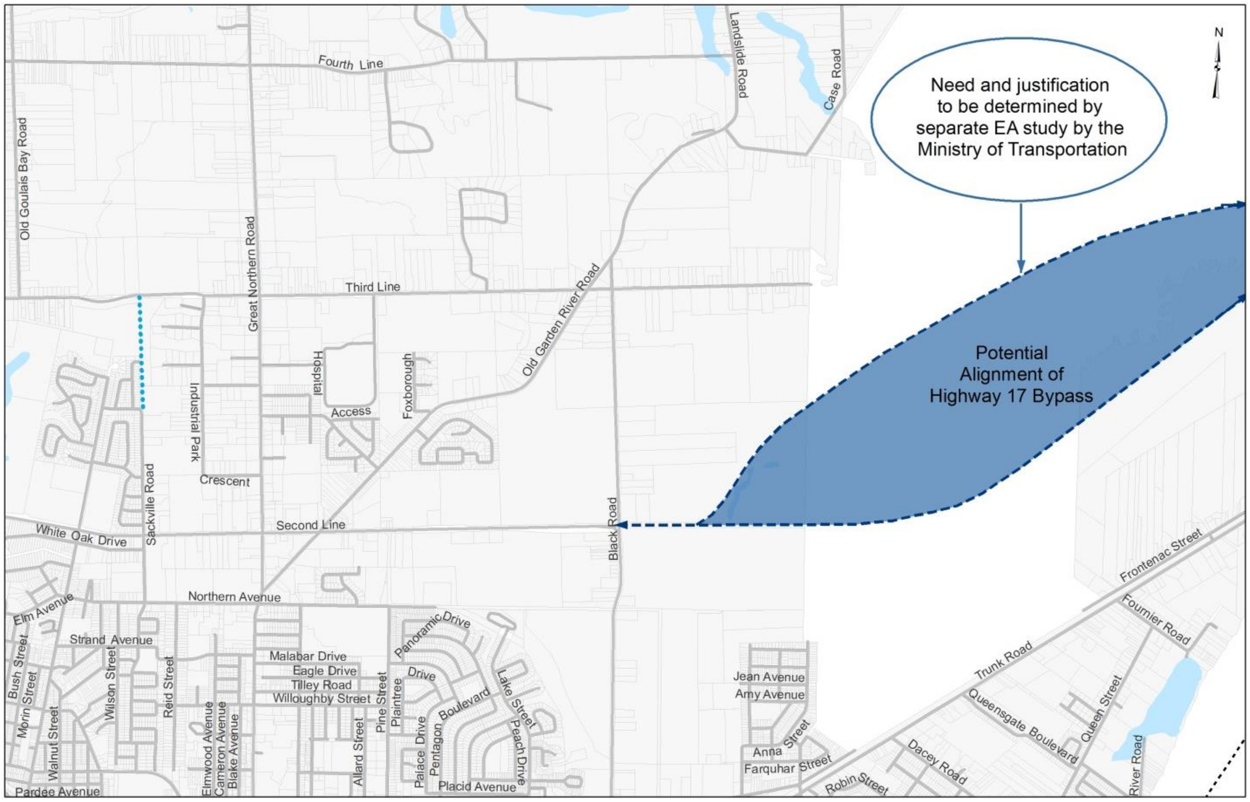


Exhibit 9-1: Potential Highway 17 Bypass Location

The City of Sault Ste. Marie believes that there are a number of benefits to the potential Highway 17 bypass, including:

1. Improve travel times for Highway 17 through traffic as well as international traffic to and from the east
2. Reduce traffic growth impacts
3. Reduce truck traffic impacts on local Sault Ste. Marie traffic and residents
4. Support growth and development / improve network connectivity

Based upon existing traffic counts, the critical movement along Highway 17 is the southbound left turn from Black Road to Trunk Road in the PM peak hour. Under existing conditions, this movement has a peak hour volume of 500 and a v/c ratio of 0.85. Traffic growth in the area based upon proposed developments is estimated to be 1% annually, and applying that to the critical southbound left turn movement here, the volume by 2042 grows to 670 and the v/c ratio is 1.00. A Highway 17 Bypass would divert Highway 17 traffic away from this intersection and improve traffic conditions.

In addition to the traffic growth impacts, the shorter travel distance would greatly benefit international truck traffic. Also, residential neighbourhoods adjacent to Trunk Road and Black Road would benefit from reduced truck traffic and finally Batchewana First Nations lands could potentially benefit from the bypass as well.

For the reasons stated within this section, the City of Sault Ste. Marie supports the further study of a Highway 17 Bypass to be undertaken by the Ministry of Transportation as a separate EA study.

Additional details and analysis are provided in **Appendix L**.

9.1.1.2 Additional Road Network Priorities

Through the Public Consultation process, comments on the City's road network were considered and are carried forward for the City's consideration:

- Reid Street extension to St. Georges from Second Line and removing the light at St. Georges and McNabb and to the new intersection with Reid Street
- Four-laning of Black Road from Trunk Rd. to Second Line & five-laning of Second Line from Black Road to the new section on top of Second Line hill would make the route (a truck route) less congested and safer, especially during peak periods.
- Many existing roads are not in good condition and require resurfacing or complete reconstruction. Capital expenditure needs should be identified along with annual budgeting requirements to keep the road network in good working order. The City's Road Asset Management system indicates significant capital funding is required.

9.1.2 Pedestrian Network Priorities

The City's transportation network for pedestrians features approximately 332 km of sidewalks and about 25 km multi-use pathway in the John Rowswell Hub Trail. To continue to promote walking in the City, multi-use trails proposed in the Cycling Master Plan will provide new routes and connections for pedestrians throughout the City. In addition, the City will provide sidewalks on all new roadways in urban areas, and encourages feedback from the public to identify locations which may benefit from improved active transportation infrastructure.

The TMP recommends the following as priorities for the City as related to the pedestrian transportation network:

- Pedestrian crossing guideline policy recommendations
- Provide safe pedestrian crossings
  - Zebra stripes along the Hub trail and major intersections
  - Pedestrian countdown signals
- Retain all existing railway crossings

Priorities have also been identified through public consultation and include the following:

1. Plowing sidewalks within the City as feasible, particularly in residential areas, to encourage walking as a mode of transportation all year round. Plowing of sidewalks is reviewed annually and criteria has been established to assess whether or not sidewalks are added to the winter maintenance program through a petition process. The criteria considers the surrounding land use and optimizes the resources available to accomplish the winter maintenance program.
2. Improving cycling and pedestrian infrastructure in the north end of the city where more businesses are locating.
3. Missing sidewalks on some streets with significant pedestrian traffic, e.g. portions of Pine Street from Pleasant Dr. to McNabb. There is a high number of students in the area and the walkway from Princess Crescent to Pine in particular discharges pedestrians onto Pine Street where there is no sidewalk on the east side.
4. Application of actuated pedestrian crossings is desired. Difficult/dangerous to cross roads like Carmen’s Way, Trunk Road, Second Line, Great Northern Road, etc. due to the lack of a legal crossing area (controlled intersections are spread out widely).
5. There is a significant volume of pedestrian activity at Second Line/Great Northern Road, but it is a challenging intersection to cross, even for a healthy individual. This can be addressed as follows:
    - Adding pedestrian countdown signals to warn pedestrians of the time remaining to cross, as suggested in Appendix C
    - Adding pedestrian crosswalk striping across the channelized right-turn lanes
    - Adding signage specific to the yield sign for right-turning vehicles to yield to pedestrians
6. Lack of accessibility of different modes of transport, for disabled individuals in particular. Specific issues: lack of controlled pedestrian crossings.

A summary of all public comments received, including project team responses are provided in **Appendix A**.

9.1.3 Cycling

The Transportation Master Plan builds upon the recommendations of the 2007 Cycling Master Plan Update, which combines the John Rowswell Hub Trail with a series of “spoke” routes which create comprehensive network of on and off-road trails connecting destination points throughout the City. Further to the network plan, general design considerations are identified to make all road and destinations within the City cycling friendly.

A cycling working paper was developed as part of the TMP which supplements and updates the 2007 Cycling Master Plan. It identifies additional details on the City’s policies with respect to cycling, and in particular confirms that the City should move forward with on-road bike lanes as part of the cycling network. This working paper is attached to the TMP as **Appendix D**, and assesses in detail the implementation of on-street cycling lanes and considers a “seasonal use” by-law for on-road cycling lanes to initially limit operations and maintenance to non-winter months.

9.1.3.1 Cycling Priorities

The following location specific priorities have been identified through public consultation and are identified in the Master Plan to be carried forward for further review and detailed study:

1. Gap in east-west cycling facilities in the Fort Creek Area. A spoke route continuing along Northern Avenue west to North Street can be considered.
2. Cyclist safety is a concern. The Hub trail has been welcomed by the community, but further monitoring is required to ensure that any safety issues are addressed. The City is planning to implement the spoke routes as soon as possible.
3. Need more segregated cycle paths in the downtown core, particularly on Queen Street, to allow better access to Queen Street businesses.
4. Need for a multi-use pathway on Third Line between the Sault Area Hospital and Old Garden River Road. Safety challenges have been identified, and an environmental assessment is currently being undertaken for this location which is identified as a spoke.

A summary of all public comments received including project team responses are provided in **Appendix A.**

9.1.4 Complete Streets

Many municipalities across Canada are taking steps to make the move towards Complete Streets, which are defined as streets designed for all ages, abilities, and modes of travel with safe and comfortable access for pedestrians, bicycles, transit users and the mobility-impaired as integral features of the planning and design process and not merely as an afterthought.

The premise of Complete Streets is **"Creating Places Where People Want to Be"**. This philosophy is supported by five themes (the "Five Cs") to ensure that mobility goals are balanced with the goals for building community and protecting the environment.

- **Community** – No plan or project can truly be successful without engaging the community and supporting community goals.
- **Choices** – Communities realize that cycling, walking and transit are critical components of the transportation system.
- **Capacity** – Capacity for private automobiles and trucks must continue to be addressed, balancing roadway capacity with mobility needs across modes.
- **Calming** – Planning and design of streets will encourage appropriate driving behaviours and speeds.
- **Connection** – Providing connections between sites, neighbourhoods, modes, and jurisdictions is crucial to maintaining healthy transportation systems and communities.

Complete Streets serve a number of purposes. The Complete Streets approach recognizes that streets serve a variety of mobility functions, but that they also help to define neighbourhoods and are places for social connections. Attributes of Complete Streets include:

- Provision for many modes, encouraging travel by walking, cycling and transit;
- Active frontages that support livable neighbourhoods, increase public space, encourage interaction and support the economic well-being of businesses and residents;

- Aesthetically pleasing environments that generate a sense of pride; and
- Environmentally sustainable, supporting reduced streetwater runoff and lower energy consumption, resulting in lower greenhouse gas emissions.

Complete Streets should not be mistaken as an approach to hinder or discourage automobile use. The necessary roadway capacity needs to be provided, but it should be provided in a manner that is sensitive to the surrounding environment and consistent with the multiple functions of the street. This may mean some slowing of travel speeds in areas of high pedestrian and other street activity. The Complete Streets approach also acknowledges that capacity can be provided in many ways. Mobility continues to be the priority function on arterial streets, other activity will be allowed for within the large rights-of-way provided for arterial streets. On local streets, particularly in residential areas, cars are expected to share the street space with other users, and as a result, streets are designed for slower travel speeds.

The City's Official Plan encourages a modal shift to public transit and active transportation with emphasis on the provision of safe, direct and attractive pedestrian access between public sidewalks, transit and building entrances. The Plan states that sidewalks shall be required (where appropriate) on both sides of arterial and collector streets and on at least one side of local streets in new residential developments. The Plan also encourages the development of bicycle routes and facilities and the incorporation of the system additions identified in the Cycling Master Plan into the overall transportation system.

The TMP reinforces the policies in the Official Plan and Cycling Master Plan to include "Complete Street" policies for all new roads and to improve existing roads as opportunities arise. These policies will ensure transportation planners and engineers consistently design the entire street network in Sault Ste. Marie to include all road users, including those with disabilities. The recommended road design standards discussed in section 10 of the Report are developed on the Complete Street foundations and designed to fully support the Multimodal Network Strategy recommended by this TMP.

9.1.5 Transit

Transit services were reviewed as part of the Transportation Master Plan and build upon and confirm the findings of the 2012-2016 Public Transit Operations Review (January 2012).

The findings from the 2012-2016 Public Transit Operations Review and confirmed in the TMP include:

- Transit service levels are not likely to expand - adjustments to current services are anticipated
- Potential new transit transfer station in the north end of the City
- Adjustments to services to:
  - Decrease travel time and improve connectivity
  - Improve customer experience; build more passenger amenities such as bus shelters
  - Provide transit routes through new subdivisions at the on-set of development
- Provide bicycle racks at major bus stops

9.1.5.1 Transit Related Public Comments

The quality and efficiency of the City's transit services are at the forefront of public attention. Based on responses from the Public Information Centre #1 and #2, the following comments were received by the public and are carried forward for the City's consideration:

- Daily service to outer areas including Prince Township, Echo Bay, and Garden River
- Bus stops at all intersections along Trunk Road
- Parabus services; no accessible taxis; reduction in fee-for-services of gateway mobility; acquiring accessible city bus services; and busing needs to have verbal announcement prior to each stop.
- Access to the Hiawatha Highlands recreation area should be considered (e.g. hourly bus up Great Northern Road to Sixth Line and back down Landslide Road)

9.1.6 Truck Traffic

With the location of the International Bridge adjacent to the City's downtown core, the routing of the Trans-Canada Highway (Highway 17) through the City, and location of many industries within the City including Tenaris Algoma Steel, Sault Ste. Marie is a hub for commercial truck traffic.

The Transportation Master Plan supports the City's truck routes identified in Schedule N-1 of the Official Plan. The recent construction of Carmen's Way in 2005 successfully removed trucks from the Downtown and Core Areas of the City.

One change to Schedule N-1 has been identified. With the construction of Carmen's Way in 2005, the City has observed a noticeable reduction in the number of trucks using Korah Road, and the majority of trucks that do use this route do so during the hours compliant to a Class B standard (between 7 am to 8 pm, Monday to Saturday). It is therefore recommended that the City proceed with a change to the Korah Road truck route classification from Class A to Class B.

Public consultation identified some potential issues specific to truck traffic, and these are documented in the TMP for further consideration:

- There is a tremendous amount of commercial (transports) and seasonal tourism using Great Northern Road and Second Line corridors.
- Heavy trucks often take routes that are illegal to do so; no enforcement.
- Additional considerations for Sackville Road can be considered during the Sackville Road Extension EA particularly to address truck traffic, and may include the following:
  - Four-laning of Sackville Road between Second Line and Northern Ave with a center turn lane.
  - Signage for trucks to use Second Line as their in and out of Sackville
  - The light at Sackville and Northern Ave. should warn trucks that at a specified distance going west on Northern Ave. that they will run out of truck access road.
  - Consider: a route from Sackville Road to the industrial park and to Great Northern Road

9.2 Strategy 2: Maximize Operational Efficiency of Existing Roads and Intersections

The City of Sault Ste. Marie is well served by a grid-like network of arterial, collector, and local roads. Improvements that increase efficiencies using the existing network should be the first priority for the City before building capacity improvements. All new roadways considered shall provide a benefit to existing roadways and operations by either reducing congestion or by diverting traffic away from congested routes.

A monitoring system may need to be developed which will allow the City to identify changes in traffic patterns and operations and react accordingly. Other improvements to be considered include roundabouts, conversion of one-way streets to two-way streets, and road diets.

Priorities:

- Monitor changes in traffic patterns and intersection operations; implement data collection and traffic monitoring system
- Consider building roundabouts instead of signalized intersections
- Consider conversion of one-way streets to two-way streets
- Consider road diets where provided capacity exceeds traffic levels
- Develop consolidated driveway and access control guidelines

9.2.1 Traffic Operations

Traffic operations recommendations are focused at specific intersection traffic issues as opposed to network-wide roadway capacity. Directions and policies on traffic operations are presented in the following sections.

9.2.1.1 Second Line at Great Northern Road

The City has identified the intersection of Second Line at Great Northern Road as having traffic congestion today and likely in the future. Second Line and Great Northern Road may require property protection for extra lanes and double left-turn lanes.

To determine the potential need for improvements at this intersection and any property which may be required, an intersection capacity analysis has been conducted using June 2011 turning movement counts provided by the City. The capacity analysis utilizes the Highway Capacity Manual 2000 (HCM) methodology and the Synchro software. The analysis was completed to determine basic performance of the intersection under existing and future traffic levels (20 plus years in the future). Traffic growth at the intersection is based upon proposed developments and is estimated to be 1% annually.

The performance measures utilized to complete the analysis are as follows:

- 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.
- 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 9-2**. Intersections should be monitored for improvements at LOS D-E and are recommended for improvements if operating at LOS F.

Table 9-2: HCM 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

The intersection capacity analysis for Great Northern Road at Second Line is summarized in **Table 9-3**. Detailed Synchro reports for existing and future are provided in **Appendix M**.

Table 9-3: Intersection Capacity Analysis for Great Northern Road at Second Line

Intersection & Critical Movement	Existing Weekday PM Peak Hour			20+ Years Forecast Weekday PM Peak Hour		
	Volume	LOS	V/C	Volume	LOS	V/C
Great Northern Road & Second Line		**D**	**0.86**		**E**	**1.05**
Eastbound Left-turn	333	**D**	**0.91**	449	**F**	**1.13**
Eastbound Through	415	C	0.43	559	**D**	0.69
Eastbound Right-turn	103	C	0.07	139	**D**	0.09
Westbound Left-turn	237	B	0.66	319	**D**	0.83
Westbound Through	379	B	0.40	511	**D**	0.65
Westbound Right-turn	87	A	0.07	117	**F**	0.08
Northbound Left-turn	210	**F**	**1.03**	283	**F**	**1.11**
Northbound Through (Thru-Right lane)	609	C	0.64	821	**D**	0.83
Northbound Right (volume only)	42			57		
Southbound Left-turn	204	**E**	**0.90**	275	**E**	**0.96**
Southbound Through	821	**D**	0.84	1107	**E**	**0.96**
Southbound Right-turn	251	C	0.18	338	C	0.23

Notes: V/C – volume to capacity ratio, LOS – level of service
LOS F or V/C > 1
LOS D-E or V/C 0.85 to 1

Existing intersection capacity analysis shows that the overall intersection requires monitoring. The northbound left-turn in particular is congested with an LOS of F and V/C exceeding 1. The eastbound left-turn also requires monitoring under existing conditions. Over 20 years in the future (a horizon year of approximately 2041), the traffic growth from population and proposed developments in the area result in an overall intersection LOS of E and V/C of 1.05. Almost all movements require monitoring, while the eastbound left-turn and northbound left-turn exceed capacity. The westbound right-turn, has a level of service F despite an increase in traffic volume from 87 to 117. A significant amount of delay is projected because of an increase in the intersection cycle length from 90 seconds to 120 seconds. Furthermore, the overall increase to traffic volumes results in fewer gaps in which drivers can complete this turn, also increasing delay.

It is noted further that the recent completion of the Pine Street extension is functioning well and has reduced movements to the east at Second Line / Great Northern Road, and is not accounted for in this analysis. The northbound right turn and westbound left-turns in particular would benefit from the Pine Street extension.

The Sackville Road extension to Third Line would also likely improve conditions for the southbound right-turn and eastbound left-turn movements. The EA study for the extension is complete, and construction is scheduled for 2017.

Based on the updated analysis of this intersection and projected capacity deficiencies, it is recommended to carry forward the recommendation from the 2002 TMP which includes the following:

- Protect for double left-turn lanes southbound, eastbound, and northbound
- Protect for right-turn lanes for all approaches

It is also reiterated that given the few double turning lanes in the City, drivers may need to be educated on making a wide turn from the outside left turn lane and it may be necessary to include pavement markings across the intersection to guide the turns. Secondly, as this intersection serves truck routes, intersection geometry must be suitable for turning trucks and thus adequate space needs to be protected for.

9.2.1.2 Specific Traffic Operations Priorities

Public consultation has identified a number of other traffic operations issues which are noted for further review and study by the City:

- Northern Avenue and Great Northern Road – check the need for an EB right-turn lane.
- Wellington Street from Pim Street to Church Street – signals are too close together and present safety and coordination challenges.
- Pim Street hill is very narrow NB at Ontario Street. EA completed but property required. Substandard width for a couple hundred metres.
- Second Line at Old Garden River Road. A Traffic Impact Study was completed but the school, gas station, Walmart, Hub Trail and snowmobile trail in the area may require another look.
- Great Northern and Old Garden River Road – add or check recommendation for a right-in right-out driveway.
- Traffic signal timing coordination for the lights at John St., North St., and Sackville east to west on Second Line.
- Traffic signal lights need some revision to enable better traffic flow, especially on the main arteries during rush hours (e.g. Northern Ave, McNabb, Pine, Second Line. etc.).

- Turn signals at the traffic lights at North St. & St. Georges' Ave intersection should be investigated.
- Problem with high traffic volume and speeding on McNabb Street
- McNabb traffic is also taking a shortcut through Lake Street and Pleasant Drive to avoid congestion at Tim Horton's.

9.2.2 Roundabouts

Roundabouts are being considered as alternatives to four-way stops and in some cases to traffic signals in many jurisdictions in Ontario. The advantages of roundabouts versus signalized and all-way stop-controlled intersections include the following:

- Less travel delay on average
- Much safer due to reduced speeds and vehicle conflict points
- Friendly towards U-turning traffic
- Good transition area between high speed and low speed environments
- Lower long-term operating maintenance costs than signalized intersections

The advantages listed above should be weighed against the disadvantages which include high initial construction costs sometimes due to additional right-of-way space required at intersections, and lower capacity operations. In addition, roundabouts may present a challenge in accommodating cyclists and pedestrians.

The City of Sault Ste. Marie should consider roundabouts as a potential traffic control at new intersections as well as a means of traffic calming or safety improvement at existing intersections where warranted. A detailed working paper that assesses the benefits of roundabouts is provided in **Appendix E**.

It is recommended that the City identify candidate locations for roundabouts based on the following criteria**:**

- The City is considering implementing a new traffic signal
- The current traffic control type is signalized or two-way stop controlled
- There is a history of injury, fatal collisions, head-on, angle, or turning collisions
- There is a transition point between high and low speed roads or a rural and urban area
- A gateway feature is required as an entry to a community
- Traffic calming is required

9.2.3 Road Diets

The City is currently undertaking an environmental assessment study for converting Queen Street east of Pim Street from four (4) to three (3) lanes, providing a centre turning lane and potentially adding cycling lanes and/or on-street parking to build a more "complete street" which attends to all travel modes. This is referred to as a "road diet". The City has requested that during the development of the Transportation Master Plan, corridors be identified and evaluated which could benefit from similar treatments.

A “road diet” involves reducing the number of vehicular travel lanes and reallocating that space to improve roadway efficiency, mode share, and safety, including:

- Cycling lanes
- Pedestrian facilities (e.g. pedestrian crossing island)
- New or enhanced transit facilities
- Landscaping
- Reduced Speeds
- Parking, if sufficient space is available

Typically, this reduction is used to adjust four (4) lane cross-sections to three (3) lane cross-sections (i.e. one (1) lane per direction) with a two-way left turn lane plus cycling lanes, as shown in **Exhibit 9-2**. Where the two-way left turn lane is not required, or where sufficient space is available, on-street parking can also be provided on one side of the street. A six (6) lane cross-section may also be reduced to a five (5) lane cross-section which would consist of two (2) lanes per direction with a two-way-left turn lane or parking on one side of the street.

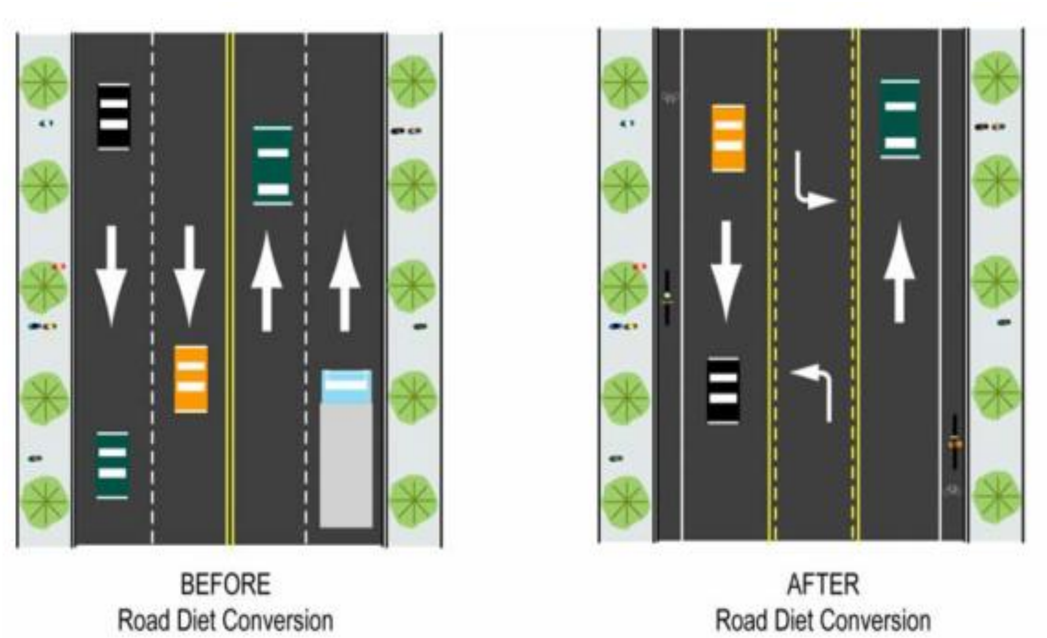


Exhibit 9-2: Road Diet Conversion – Before and After

Road diets are highly effective, and can be implemented quickly at low cost. They also have multiple safety and operational benefits for vehicles as well as cyclists and pedestrians, such as:

- Decreasing number of vehicle travel lanes for pedestrians to cross, therefore reducing the multiple-threat crash for pedestrians (when one vehicle stops for a pedestrian in a travel lane on a multi-lane road, but the motorist in the next lane does not, resulting in a crash)
- Providing room for a pedestrian crossing island
- Improving safety for cyclists when cycling lanes are added (such lanes also create a buffer space between pedestrians and vehicles)
- Providing additional opportunities for accommodation for persons with disabilities
- Providing the opportunity for on-street parking where sufficient space is available (also a buffer between pedestrians and vehicles)
- Reducing rear-end and side-swipe crashes by removing through-left movements
- Improving speed limit compliance and decreasing crash severity when crashes do occur
- Improving livability and quality of life

The advantages must be weighed against the disadvantages of road diets for traffic operations, which include:

- Can reduce roadway capacity if they are not applied at appropriate locations
- In some cases, a road diet may reduce the amount of on-street parking
- Could cause some route diversion and poor public reception due to unfamiliarity
- Vehicles that require frequent stops such as transit buses will likely impact traffic operations under a road diet option if no bus bays are provided. Through traffic would require stopping for transit vehicles and would interfere with flow of vehicular traffic within the single travel lane. This would result in increased travel times and vehicle queuing especially during peak hours
- Decreased travel lanes may impact emergency vehicle response time, as there is limited space for vehicles to yield, and also turning radii can become more constrained especially for large vehicles such as fire trucks with less available road space
- Reduced roadway space may impact access to driveways, particularly where only 2 lanes are provided and large vehicles may encroach onto the oncoming traffic lane. Backing out of driveways may also be a concern. To mitigate such issues, road diets in most cases are recommended with 3-lane cross sections (center-median turning lane) instead of 2-lane cross sections.

Eight candidate locations were identified for further study which may benefit from a Road Diet. These locations are illustrated in **Exhibit 9-3** and include:

1. Wellington Street East (Trunk Rd to Texas Ave)
2. Bennett Boulevard (Texas Ave to Boundary Rd)
3. Northern Avenue East (North St to Pine St)
4. Wallace Terrace (Korah Rd to Brookfield Ave)
5. Goulais Avenue (Second Line W to Korah Rd)
6. Bay Street (Andrew St to Pim St)
7. Queen Street (Pim St to Gravelle St)
8. McNabb Street (Great Northern Rd to Black Rd)[1]

Additional information on Road Diets is presented in **Appendix F**.

The above identified candidate locations can be carried forward for further study by the City. The City should also identify and screen other potential road diet locations using the process identified herein.

[1] This location was identified through public consultation.

Potential Road Diet Locations

Legend

Potential Road Diet Location

1. Wellington Street East (Trunk Rd to Texas Ave)
2. Bennett Boulevard (Texas Ave to Boundary Rd)
3. Northern Avenue East (North St to Pine St)
4. Wallace Terrace (Korah Rd to Brookfield Ave)
5. Goulais Avenue (Second Line W to Korah Rd)
6. Bay Street (Andrew St to Pim St)
7. Queen Street (Pim St to Gravelle St)
8. McNabb Street (Great Northern Rd to Black Rd)

Exhibit 9-3: Potential Road Diet Locations

9.2.4 Conversion of One-way Streets to Two-way Streets

The City of Sault Ste. Marie is occasionally asked to consider conversion of their one-way streets in the Downtown to two-way streets. There are currently four one-way streets and these include Bay, Queen, Albert, and Wellington. At the time of development, downtown was where all the activity was occurring and these one way streets provided vehicular traffic access to/from the international border with the U.S.A. However, with the construction of Carmen's Way in 2005, there has been a shift in vehicular traffic away from the downtown to the north (Great Northern / Second Line). Development activity has also followed with new Sault Area hospital, two new high schools (one built, one anticipated to be constructed shortly), Sault College, and retail development.

With this shift in traffic patterns, the advantages of the one-way street system through the downtown are no longer needed. Such advantages include improved traffic flow, reduced traffic congestion, elimination of turns that involve crossing in front of on-coming traffic, and additional lanes for slow moving vehicles such as waste collection and bus services.

Meanwhile, conversion of the aforementioned one-way streets in the downtown to two-way streets would potentially benefit in the following areas:

- Increased economic activity and livability
- Increased exposure to local businesses
- Potentially more efficient traffic control
- Shorter trips overall
- Greater predictability for both motorists and pedestrians

The main disadvantage of converting one-way streets to two-way streets include cost, which might be up to $1.3 million per kilometre as it the conversion requires new curb alignments, traffic signals, etc. Other disadvantages may include impacts to traffic operations, resulting in increased congestion and additional greenhouse gas emissions.

Due to the change in role and function of the one-way streets through downtown and the potential benefits noted, it is recommended to study in further detail the potential conversion of Bay, Queen, Albert, and Wellington Streets to two-way streets. A feasibility study may be the first step to determine the costs and benefits of conversion should there be sufficient public interest in the conversion.

9.2.5 Software for Traffic Data

Currently the City of Sault Ste. Marie uses a variety of products for managing traffic data. The problem currently facing the City is that their version of Ontrac, used for maintaining collision data, is out of date and not compatible with the latest suite of Microsoft software, and this has resulted in a stoppage of the updating of collision information into the database.

A number of options were identified to upgrade the City's traffic software. Ultimately, it is recommended to transfer the City's transportation data to the TES software. To the best of our knowledge, there is no better competing product on the market that has the same level of support, technical functionality, and understanding of Ontario systems, than TES.

A discussion paper which discusses other traffic software data management options is provided in **Appendix J**.

9.2.6 Consolidated Driveway and Access Control Guidelines

To better inform and guide the decisions on site plan approval, the City should identify standards for consolidated driveway and access control guidelines for arterial roads and the Trans-Canada Highway. Such guidelines would rationalize and control commercial, industrial and residential access to the arterial road network. The overall emphasis of the guidelines should be placed on minimizing traffic conflicts, number of collisions, traffic congestion and energy consumption due to delays; restoring and/or preserving the integrity of the arterial corridor, promoting safe access to/from a property for all modes of travel including pedestrians and cyclists, and promoting an aesthetically pleasing arterial corridor.

9.3 Strategy 3: Provide Safe and Accessible Network for All Travelers

It is a priority for the City of Sault Ste. Marie to provide a safe and accessible network for all residents and travelers. Policies shall be developed to regulate roadway cross sections allowing for sufficient travel space for all modes, pedestrian crossing policies including spacing between signalized crossings, special considerations at railway crossings, and policies for traffic calming measures.

Finally, design guidelines must be developed to ensure that roads, cycling facilities and sidewalks can accommodate all users, including persons with disabilities. A cost effective method to address locations which are not currently accessible is also recommended.

Priorities:

- Provide a safe pedestrian environment
- Establish minimum pedestrian crossing standards along the hub trail and high demand pedestrian corridors
- Maintain existing railway crossings
- Continue with the implementation of traffic calming measures
- Continue with the completion of the Hub Trail and spokes to provide cyclists with their own travel space
- Review the City's design guidelines to ensure roads, cycling facilities and sidewalks are built for all users including persons with disabilities

9.3.1 Pedestrian Crossing Policy Guidelines

One such type of infrastructure which the public has noted repeatedly to the City is the pedestrian crossing. To assist the City of Sault Ste. Marie in making consistent and justifiable decisions on how and when to implement pedestrian crossings, the Transportation Master Plan has completed a thorough review of best practices and policies to adopt. A detailed working paper on this issue is attached to this report as **Appendix C**.

The working paper outlines the current forms of pedestrian crossings available in the City, provides a summary of current practices elsewhere, and provides recommendations on the way forward for future pedestrian crossings within the City.

Following a review of relevant pedestrian crossing design guidelines, it is recommended that the City of Sault Ste. Marie follows the policy and implementation guidelines as detailed below and as warranted by the OTM Book methodologies and thresholds, to accommodate protected pedestrian crossings as shown in **Table 9-4**. Any of the protected and unprotected pedestrian crossing treatments identified in **Appendix C** and in the Ontario Traffic Manual (OTM) Book 15 are suitable for consideration and implementation by the City of Sault Ste. Marie.

Table 9-4: Recommended Pedestrian Crossings

Type	Recommendation	Implementation Costs
Intersection Pedestrian Signals	▪ Where there is a documented safety problem (i.e. visibility or measured sight distance constraints, collision trends, or frequent vehicle-pedestrian conflicts) identified and protected crossings are not warranted, consideration should be given to implementation of traffic control signals. ▪ Where signals are not warranted, existing courtesy crossings should be maintained or considered where there is high pedestrian activity, operating speeds are 50 km/h or less and the spacing of crossing opportunities exceed 300 m. ▪ It is also recommended that a minimum of 90 metre separation be maintained between a courtesy crossing and adjacent signalized intersections. Courtesy crossings should include supplemental signage conveying to pedestrians that they do not have the right of way. ▪ To accommodate all users, all new and reconstructed intersections will have Audible Pedestrian Devices.	▪ Pedestrian walk / don't walk indicators and crosswalk markings ▪ $80,000 to $120,000
	It is recommended that the City include pedestrian walk/don't walk signals, audible pedestrian signals, push buttons, and markings at any new signalized intersection. At busier intersections, the City might want to consider pedestrian countdown signals to warn pedestrians on how much time is left to cross the intersection. When updating existing traffic signals, pedestrian signals and pavement marking should be updated as well. The City should maintain and repaint any faded pedestrian crosswalks at existing traffic signals with consideration for zebra striping. Pedestrians should be directed to use signalized intersections were appropriate through signage or public education campaign.	

Type	Recommendation	Implementation Costs
Crossing Guard	▪ It is recommended that the exposure-based approach be adopted as part of the warrant analysis as an initial screening tool for pedestrian crossing guard requests. If warrants are not met and there is uncertainty about the impacts of the traffic volume on crossing opportunities for a particular site, then a gap survey is recommended and results compared to OTC School Crossing Guard Guide. ▪ With the exception of school crosswalks patrolled by a trained crossing guard, marked unprotected crosswalks should be discouraged. Consideration should be given to the delineation of high contrast markings to distinguish pedestrian desire lines in highly urban areas where drivers are aware of very high pedestrian activity (40 or more people over two hours). In these locations, pedestrian signage should acknowledge that pedestrians do not have the right of way over vehicles (e.g. OTM Book 6 Wc-28 sign). ▪ In other areas of high pedestrian/vehicular activity and/or high vehicle speeds, pedestrian markings at unprotected locations should not be implemented with pedestrians encouraged to cross at protected crossings (signalized intersections) through signage or a public education campaign.	▪ School Crossing signs, advance warning signs ▪ $250-500 for signs and installation ▪ Estimated annual cost of $10,000/guard.
Unprotected Crossings	▪ At locations where unprotected crosswalks are maintained, warning signage should be implemented as appropriate (OTM Book 6 Wc-3, Wc-7 signs or specialized signs) to increase drivers' awareness of pedestrian activity. ▪ Pedestrian refuge islands or centre medians should also be considered as a passive feature at unprotected crossing points where right-of-way is available and lane alignment is not compromised (e.g. integrated with centre turn lanes). ▪ Textured Crossings are beneficial not only for identifying pedestrian crossing location, but for the surrounding streetscape as well. Textured crossings offer aesthetically pleasing surrounding and can enhance the character of the intersection/location. ▪ Other measures such as reflective delineator poles and pavement markings may be considered at the boulevard of unprotected crossing locations in order to draw the driver's attention to potential crossing activity.	▪ Signage, paint, and other pavement markings ($2,000) ▪ Refuge Island / Centre medians ($200,000)
	At unprotected crossings, signage and other markings should be used to warn pedestrians and drivers of the crossing. The City should continue to repaint and maintain any faded/worn pedestrian markings and signs, an activity currently carried out under the City's reflectivity program. Refuge Islands / Centre Medians should only be considered when the road is undergoing reconstruction as the costs can be included in the budget of the reconstruction.	

Type	Recommendation	Implementation Costs
Removal of Crosswalks	▪ It is recommended that the City remove unprotected crosswalks on high speed or high volume multilane roads, where the crosswalk is not specifically intended to direct pedestrians away from crossing at locations with poor sight lines or unanticipated conflicts. The City should direct pedestrians to the nearest signalized intersection through signage in order to cross safely. The City should consider the removal of unprotected crosswalks under the following circumstances: • Where the speed limit is greater than 60 km/h; • On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 or greater; and • On a roadway with four or more lanes with a raised median or crossing island that has (or will soon have) an ADT of 15,000 or greater. ▪ The removal of crosswalks should include public notification.	▪ Costs will be minimal as mostly manpower involved.

Note: Costs shown are estimated typical installation costs based in 2009; actual costs vary based on site conditions.

It is also recommended that the City of Sault Ste. Marie proactively address pedestrian safety needs and establish a program of pedestrian crossing reviews either through on-going traffic operations studies or annual corridor reviews. Compliance with the pedestrian crossing practices will be reviewed, and necessary roadway and traffic control modifications programmed and implemented. Streetlight warrants and maintenance should also be monitored.

Other features and crossing treatments may be considered for implementation by the City of Sault Ste. Marie on a site-by-site basis to enhance pedestrian safety based on the needs of the particular site.

It is recommended that the City of Sault Ste. Marie continue to maintain all pedestrian railway crossings in existence and continue to work closely with the railway line owners in ensuring adequate and safe crossings are provided. Current legislation dictates that crossings are to be inspected annually.

9.3.2 Pedestrian Crossings along Hub Trail

Protected intersection and mid-block pedestrian crossings should be considered on all street types where pedestrians are not considered to have priority over vehicles yet are present or are encouraged to use the facility. Safe pedestrian crossings should connect key elements of the Hub Trail and provide access to pedestrian destinations and be placed at the mid-block crossing locations to encourage use of the formal crossings rather than jay-walking. Along the busiest sections of the Hub Trail, pedestrian crossings including mid-block crossings should be provided at approximately 200 meter spacing.

9.3.3 Zebra Stripe Markings

Textured surfaces and high-visibility (e.g. zebra) markings are ideally suited for crossing in low speed, high traffic volume and pedestrian environments. They increase drivers' awareness of possible crossings at an unprotected crossing. The use of these features such as textured pavement is not preferred at unprotected crossings on high volume roads. Many municipalities use textured crosswalks in downtown areas. It is recommended that the City develop a policy to implement zebra crossings at locations which either have a high pedestrian crossing volume or are identified as needing improved pedestrian visibility, including crossings of the Hub Trail.

9.3.4 Pedestrian Countdown Signals

Pedestrian countdown signals have been installed in many jurisdictions in Ontario to provide pedestrians with more precise information about remaining time available for them to cross the street.

Based on US Department of Transportation's Federal Highway Administration (FHWA) safety research conducted in San Francisco (August 2008), pedestrian countdown signals have been associated with a 52% reduction in pedestrian injury collisions, and 92% of persons interviewed following installation explicitly noted that the signals were "more helpful" than conventional signals because they showed the time remaining to cross. In addition, fewer instances of pedestrians having to run once in the crosswalk were observed. Finally, the installations found that the technology is relatively straightforward and easy to apply.

It is recommended at all new signalized intersections or when updating existing intersections that the City consider implementing pedestrian countdown signals to warn pedestrians on how much time is left to cross the intersection.

9.3.5 Traffic Calming Policy

The recently approved City of Sault Ste. Marie's Traffic Calming Policy was developed with the goal of reducing speed and increasing safety on local roads. As part of the Transportation Master Plan, HDR has conducted a review of the policy to firstly ensure its effectiveness and secondly to ascertain its role in the future transportation network.

The policy provides an effective means to ensure reduced speeds in certain areas and improve the safety of local roads. To further increase the effectiveness of the policy, traffic calming policy recommendations were made to the City, and are summarized in **Table 9-5**.

Public consultation also identified one additional traffic calming comment – to identify speed reduction strategies especially in residential areas and consider heavier fines for areas such as school zones and senior residences.

The original policy document and policy recommendation document provided to the City is included in **Appendix G**.

Table 9-5: Traffic Calming Policy Suggested Revisions

Section	Comment
1. General	The policy should refer specifically to ITE / TAC's ***Canadian Guide to Neighbourhood Traffic Calming*** as a guiding document. The edition or date of the document should not be noted as an update will be forthcoming within the next year or two.
2. Request for a study	No suggested revisions.
3. Timing of study	No suggested revisions.
4. Consultation	It is stated in this section of the policy that traffic calming would not be recommended on a primary emergency response route. It is suggested that the statement in Section 4 be removed as it partially contradicts item 5.f). Many traffic calming measures do not affect response times.
5. Information to be obtained for Traffic calming/traffic management study (Phase 1)	
a) and b)	No suggested revisions.
c)	Agree that vertical deflection measures should not be placed on roadways exceeding 5% grade. However, non-vertical deflection measures could be used such as pavement markings and horizontal narrowing's.
d)	No suggested revisions.
e)	Although ideal, this requirement would prevent many streets with rural cross-sections from qualifying. It is often these types of streets that need traffic calming to encourage a more pedestrian friendly environment. This requirement should be removed and left to engineering judgement.
f) and g)	No suggested revisions.
Other	Other items that should be reviewed: 1. Roadway geometrics 2. Rural or urban cross-section 3. Rural or urban environment 4. Lighting 5. Cycling routes or lanes 6. Building setbacks 7. Review of parallel streets and other neighbourhood streets 8. Transit routes 9. On-street parking 10. History of complaints
5. Information to be obtained for Traffic calming/traffic management study (Phase 2)	
a)	No suggested revisions.
b)	The phrase "default speed" should be replaced with a discussion of statutory speed limits as mandated by the HTA.
c)	No suggested revisions.
6. Expected timeframe for study completion	No suggested revisions.

7.	The warrant criteria discuss two very different types of issues, but are not clear on their differences. Traffic calming is used to influence speed, whereas traffic management is used to control volume and "cut-thru" traffic. Rarely do both issues exist on the same street. The warrant criteria should address these two separately. Warrant criteria specific to traffic management policies and infrastructure are recommended to be developed in a separate study.
8. Basic consideration for the decision making process	No suggested revisions.
9. Alternatives	No suggested revisions.
10. Reporting to council and implementation of decision	No suggested revisions.
Appendices	No suggested revisions.

9.4 Strategy 4: Promote Environmental Sustainability and Community Health

Building upon Strategy 1 and the need firstly to build multi-modal networks, the City must continue to promote sustainable travel choices including active transportation and transit use to protect the natural environment and community health.

Priorities:

- Promote active transportation & transit use
- Actively promote the reduction in usage of single occupant vehicles
- Manage travel demand by providing and supporting non-auto travel choices (investing in transit and cycling)
- Increase density and promote mixed-use developments in downtown and along key arterial roads

9.4.1 Travel Demand Management

Travel Demand Management (TDM) refers to various strategies that are used to change travel behaviour, including how, when and where people travel, in order to increase the efficiency of the transportation system and achieve specific planning objectives.[2] Specifically, TDM is often used to encourage sustainable, non-auto modes of transportation.

[2] "What is Transportation Demand Management?", Victoria Transport Policy Institute, 21 Jan. 2011 <http://www.vtpi.org/tdm/tdm12.htm>

Key planning objectives for the City of Sault Ste. Marie, as indicated in this Plan, include the development of a multi-modal transportation network that provides for the safe and efficient mobility of transit vehicles, motorists, cyclists and pedestrians while minimizing impacts on the natural environment and air quality. TDM initiatives can play an important role in influencing transportation choices and there are various TDM strategies that the City of Sault Ste. Marie could consider, such as:

- **Land Use Planning:** Land-use planning that supports alternative, non-auto travel modes is a key component to encouraging non-auto use. Effective land-use planning methods include compact and mixed-use development (e.g. commercial development integrated with residential development); a connected transportation network that includes connected roads, sidewalks and pedestrian paths; streets designed to accommodate various transportation modes; and smaller building blocks, for example. Investing in redevelopment of existing, vacant, or underutilized serviced areas instead of expanding outwards, since the forecasted population growth is low.
- **Parking Management Strategies:** Parking strategies can be used to reduce auto usage and encourage motorists to consider alternative transportation modes. Examples of parking management strategies include not providing an over-supply of parking at major destinations, charging motorists directly for parking, as well as charging higher parking fees for long-term parkers or during most congested times.
- **Promoting Commuting by Non-Motorized Travel:** This can be encouraged by providing facilities for cyclists such as changing rooms at workplaces and secure bicycle parking at places of employment, community centres, shopping malls and schools, as well as at transit stops. Employers can also provide bicycles to employees for rent or loan to encourage more bicycle commuting.
- **Variable Work Schedules:** Initiatives to encourage employers to allow for variable work schedules such as “flextime”, where employees have flexibility in daily work schedules, or a compressed work week, where employees can work longer hours over fewer days, to help reduce peak-hour commuting demands on the transportation system. Variable work schedules assist in “spreading out” commute trips over a longer commuting period, rather than concentrating all trips within a single hour.
- **Rideshare, Carpooling and Vanpool programs**: These types of initiatives will firstly increase awareness of the benefits of carpooling, and secondly provide additional options to persons who may not be able to drive by themselves or do not have access to Sault Transit, such as persons living in the outskirts of the City. These programs can be established with major employers or major retail destinations to encourage ridesharing and maximizing the efficiency of the road network.
- **Marketing TDM**: The marketing and promotion of TDM strategies should begin with surveys to identify potential users of alternative modes of transportation and to identify their needs, preferences and barriers. TDM marketing campaigns should be directed at individuals and groups who are most willing to change their travel behaviour.

The implementation and monitoring of TDM programs and strategies need to be supported by allocating funds to alternative (non-auto) travel modes, increased support for TDM programs and changes in land-use planning practices. The implementation of TDM strategies can support the City in its transportation planning objectives and assist in reduced traffic congestion, road and parking facility cost savings, energy conservation, pollution emissions reduction and improved mobility for non-motorists.

9.4.1.1 Recommended TDM Measures

The TMP has identified several measures that could be introduced, or existing measures that could be enhanced and that will lead to improved travel demand management. Listed according to their potential impact, the measures are as follows:

- Increase the efficiency of land utilization by increasing densities, land use mix and the provision of transportation services including improved transit services and support for active transportation modes
- Enhance pedestrian experience by transforming streets within neighbourhoods and downtown area to complete streets with amenities such as cycling lanes, bicycle parking at bust stops, bus shelters, pedestrian rest areas, etc.
- Decrease auto travel by providing reliable transit service, limiting parking supply and charging parking fees
- Decrease pressure on roadway capacity by shifting passenger travel to transit and auxiliary modes
- Support employer-based TDM programs such as variable work schedules, carpooling and ridesharing

The City of Sault Ste. Marie should also consider adding TDM requirements, such as sidewalks, bicycle lanes, bicycle parking, to site plan review and approval process and encourage use of TDM programs by the City's employees and other large employers in the area.

10. FUNCTIONAL ROAD NETWORK

10.1 Road Classification Best Practices Review

The City of Sault Ste. Marie's current road classifications for urban and rural roads are as follows (as stated in their 1996 Official Plan):

- Arterial Streets – are designed to facilitate the safe movement of large volumes of traffic at a moderate rate of speed over extended distances. A design width of up to 36 m shall be protected for arterial streets. Access shall be restricted to other arterial streets, collector streets, and streets serving major commercial / industrial uses. Access from abutting uses shall be controlled and permitted only where approved by the Commissioner of Public Works and Transportation.
- Collector Streets – are designed to facilitate the safe movement of traffic from residential, commercial, and industrial areas to or from the arterial street network. A design width of up to 26 m shall be protected for collector streets. Limited access is permitted from abutting uses subject to the approval of the Commissioner of Public Works and Transportation.
- Local Streets – are designed to facilitate the safe movement of traffic within a residential area. A design width of up to 20 m shall be protected for local streets. Individual access from abutting land uses is permitted. Local streets shall be designed to discourage through traffic, thus, preserving their usage as access to the abutting land uses and enhancing safety.

An important recommendation of this report is the introduction of the Complete Street road design standards to accommodate multiple modes and to recognize the various functions of the street right-of-way. This approach seeks to maximize the use of the right-of-way. Private automobiles should continue to be provided with the necessary capacity for reasonable mobility, while at the same time allowing the street to be used for other purposes and transportation modes.

To facilitate varying needs for different types of arterial streets, the City should consider further dividing its current arterial road class into subclasses with distinct design standards for arterials with differing characteristics. This can be done in a manner similar to the Thunder Bay or Sudbury official plans in which arterials are divided into major and minor arterials or primary, secondary and tertiary arterials. Alternatively, the arterial designation can be divided in accordance with the truck route and cycling networks with possible designations such as "Industrial Arterial" or "Complete Arterial", respectively.

A review of the City's land use map also reveals a similar need. Sault Ste. Marie has distinct industrial and commercial areas and a downtown core through which arterials run and serve differing purposes and thus these roads should not be lumped into the same category with the same design requirements. Many other possibilities exist for the sub-classification of arterial roads, but the main purpose remains to establish specific design standards for certain types of arterial roads serving different purposes within the City's transportation network.

It is recommended through further study that the City's arterial road network be subdivided into categories which are suitable for differing design standards, such as industrial or major arterials for truck routes and high traffic volume roads, and complete or minor arterials for complete streets or road diet corridors. Such classification could limit access points and intersection spacing for major arterials and allow more access for minor arterials, for example, and enhance road usage and safety.

A best practices review of other jurisdictions and recommendations paper on road classifications is provided in **Appendix H**.

A Complete Streets approach for the transportation system represents an evolution of the traditional road hierarchy network. A street hierarchy is retained, but the Complete Streets approach expands on the traditional "arterial-collector-local" hierarchy and provides a wider range of alternatives to fit with the needs and priorities of the city and individual neighbourhoods. The needs of all users should be considered in the planning and design of a complete street. Full consideration is given to the accommodation of all modes, and to the safety and convenience of users of all ages, income levels, and physical abilities.

Not all users can be accommodated at the highest level possible, as the amount of right-of-way is limited. Trade-offs for shared space are required and these should be considered in the context of the function of the street, in addition to balancing the needs of all users. Vulnerable users, such as children, elderly and those with disabilities must be treated with priority. If the safety and comfort of vulnerable users is well addressed, most needs of other pedestrians will be accommodated. In addition to accommodating all users, environmental, economical and social considerations should be taken into account.

10.2 Proposed Road Classification

The complete streets approach for Sault Ste. Marie retains a hierarchical street classification system, but one that recognizes the need to accommodate multiple modes and provide options. There are three road (in rural environment) and street (in urban environment) categories:

- **Multi-Modal Arterial** - These streets provide higher capacity within communities and development areas and create the overall framework for the city's transportation system. This street type has a role in establishing a sense of community and city identity for Sault Ste. Marie. Multi-modal arterial roads in rural environment and multi-modal arterial streets in the urban core connect neighbourhoods. They are characterized by the function they serve, not the size of the street. Active modes and local commercial activity are important on liveable arterial streets, and they act as both a transportation facility and a destination, which promotes and enables social interaction between its users and adjacent land uses. Urban Arterial streets can be divided into Major Arterials and Urban Boulevards, where Major Arterials are focused more on high traffic capacity and moving vehicles while Urban Boulevards are focused on accommodating all travel modes.
- **Collector** – Collector roads and streets are smaller in scale and do not serve a city-wide role. There are a large number of streets within this classification that serve varying roles (i.e.: residential, industrial, etc.). These streets provide connections to the larger network of arterial

streets and are primarily used in residential areas. Depending on the specific use, cross-sectional elements such as bike paths and sidewalks vary.

- **Local** – local roads and streets serve limited area uses such as residential or industrial. These streets serve local area traffic and provide connections to the collector road network. Urban Local streets can be divided into Residential Streets and Industrial Streets. Residential streets will make accommodations for all travel modes, parking areas, sidewalks and cycling facilities, while Industrial streets can provide wider vehicle travel lanes for large trucks but can also accommodate some active transportation facilities where applicable.

A summary of the proposed road classes for the City is provided in **Table 10-1**. The proposed cross-sections are based on the TAC Geometric Design Guide for Canadian Roads.

Further to a more detailed study to update the City's street classifications, it is also recommended to update Official Plan Schedule D Transportation, which depicts street classifications.

10.2.1 Commercial Access and Complete Street Design

Commercial accesses should be minimized on high volume / high speed arterial streets, and those with high pedestrian volumes. Where possible, commercial access for businesses fronting on arterial streets should be from an intersecting cross street. Commercial access should be shared between adjacent properties as much as possible to maintain traffic flow and sidewalk continuity. Minimizing commercial accesses should not be seen as discouraging commercial frontage; commercial buildings should front onto arterial and activity centre streets, but vehicle access should be from elsewhere. It should be noted that sidewalks and bike facilities should be continous across accesses, and pedestrians and cyclists should have prioirty. Accesses that cross sidewalks or multi-use pathways must be at the same level as the sidewalk/pathway.

Table 10-1: Proposed Road Classification System

Road Classification	Road Sub-class	Typical Adjacent Land Use Types								Examples
		Residential		Commercial		Industrial		Institu-tional	Rural Area	
		Low Density	Medium -High Density	Large Format Retail	Local Commer-cial	Business Park	Heavy Industrial			
Urban Arterial	Major Arterial		x	x		x	x	x		Wellington Street, Great Northern Road, Second Line, Carmen's Way, Trunk Road
	Urban Boulevard	x	x	x	x	x	x	x		Bay Street, Queen Street, Wallace Terrace, MacDonald Ave
Urban Collector	N/A	x	x	x	x	x		x		Northern Ave, North Street, Goulais Ave, Sackville Road
Urban Local	Residential Street	x	x		x					Elizabeth St, Lake St, Prentice Ave
	Industrial Street			x		x	x	x		Industrial Park Crescent, Yates Ave
Rural Arterial	N/A	x			x		x	x	x	Second Line west of Leigh's Bay Road
Rural Collector	N/A	x			x				x	Fourth Line, Old Garden River Road, Allen's Side Road
Rural Local	N/A	x			x				x	Base Line, Old Goulais Bay Road

10.3 Road Design Standards for Complete Streets

A detailed description of each of the proposed urban road classes is provided in the following tables. Each table provides a description of each road class and specific treatments and priorities specific to the road class for different modes and various street components.

Street components are the facilities provided to allow for multiple uses of the street space and to set priorities among the various uses. The street space can be divided into three zones:

- **Vehicle Roadway** – The space between the curbs for moving vehicles.
- **Curbside Transition** – The space that provides for transition between vehicle space and pedestrian movement. The transition may include cycling facilities, bus stops, green infrastructure and other amenities.
- **Pedestrian Realm** – The space that is primarily used by pedestrians for movement or access to property.

The components serve the following modes:

- Pedestrians
- Cyclists
- Transit
- Automobiles
- Goods Movement

10.3.1 Pedestrians

The pedestrian mode is the only mode that everyone uses. The pedestrian mode predominantly refers to walking, but also considers people requiring mobility assistance such as wheelchairs and mobility scooters. Most trips involve a pedestrian component, even if just the portion of the trip between parking a car and walking to the door of the destination.

Because this mode is shared by all and is available to everyone, it is critical that provisions be made for pedestrian access throughout the City. The pedestrian mode should be treated as a priority and City streets should provide a safe and comfortable environment for pedestrians. People are most prone to walking in compact, mixed use communities that have been planned with pedestrians in mind. Even in less dense communities, pedestrians need to be treated with priority.

Pedestrian facilities need to connect people with key activity centres. Activity centres such as a shopping mall or plaza, educational facility, a hospital, entertainment centre, etc. are destinations and as such, should be considered “pedestrian-first” zones. The pedestrian connections to important destinations should exist, and be of good quality. This not only includes providing adequate design, but also placing priority on pedestrian facility maintenance and educating the public about the importance the pedestrian mode.

10.3.2 Cyclists

Like walking, cycling can be most easily encouraged with a compact, mixed use urban form, and requires good public education and facility maintenance. It is important to understand that not all cyclists can be treated in the same way. Highly experienced and confident cyclists move at much higher speeds and require different facilities than novice and recreational cyclists. It is unreasonable and unsafe to expect an experienced cyclist to use a shared pathway with recreational cyclists, young children and pets. Similarly, novice and less confident cyclists are unlikely to ride on busy roads.

Complete streets should acknowledge these differences and provide facilities that allow individual cyclists to evolve as experience and confidence increases. This does not imply that every street needs to have a multitude of cycling facilities, but the overall network should provide opportunities for all levels of cyclists.

10.3.3 Transit

Local public transit services are abundant and used as a primary mode of transportation by many in Sault Ste. Marie. In order to enhance transit use experience and allow for efficient and reliable transit operation, streets need to be designed with transit service in mind.

Land use is always a factor in transit use. Higher density development with good pedestrian connections to transit routes is critical to successful transit operation. Key transit destinations need to be located on transit corridors and site layouts should seek to minimize the walking distances between transit stops and building entrances. Proximity of employment to transit is of particular importance in encouraging transit use.

Employment nodes should be easily served by transit. Streets that serve as bus routes should be designed to provide sufficient priority to buses for reliable operation in a safe environment.

A local bus route aims to provide access to transit services. Buses will operate on a range of street types, almost always including some lower-order local streets. As such, a strong supporting pedestrian network is required near bus stops to maximize the potential transit users within a 5 minute walk of the bus stop.

High frequency services have a higher mobility function than local services and therefore will usually have greater spacing between stops and will operate on higher order streets. Streets need to be designed to accommodate full-size buses. This includes allowing buses to make turns at an intersection without encroaching onto oncoming traffic lanes. Similarly to local routes, sidewalks should be provided on any street with a bus stop and particular care needs to be taken at bus stops where cycling facilities are present.

10.3.4 Private Automobiles

The necessary roadway capacity needs to be provided, but it should be provided in a manner that is sensitive to the surrounding environment and consistent with the multiple functions of the street. This may mean some slowing of travel speeds in areas of high pedestrian and other street activity. The Complete Streets approach also acknowledges that capacity can be provided in many ways. Mobility continues to be the priority function on arterial streets; other activity will be allowed for within the large rights-of-way provided for arterial streets. On local streets, particularly in residential areas, cars are expected to share the street space with other users, and as a result, streets are designed for slower travel speeds.

10.3.5 Goods Movement

Movement of goods and other industrial traffic is important to the economic vitality of Sault Ste. Marie. Trucks need to be accommodated on industrial streets, and on those streets that lead to and from industrial areas. In these areas, wider lanes and more generous curb radii should be provided. Commercial vehicles are not restricted to industrial areas. Commercial areas rely on trucks for deliveries and even in residential areas there is a need to accommodate a limited amount of commercial vehicle activity.

Streets identified as class ‘A’ and ‘B’ truck routes are generally applied to arterial roads connecting industrial areas where trucking is critical to the operation of many businesses and to through routes connecting the City to the Provincial network and the international border crossing. Wider curb lanes may be appropriate to accommodate high volumes of larger vehicles. Pavement design should consider the use of the roadway by higher truck volumes.

10.3.6 Street Classification Tables and Cross-sections

Design treatments by mode and an example cross-section illustrating the various elements for each road type are provided in the following tables for the City’s consideration. Note that these are typical cross-sections and will vary depending on location-specific conditions. Furthermore, the right-of-way widths shown are ideal, and it must be noted that in many instances they may not be achievable in developed areas. It is recognized that the ability to provide complete streets components for various modes must be consider the context of the existing street and the specific modes which would benefit the street the most if not possible to provide for all modes.

Following the description for each road type, a complete streets component summary table is provided for each mode as it applies to the five urban road classes.

Street Classification
URBAN ARTERIAL

Major Arterial

Major Arterial Streets carry high through traffic volumes. These streets usually have transit routes and must provide adequate pedestrian facilities to allow safe and comfortable access and waiting areas for transit users. Because of the high traffic volumes and higher travel speeds, pedestrian and bicycle traffic will be separated from vehicle traffic. These streets may provide access to commercial, retail and industrial sites. Pedestrian and cycling access will be accommodated but vehicles will be the primary form of access. *(Typical AADT range: 10,000 – 40,000)*

PEDESTRIAN SIGNIFCANCE
Medium

VEHICLE SIGNIFCANCE
High

TYPICAL USE

- Commercial, mixed use, industrial, large institutional and high density residential

CHARACTERISTICS

- Use of green infrastructure to enhance the pedestrian environment
- Minimal driveways to reduce conflicts for cyclists and pedestrians and maintain vehicle movement efficiency
- Use signal timing, pedestrian refuges, crosswalks and other treatments to create safe and convenient crossings and routes between transit stops and surrounding destinations

DESIGN TREATMENTS

Pedestrian Component

Required

- Buffer between roadway and sidewalk or shared (multi-use) pathway
- Curb letdowns

High Priority

- Signalized mid-block crossings

Appropriate in Limited Circumstances (suitable depending on location)

- Unsignalized mid-block crossings

Cycling Component

High Priority

- Shared (multi-use) pathway or dedicated cycleway separated from vehicle traffic lanes

Appropriate in Limited Circumstances (suitable depending on location)

- Conventional bike lanes, only where width does not permit a separated shared pathway or cycleway
- Wide curb lanes, only as a transition to another form of cycle infrastructure and while vehicle volumes are low
- Green lane painting in the rare situations in which conventional bike lanes or wide curb lanes are provided

Transit Component

High Priority

- Once required, high frequency transit service
- Pull outs for bus stops to bring buses closer to passengers

Low Priority

- Local bus service
- Bus lanes and other priority measures as required

Private Automobile Component

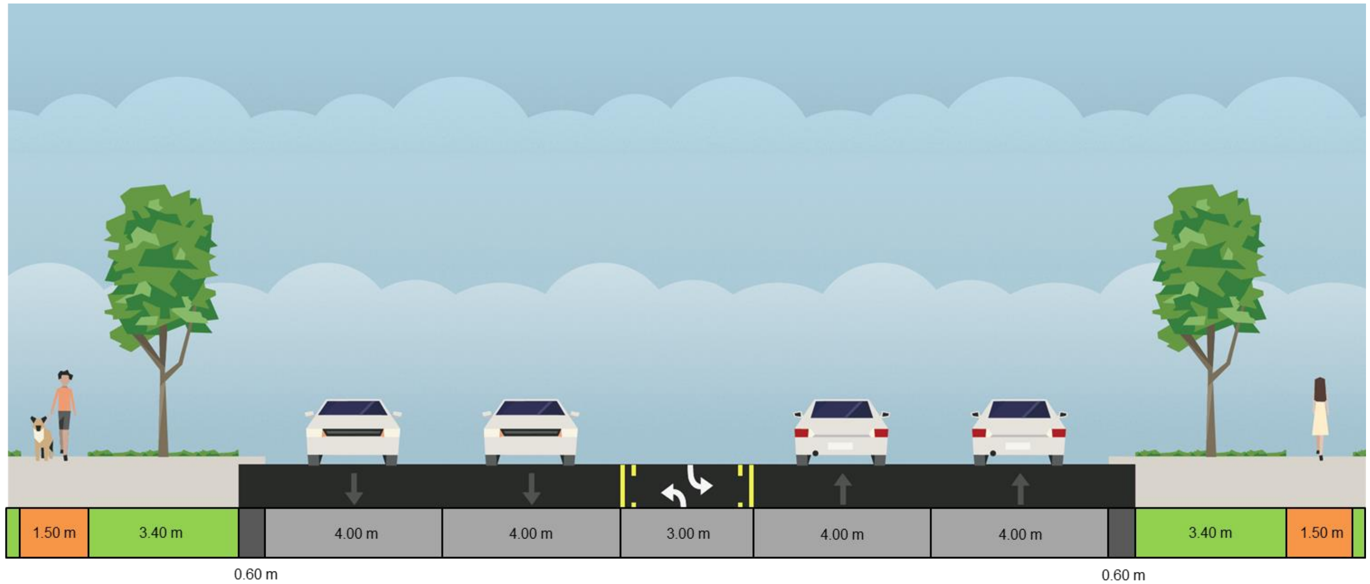
Required

- Centre median

Appropriate in Limited Circumstances (suitable depending on location)

- Commercial business access (large shopping centres, business parks and other major generators would normally be acceptable, provided the access design is comparable to an intersecting street)

Example Cross Section – 30 m ROW (exact dimensions will vary depending on location-specific conditions)



Reference: This image was created using Streetmix and is subject to the Creative Commons BY-SA 3.0 license (http://creativecommons.org/licenses/by-sa/3.0/).

Legend
- Vehicle Lane
- Green Infrastructure
- Sidewalk

Goods Movement Component

Required

- Truck route, with geometric design elements to support truck traffic
- Minimum curb lane width of 3.5 m

Street Classification
URBAN ARTERIAL

Urban Boulevard

Urban boulevards carry medium levels of traffic volumes. Active modes and local commercial activity will be strongly supported. This emphasis on active modes encourages social interaction and creates a street environment that is both a facility and a destination. Pedestrians and cyclists would ideally be separated from vehicular traffic on a shared pathway or separate pathways. These streets may provide access to a range of land uses. Adjacent development can be urban in nature, with minimal setbacks and an emphasis on street-front activity. *(Typical AADT range: 5,000 – 20,000)*

PEDESTRIAN SIGNIFCANCE
High

VEHICLE SIGNIFCANCE
Medium

TYPICAL USE
- Commercial, mixed use, industrial, large institutional and residential with minimal setbacks

CHARACTERISTICS
- Use of green infrastructure to enhance the pedestrian environment
- Street is both a facility and a destination to promote social interaction and interaction with adjacent land uses
- Provides high level of connectivity to the surrounding communities

DESIGN TREATMENTS

Pedestrian Component

Required
- Curb letdowns

High Priority
- Separated Sidewalks or shared (multi-use) pathways
- Signalized Mid-block crossings
- Marked Mid-block crossings

Appropriate in limited circumstances (suitable depending on location)
- Monolithic sidewalks

Cycling Component

High Priority
- Shared (multi-use) pathway or dedicated cycleway separated from vehicle traffic lanes

Appropriate in Limited Circumstances (suitable depending on location)
- Conventional bike lane
- Green lanes
- Cycle tracks
- Wide curb lanes

Transit Component

High Priority

- Local bus service
- Bus lanes and other priority measures as required

Low Priority

- High frequency bus routes
- Bus Stop pullouts
- Bus priority measures

Private Automobile Component

Required

- Centre median

Low Priority

- Traffic calming
- Commercial access
- Residential Driveways

Goods Movement Component

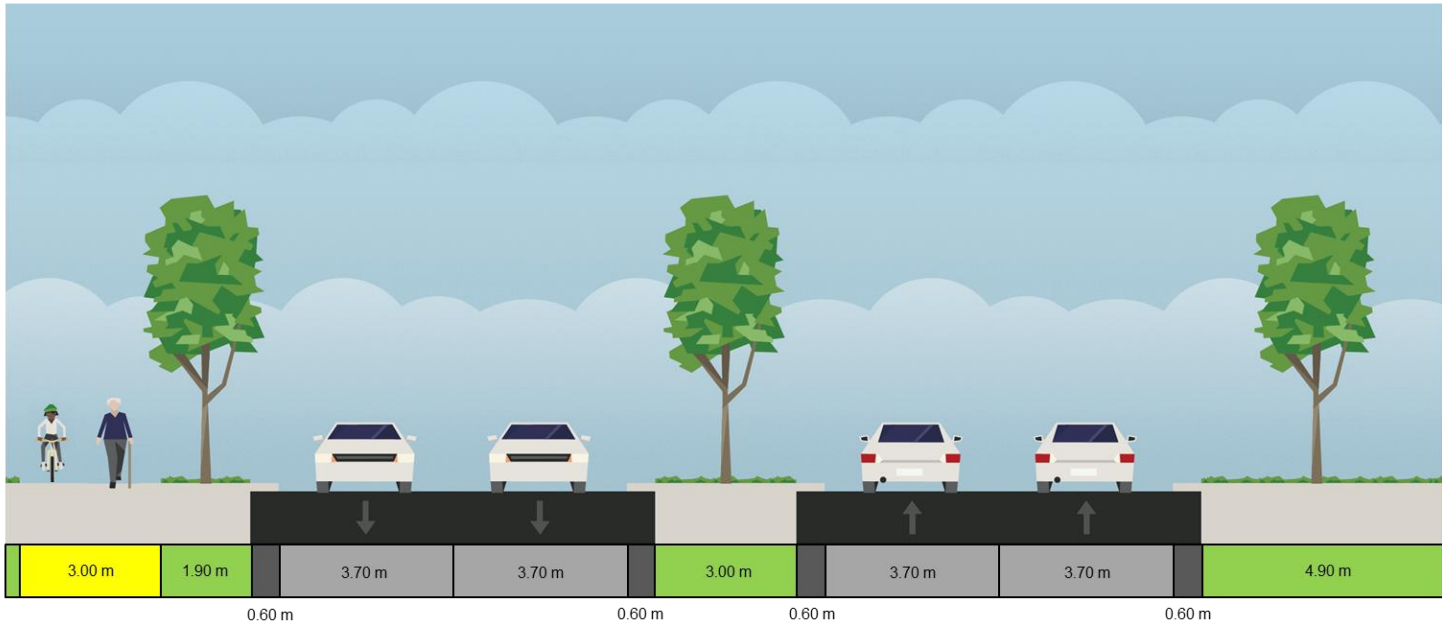
Required

- Minimum curb lane width of 3.5 m

Low Priority

- Truck route, with geometric design elements to support truck traffic

Example Cross Section – 30 m ROW (exact dimensions will vary depending on location-specific conditions)



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Legend

- Vehicle Lane
- Green Infrastructure
- Multi-Use Pathway

Street Classification
URBAN COLLECTOR

Collector

Collector Streets provide the connection between local streets and the arterial road network. In many ways, they operate in much the same manner as local arterial streets and have a relatively even balance between vehicle and active mode priority, albeit they typically are designed for lower traffic speeds than arterials including more frequent intersection access points than arterials. As these streets are often gateways to residential areas, there is considerable flexibility in design to reflect neighbourhood characteristics. *(Typical AADT range: < 10,000)*

PEDESTRIAN SIGNIFCANCE
Medium

VEHICLE SIGNIFCANCE
Medium

TYPICAL USE
- Residential gateways, connections between local streets and local arterials

CHARACTERISTICS
- Similar in design and function to local arterials
- Even balance in priority between vehicle and active modes
- More access points than arterials to allow access points from local streets including for cyclists and pedestrians
- Small front yard setbacks
- On-street parking to provide an active streetfront and to generate some traffic calming effect
- Marked crosswalks for pedestrian crossings

DESIGN TREATMENTS

Pedestrian Component

Required
- Separated sidewalks and/or buffer between roadway and sidewalk
- Curb letdowns

High Priority
- Marked mid-block crossings

Low Priority
- Signalized mid-block crossings

Appropriate in Limited Circumstances (suitable depending on location)
- Pedestrian priority street
- Curbless streets

Cycling Component

High Priority
- *Conventional bike lanes*
- *Green lane painting*
- Marked wide curb lanes

Low Priority
- Shared pathway
- Cycle tracks

Appropriate in Limited Circumstances (suitable depending on location)
- Bicycle friendly street

Transit Component

Low Priority

- Local bus service
- Pull outs for bus stops

Appropriate in Limited Circumstances (suitable depending on location)

- High frequency bus route
- Bus lanes and other priority measures as required

Private Automobile Component

Low Priority

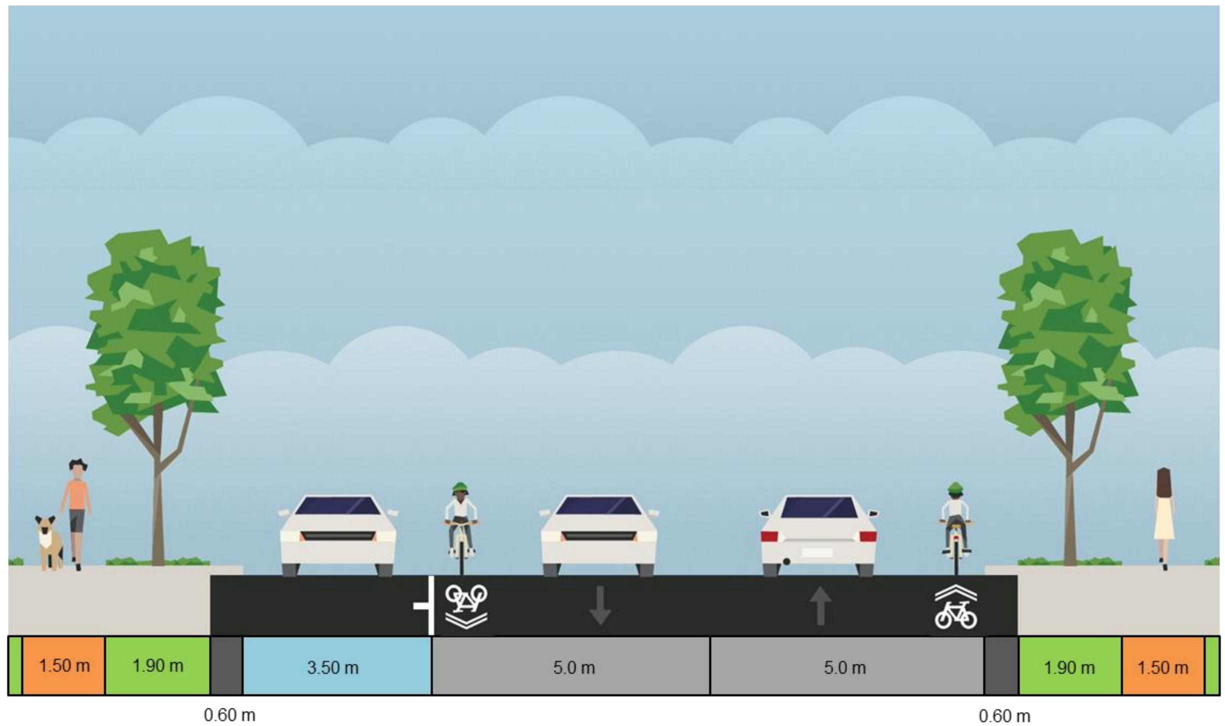
- Traffic calming
- Commercial and residential property access
- Centre median
- Two-way left turn lanes

Goods Movement Component

Appropriate in Limited Circumstances (suitable depending on location)

- Truck route
- Minimum curb lane width of 3.5 m

Example Cross Section – 21.5 m ROW (exact dimensions will vary depending on location-specific conditions)



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Legend

- Vehicle Lane / Sharrow
- Green Infrastructure
- Sidewalk
- Parking Lane

Street Classification
Local

Residential Street

Residential streets provide access to medium and low density residential development and carry low vehicle volumes at low speeds. These streets accommodate active transportation and vehicles equally. Parking is typically permitted on both sides of the street. *(Typical AADT range: < 4,000)*

PEDESTRIAN SIGNIFCANCE
High

VEHICLE SIGNIFCANCE
Low

TYPICAL USE
- Residential

CHARACTERISTICS
- Use of green infrastructure to enhance the pedestrian environment
- High residential driveway access density
- Low posted speeds
- Minimal to no through traffic

DESIGN TREATMENTS

Pedestrian Component
Required
- Curb letdowns

High Priority
- Separated sidewalk and/or buffer between roadway and sidewalk
- Marked mid-block crossings

Low Priority
- Pedestrian Priority Street
- Curbless Street

Appropriate in Limited Circumstances (suitable depending on location)
- Signalized mid-block crossings

Cycling Component
High Priority
- Bicycle friendly street

Low Priority
- Conventional bike lane
- Green lane painting
- Marked wide curb lanes

Appropriate in Limited Circumstances (suitable depending on location)
- Shared pathway
- Cycle tracks

Transit Component

Low Priority

- Local bus service

Private Automobile Component

Required

- Residential driveways

High Priority

- Traffic calming

Low Priority

- Commercial access

Appropriate in Limited Circumstances (suitable depending on location)

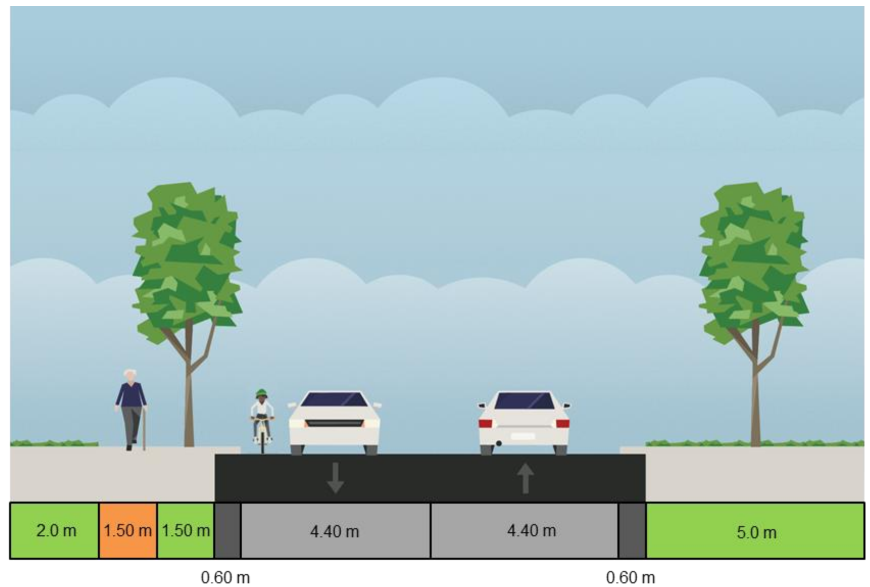
- Two-way left turn lanes

Goods Movement Component

Required

- Minimum curb lane width of 3.5 m

Example Cross Section – 20 m ROW (exact dimensions will vary depending on location-specific conditions)



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Legend

- Vehicle Lane
- Green Infrastructure
- Sidewalk

Street Classification
URBAN LOCAL

Industrial Street

Industrial streets provide direct access to adjacent industrial and commercial properties. These two-lane streets accommodate a high percentage of heavy vehicles at lower speeds. Local bus service may serve these areas to provide employees access to their workplace. Sidewalks on both sides of the street facilitate access to transit and adjacent land uses. *(Typical AADT range: < 10,000)*

PEDESTRIAN SIGNIFCANCE
Low

VEHICLE SIGNIFCANCE
High

TYPICAL USE
- Industrial, Commercial

CHARACTERISTICS
- Use of green infrastructure to enhance the pedestrian environment
- Heavy vehicle traffic accommodated with wider lanes
- Industrial land use access driveways may be frequent

DESIGN TREATMENTS

Pedestrian Component

Required
- Curb letdowns

High Priority
- Separated sidewalk and/or buffer between roadway and sidewalk

Low Priority
- Signalized mid-block crossings

Appropriate in Limited Circumstances (suitable depending on location)
- Marked mid-block crossings

Cycling Component

High Priority
- Green lanes
- Marked wide curb lanes

Low Priority
- Conventional bike lane

Appropriate in Limited Circumstances (suitable depending on location)
- Shared pathway

Transit Component

Low Priority

- Local bus service

Appropriate in Limited Circumstances (suitable depending on location)

- High frequency bus route
- Bus pull outs
- Bus lanes and other priority measures as required

Private Automobile Component

Required

- Commercial access

High Priority

- Traffic calming

Appropriate in Limited Circumstances (suitable depending on location)

- Residential driveways
- Centre median
- Two-way left turn lanes

Goods Movement Component

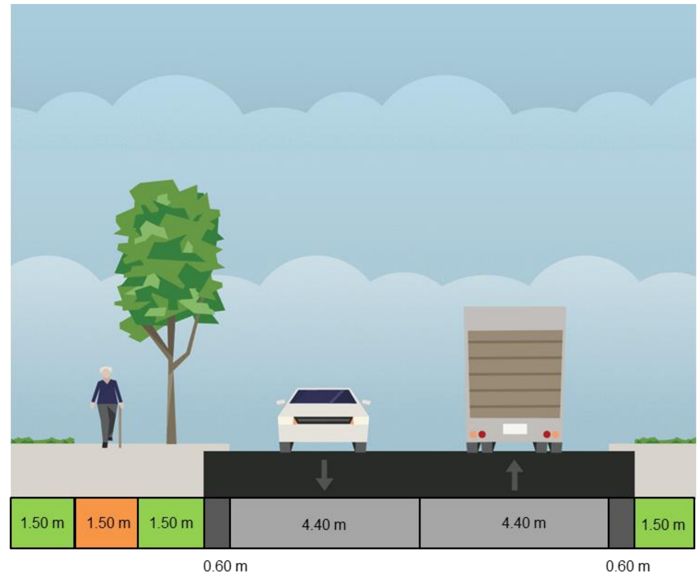
Required

- Truck route
- Minimum curb lane width of 4.5 m

Low Priority

- Loading zones

Example Cross Section – 16 m ROW (exact dimensions will vary depending on location-specific conditions)



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Legend

- Vehicle Lane
- Green Infrastructure
- Sidewalk

Complete Streets Components Summary

Complete Streets Components Summary	Urban Arterial: Major Arterial (10,000 – 40,000 veh/day)	Urban Arterial: Urban Boulevard (5,000 – 20,000 veh/day)	Urban Collector: Collector (<10,000 veh/day)	Urban Local: Industrial Street (<10,000 veh/day)	Urban Local: Residential Street (100– 2,000 veh/day
Sidewalk/Pathway Width (m)	≥3.0	≥3.0	≥1.5	≥1.5	≥1.5
Separated Sidewalks	●	■	●	■	□
Curb Letdowns	●	●	●	●	●
Pedestrian Priority Street	♦	♦	♦	♦	□
Curbless Street	♦	♦	♦	♦	□
Signaled Mid-Block Crossings	■	■	□	◉	□
Marked Mid-Block Crossings	◉	■	■	□	■

Legend:
- ● Required
- ■ High Priority (Include if conditions permit)
- □ Low Priority (should be considered)
- ◉ Appropriate in Limited Circumstances
- ♦ Not Recommended

The pedestrian mode is the only mode that everyone uses. The pedestrian mode predominantly refers to walking, but also considers people requiring mobility assistance such as wheelchairs and mobility scooters. Most trips involve a pedestrian component, even if the trip is between parking a car and walking to the door of the destination. Pedestrian facilities need to connect people with key activity centres. Activity centres are destinations and as such, should be considered “pedestrian-first” zones. The pedestrian connections to important destinations should exist, and be of good quality. This not only includes providing adequate design, but also placing priority on pedestrian facility maintenance and educating the public about the importance the pedestrian mode.

Complete Streets Components Summary	Urban Arterial		Urban Collector	Urban Local		Legend: ● Required ■ High Priority (Include if conditions permit) □ Low Priority (should be considered) ○ Appropriate in Limited Circumstances ♦ Not Recommended
	Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day	
Conventional Bike Lane	○	○	■	■	□	Like walking, cycling can be most easily encouraged within a compact, mixed use urban form, and requires good public education and facility maintenance. It is important to understand that not all cyclists can be treated in the same way. Highly experienced and confident cyclists move at much higher speeds and require different facilities than novice and recreational cyclists. Complete streets should accommodate varying levels of experience and confidence, and provide facilities that allow individual cyclists to evolve. The City has already taken steps towards encouraging active transportation with the Hub Trail, and is encouraged to continue that progress with the proposed spoke routes.
Shared Pathway (off-street, i.e. Hub Trail)	●	●	□	○	○	
Bicycle Friendly Street	♦	♦	○	♦	■	
Green Lanes (protected bike lanes via landscaped barrier, curbs, etc., typically on-street)	○	○	■	■	□	
Cycle Tracks (protected two-way bike lanes, on or off-street)	♦	○	□	♦	○	
Marked Wide Curb Lanes	○	○	■	■	□	

Complete Streets Components Summary		Urban Arterial		Urban Collector	Urban Local		Legend: ● Required ■ High Priority (Include if conditions permit) □ Low Priority (should be considered) ◉ Appropriate in Limited Circumstances ♦ Not Recommended
		Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day	
	Local Bus Route	□	■	□	□	□	In order to encourage transit use and allow for efficient and reliable transit operation, streets need to be designed with transit service in mind. Land use is always a factor in transit use. Higher density development, with good pedestrian connection to transit routes is critical to successful transit operation. Key transit destinations need to be located on transit corridors and site layouts should seek to minimize the walking distances between transit stops and building entrances. Proximity of employment to transit is of particular importance in encouraging transit use. Employment nodes should be located so they can be easily served by transit.
	High Frequency Bus Route	■	□	◉	◉	♦	
	Bus Stop Pull Outs	■	□	□	◉	♦	
	Bus Priority	□	■	□	◉	♦	

Complete Streets Components Summary		Urban Arterial		Urban Collector	Urban Local		Legend: ● Required ■ High Priority (Include if conditions permit) □ Low Priority (should be considered) ○ Appropriate in Limited Circumstances ♦ Not Recommended
		Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day	
	Posted Speed (km/h)	60	50	40	40	40	Complete Streets should not be mistaken as an approach to discourage automobile use. The necessary roadway capacity needs to be provided, but it should be provided in a manner that is sensitive to the surrounding environment and consistent with the multiple functions of the street. This may mean some slowing of travel speeds in areas of high pedestrian and other street activity. The complete streets approach also acknowledges that capacity can be provided in many ways. Mobility continues to be the priority function on arterial streets; other activities will be accommodated within the large rights-of-way provide for arterial streets. On local streets, particularly in residential areas, cars are expected to share the street space with other users, and as a result, streets are designed for slower travel speeds.
	Traffic Calming	♦	□	□	□	■	
	Commercial Access	○	□	□	●	□	
	Residential Driveways	♦	□	□	○	●	
	Median	●	●	□	○	♦	
	Two-way Left Turn Lanes	♦	♦	□	○	○	

Complete Streets Components Summary		Urban Arterial		Urban Collector	Urban Local		Legend: ● Required ■ High Priority (Include if conditions permit) □ Low Priority (should be considered) ○ Appropriate in Limited Circumstances ♦ Not Recommended
		Major Arterial (10,000 – 40,000 veh/day)	**Urban Boulevard** (5,000 – 20,000 veh/day)	**Collector** (<10,000 veh/day)	**Industrial Street** (<10,000 veh/day)	**Residential Street** (100– 2,000 veh/day	
	Truck Route	●	□	○	■	♦	Movement of goods and other industrial traffic is important to the economic vitality of Sault Ste. Marie. Trucks need to be accommodated on industrial streets, and on those streets that lead to and from industrial areas. In these areas, wider lanes and more generous curb radii should be provided. Commercial vehicles are not restricted to industrial areas. Commercial areas rely on trucks for deliveries and even in residential areas there is a need to accommodate a limited amount of commercial vehicle activity.
	Loading Zones	♦	♦	♦	□	♦	
	Minimum Curb Lane Width (m)	3.5	3.5	3.4	4.5	3.5	

11. SUPPLEMENTARY POLICIES AND DIRECTIONS

Building off of the strategies and priorities identified in the previous chapter, a number of policies for further study are identified in this chapter.

11.1 Winter Maintenance of the Cycling Network

Further to the findings of the Cycling Working Paper in **Appendix D**, a seasonal usage by-law is recommended for adoption which will limit winter maintenance of the proposed on-road cycling network.

The City understands that painting cycling lanes and/or shared symbols, and providing signage on primary and secondary cycling routes identified in the Cycling Master Plan will benefit and encourage active transportation. However, maintaining bicycle lanes throughout the winter will add additional burden to the residential tax base resulting in a low overall benefits as very few people cycle in winter. Conversely, it is not practical to keep cycling lanes open and clear of snow and ice in winter months. City Council has the authority to pass a seasonal use by-law that will permit closure of the painted cycling lanes for the winter months.

This recommendation is consistent with similar jurisdictions with heavy snowfall which do not maintain on-street cycling lanes through winter and consider their cycling lanes as seasonal. Over time, these seasonal lanes can be expanded to a more extensive and interconnected network.

11.2 MTO Connecting Link Program Reinstatement

The Transportation Master Plan for the City of Sault Ste. Marie reaffirms its desire to see the Ministry of Transportation Ontario's Connecting Link Program reinstated to assist in the maintenance of municipal roadways that carry significant provincial traffic such as Highway 17 through the City and connecting to the International Bridge.

It is recommended that the Ministry of Transportation:

1. Reinstate 75% funding program for municipal connecting links in continued recognition of the Province's responsibility to assist municipalities that service through traffic, with particular emphasis on the extensive impact it will have on the City of Sault Ste. Marie; or, identify other grant funding for Sault Ste. Marie, in particular for a five year capital plan for the widening of Second Line from Pine Street to Black Road, Black Road from Second Line to McNabb Street, and the eventual resurfacing of the other connecting links
2. Assume portions of our connecting link system so that the Province is 100% responsible for them
3. Renew efforts to complete the connection of Highway 17 (new) to Second Line at Black Road, and/or complete a by-pass around Sault Ste. Marie to connect Hwy 17 north and east

A sample connecting link is illustrated in **Exhibit 11-1**.

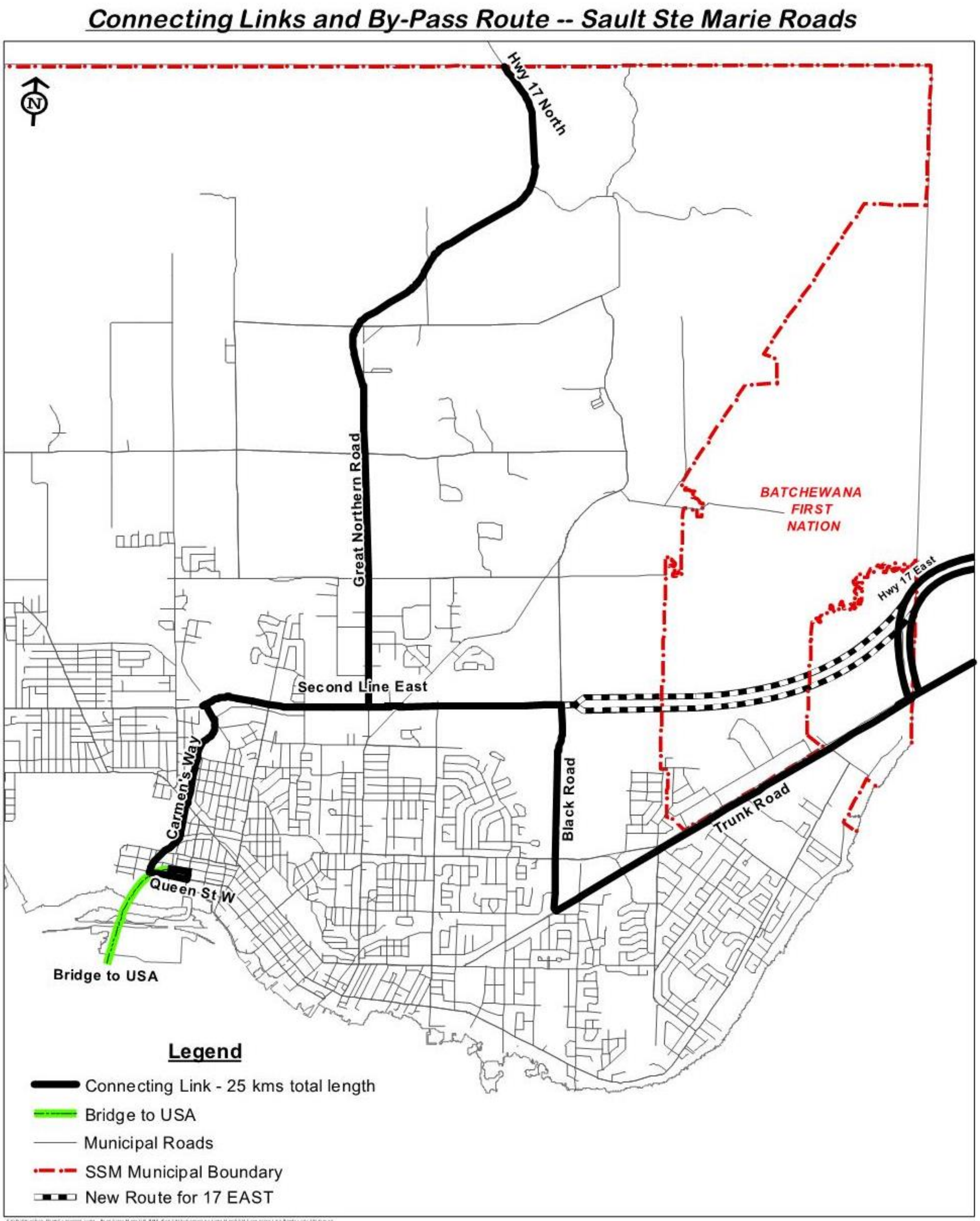


Exhibit 11-1: Sample Connecting Link

11.3 Development Traffic Impact Study Guidelines

To assist the City with addressing development applications with potential traffic impacts, it is recommended that the City develop its own Traffic Impact Study (TIS) policy guidelines. The development of such a documented will assist the City's transportation planning and development planning staff in determining whether certain development applications are allowable from a transportation perspective. These guidelines will standardize the traffic assessments performed for development approval and will provide the City with precedence and a means to withhold approval as necessary. The guidelines may include but are not be limited to:

- Trip generation assumptions using the latest version of the ITE Trip Generation Manual
- Synchro assumptions for intersection capacity analysis
- Parking rate requirements
- Access to arterial road network including driveways and intersection spacing
- Provision of pedestrian and cycling facilities

11.4 Snowmobile Policy

Snowmobiling represents a significant recreational activity and tourist attraction in the City of Sault Ste. Marie and surrounding areas. Through the course of the Transportation Master Plan Study and the two public open houses, no comments regarding snowmobiles within the City were made. Therefore the TMP recommends that the current snowmobile by-law 69-6 continue to be in effect which places restrictions in the areas and corridors reflected in **Exhibit 11-2**.

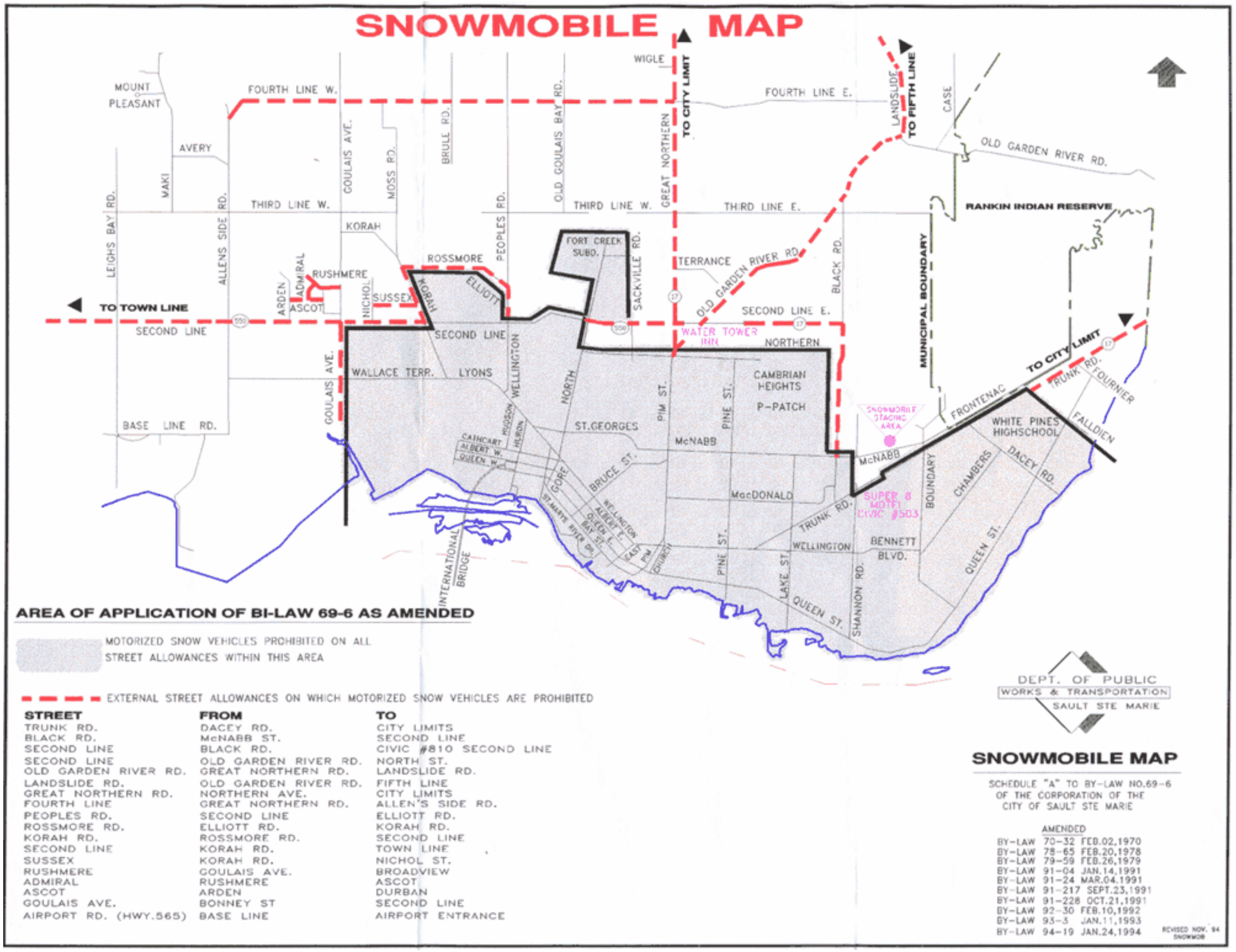


Exhibit 11-2: Snowmobile Map By-Law 69-6

12. IMPLEMENTATION TIMING

Table 12-1 summarizes all recommended activities and infrastructure improvements identified through the Transportation Master Plan process report, and categorizes each into short term, medium term and long-term priorities.

Table 12-1: Summary of Recommendations and Timing

Item #	Recommendation Item:
	Short Term (up to 5 years by 2020)
1	Council adoption of the 2014 Transportation Master Plan
2	Cycling Master Plan Update
3	Traffic Impact Study (TIS) policy guidelines
4	Arterial Roads Access Management Policy
5	Adoption of seasonal usage by-law for on-street cycling lanes
6	Pursue reinstatement of the MTO Connecting Link Program
7	Continue with the implementation of the Cycling Master Plan and extension of the Hub Trail including proposed “Spoke” routes
8	Change Korah Road truck route classification from Class A to Class B
9	Monitor changes in traffic patterns and intersection operations; implement data collection and traffic monitoring system.
10	Transfer the City’s transportation data to the TES software
11	Consider building roundabouts instead of intersections where new intersections are built or reconstructed
12	Further gauge public interest in conversion of one-way streets to two-way streets, and undertake feasibility study if sufficient public interest.
13	Undertake further location screening and environmental assessment process for the implementation of road diets at the following locations: 1. Wellington Street East (Trunk Rd to Texas Ave) 2. Bennett Boulevard (Texas Ave to Boundary Rd) 3. Northern Avenue East (North St to Pine St) 4. Wallace Terrace (Korah Rd to Brookfield Ave) 5. Goulais Avenue (Second Line W to Korah Rd) 6. Bay Street (Andrew St to Pim St) 7. Queen Street (Pim St to Gravelle St) 8. McNabb Street from Great Northern Road to Black Road Identify and screen other potential road diet locations.
14	At the Great Northern and Second Line intersection: ▪ Protect for double left-turn lanes southbound, eastbound, and northbound ▪ Protect for right-turn lanes for all approaches

Item #	Recommendation Item:
15	Short-term pedestrian priorities for implementation: ▪ Establish minimum pedestrian crossing standards along the hub trail and high demand pedestrian corridors ▪ Establish pedestrian crossing guideline policy recommendations as per **Table 9-4** ▪ Provide Zebra stripes along the Hub trail and major intersections ▪ Install pedestrian countdown signals Retain all existing railway crossings
16	Continue with the implementation of traffic calming measures
17	Review the City's design guidelines to ensure roads, cycling facilities and sidewalks are built for all users including persons with disabilities
18	Actively promote the reduction in usage of single occupant vehicles, and active transportation and transit usage
19	Implement updated road classifications and complete street road design standards
20	Review traffic operations issues as identified by the public during the various consultation events (as summarized in Appendix A).
21	Lobby for Highway 17 Bypass with MTO
22	Update Official Plan Schedule D
	Mid Term (up to 10 Years or by 2025)
23	Update Transportation Master Plan
24	Build complete streets and consider "road diets" to meet the needs of all modes
25	Increase density and promote mixed-use developments in downtown and along key arterial roads (on-going)
26	Consider a new transit transfer station in the north end of the City, and other transit service improvements to meet shifts in demand
27	Complete Environmental Assessment studies and construct the following road improvements: ▪ Black Road from McNabb Street to Second Line (EA currently underway) ▪ Third Line from the Sault Area hospital to Black Road (EA currently underway) ▪ Second Line widening from 2 to 5 lanes from Pine Street to west of Black Road (EA is complete and widening is underway) ▪ Northern Avenue Extension to Black Road ▪ Sackville Road Extension to Third Line (EA is complete and work is scheduled in the five-year plan for 2017) ▪ Bay Street Extension under the Sault Ste. Marie International Bridge ▪ Queen Street East of Pim Street Road Diet (road diet is underway , scheduled to open in the fall of 2014)
28	Undertake planning and EA studies to identify need and justification for: 1. Reid Street extension to St. Georges from Second Line and removing the light at St. Georges and McNabb and to the new intersection with Reid Street

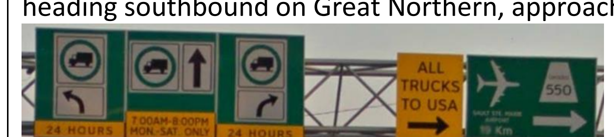
Item #	Recommendation Item:
	2. Four-laning of Second Line from Black Road to the new section on top of Second Line hill would make the route (a truck route) less congested and safer, especially during peak periods.
	Long Term (10 to 20 years or by 2030/2035)
29	Consider a new transit transfer hub/ station in the north end of the City, and other transit service improvements

13. PLAN MONITORING

The Sault Ste. Marie Transportation Master Plan will not be fully successful without effective monitoring of the Plan's progress. The continued well-being of the City of Sault Ste. Marie is dependent on balanced investments in all modes of transportation including transit services at various levels, roads to serve passenger cars and goods movement, continued investment in the hub trail system and spokes, and ensuring a safe and effective sidewalk and pedestrian crossing system.

To ensure that the Master Plan recommendations are carried out, each recommendation should be tracked to document progress through the municipal monitoring system and through capital planning. Public input to Plan recommendations is also very valuable to ensure that residents' needs are being met. City wide or focus group surveys can be considered. Finally, the City should consider an update to the Transportation Master Plan every 10 years or less which, in addition to monitoring progress, would also reconfirm the need for plan recommendations.

PUBLIC COMMENTS
SUMMARY

Comment #	Comment Source	Comment	Response
1	PIC #1	Might be worth investigating some kind of daily runs to outer areas including Prince Township, Echo Bay and Garden River. Need to reduce carbon footprint via more efficient transportation	If demand to these locations is sufficient, Sault Transit or perhaps another provider could consider services to these areas.
2	PIC #1	Bus stops at all intersections along Trunk Road are necessary, especially on the north side of intersection of Trunk Road and the new street running across it.	The Transportation Master Plan does not address specific stop locations, however your comment has been noted and shall be forwarded to Sault Transit for consideration.
3	PIC #1	Please keep me informed on your transportation plans.	Thank you for your interest - we have added you to the mailing list.
4	PIC #1	Solar and wind generation expenditures for the city infrastructure to reduce costs	Comment noted by the City – however this is not an issue that is typically addressed in a Transportation Master Plan
5	PIC #1	I would like to be placed on the Project Contact list.	Thank you for your interest - we have added you to the mailing list.
6	PIC #1	Four-laning of Black Road from Trunk Rd. to Second Line & Second Line from Black Road to the new section on top of Second Line hill would make the route (a truck route) less congested and safer, especially during peak periods. Turn signals at the traffic lights at North St. & St. Georges' Ave intersection should be investigated.	Comment noted – we are considering similar options for our final report.
7	PIC #1	Traffic signal lights need some revision to enable better traffic flow, especially on the main arteries during rush hours (e.g. Northern Ave, McNabb, Pine, Second Line etc.).	Comment noted – we are considering transportation policies directing the City to undertake traffic signal coordination and optimization studies.
8	PIC #1	I really enjoy giving feed back and doing surveys when it comes to our city, as giving input helps to better our future. Progress is extremely important to population growth and a good transportation system will improve the economy when places are easier to get to.	Thank you for your comment and we encourage you to continue to provide feedback.
9	PIC #1	The plan seems to have covered all bases. There is a tremendous amount of commercial (transports) and seasonal tourism using Great Northern Road and Second Line corridors. Public transit and the Hub Trail must continue to be high priority items.	Our final report will address the commercial vehicle traffic on those corridors and look at mitigation options. We confirm that public transit and the Hub Trail will continue to be high priority items.
10	PIC #1	From John Street going east to say Sackville or so we should dedicate one lane to trucks going east and west. What I found is that there are a few drivers that like to take both the lanes in order to pass each other. Sackville Road should be four-laned between Second Line and Northern Ave with a center turn lane. The extension to Sackville should be planned the same way also. Turn lanes should be incorporated. The road should be signed that trucks have to use Second Line as their in and out of Sackville. The light at Sackville and Northern Ave. should warn trucks that at a specified distance going west on Northern Ave. that they will run out of truck access road. Consider: a route to the industrial park and to Great Northern Road; Reid Street extension to St. Georges from Second Line; Removing the light at St. Georges and McNabb and brought further West to Reid St. Visible signage to control the traffic and proper enforcement is needed. The lights at John St. North St. and Sackville east to west on Second Line should be timed together- that may help the flow.	We appreciate the concern for truck traffic in the area. However the proposal to dedicate one lane to trucks may not be feasible. The existing four lane configuration along Second Line should be sufficient. Thank you for identifying these issues on Sackville Road. We will consider the potential for further study on these issues, perhaps in conjunction with the Sackville Road extension that has been identified. The suggestion of a Reid Street extension to both Second Line and St. Georges can be considered in a future more localized traffic study, however the need for such extensions is not warranted at the Transportation Master Plan level. Signal timing coordination on Second Line from Carmen's Way to Sackville Road can be considered in future studies.
11	PIC #1	Logging trucks are going to the Huron Central yards via Pim St. There is a truck route and the Re-Load Center next to it. Why not use this Route and Center for this traffic? Better and more visible signage is needed to provide travellers with the most direct routes directing traffic to the International Bridge	Pim Street is a Class B truck route per the City By-Law 77-200. Trucks are allowed on Pim Street from 7 am to 8 pm Monday to Saturday. We feel that adequate signage is provided for trucks heading southbound on Great Northern, approaching Second Line: 

Comment #	Comment Source	Comment	Response
12	PIC #1	Sackville Road has to go thru to Third Line as soon as possible, to help alleviate the congestion on Gt. Northern. I can't take my bike to Metro from Fort Creek area, as I am afraid to bike on Northern Ave. or Second Line, but the sidewalks are always empty on both of these corridors.	Sackville Road extension to Third Line is identified as a future road in the Transportation Master Plan. The gap in east-west cycling facilities in this location is noted – a spoke route continuing along Northern Avenue west to North Street could be considered.
13	PIC #1	Having known some people that have been hit and almost having been hit myself, our roads are unsafe for riders as there are no bike lanes, or not even really much of a shoulder or even edge for riders to ride along. There should be initiatives to push people to want to Carpool more. Having spoken to a lot of people around the city, some who don't even ride themselves, more bike lanes would be well received and highly appreciated. Given the success of the Hub trail, one can easily see that the added bike lanes, trails and paths would be well used.	We hope that the cycling master plan has addressed some of the safety concerns for cyclists and we appreciate your input to help us identify any specific locations which pose a safety concern. Travel demand management including carpool policies are encouraged as part of the Transportation Master Plan and form part of the policy framework that the City will build upon for the future. We hope to implement the spoke routes to the Hub trail as soon as possible.
14	PIC #1	Re: public transit- development of a sub/satellite station to facilitate "upper hill" area east and west. There has been consideration given to the establishing a sub-terminal in the "above" hill area. If riders could be surveyed as to where they think the most suitable location for a second terminal would benefit the community. At the survey I attended the mention of an area near the hospital. An area closer to the shopping plazas and Sault College would be a ridership preference.	A satellite station in the northern part of the City is being considered by Sault Transit and is noted in the Transportation Master Plan.
15	PIC #1	Lack of cycling infrastructure in the community, except for Hub Trail, which is a success for pedestrians and cyclists. There should be a review of our current transit network again, this time looking at low income areas of the city and where essential services are located. Sault Ste. Marie can be consider a winter city, therefore plowing all sidewalks within the city, even in residential areas should be considered to encourage walking as a mode of transportation all year round. An Active Transportation Strategy should be included within the TMP. It would help identify opportunities for other modes of transportation in planning. The TMP should be encouraged to include "Complete Street" policies as well, to ensure transportation planners and engineers consistently design the entire street network in the Sault to include all road users. There needs to be further studies on how to move people from one side to others in a safe manner. The other issue is the need to move people by foot and/or bike to the north end of the city where more businesses are locating. Speed reduction strategies especially in residential areas and possibly heavier fines for areas such as school zones, senior residences.	A detailed review of transit routes is not part of the Transportation Master Plan, but is noted for further study by Sault Transit. We agree with plowing of sidewalks to encourage active transportation, and recommend as part of the Transportation Master Plan. The Transportation Master Plan does provide active transportation policies and recommendations particularly regarding cycling and pedestrian crossings. Complete street policies are part of the recommendations of the Transportation Master Plan. Our review of the City's traffic calming policy provides added policy directions to provide for speed reduction strategies in the City.
16	PIC #1	Invest in redevelopment of existing, vacant, or underutilized serviced areas instead of expanding outwards, since the forecasted population growth is low.	Comment noted.

Comment #	Comment Source	Comment	Response
17	PIC #1	Reduce traffic signals on the Trans Canada Highway within Sault Ste. Marie City Limits, or build a bypass. There should be an awareness campaign for local transit services to highlight its improvements and effectiveness.	We are making recommendations for a bypass in the Transportation Master Plan.
18	PIC #1	ALL Pedestrian walkways should be cleared of snow in the winter. For some streets with little pedestrian traffic, I suggest removing sidewalk on one side of the road and widening the sidewalk on the other side into a multi-use trail. Use more pavement rather than concrete for sidewalks Get the sidewalks plowed overnight on key streets to accommodate for pedestrians walking to work in the downtown core and Great Northern Road. Need more segregated cycle paths in the downtown core to allow better access to Queen St. businesses. There are missing sidewalks on some streets that need it, e.g. Pine Street from Pleasant Dr to McNabb; a higher number of students in the area and the walkway from Princess Crescent to Pine discharge pedestrians onto road traffic.	We agree with plowing of sidewalks to encourage active transportation, and recommend as part of the Transportation Master Plan. The Hub trail and spoke system identifies active transportation facilities throughout the City. Beyond these plans, where specific improvements may be required, please notify City staff who will assess the need for improvements in detail. Cycling access to the downtown has been noted. Missing sidewalks have been noted.
19	PIC #2	Third Line between SAH and Old Garden River Rd. is unsafe for cyclists and pedestrians (very busy) – a multi-use bike path along this corridor would be preferred.	This part of Third Line is identified as a “Spoke Route” in the Cycling Master Plan, and one of the key recommendations of the Transportation Master Plan is to proceed with building the Spoke Routes.
20	PIC #2	Strongly support: Bike lanes on Queen Street; and; conversion of one-way streets in the downtown core to two-way operations.	Support for these items is noted, thank you.
21	PIC #2	Application of actuated pedestrian crossings is desired. Difficult/dangerous to cross roads like Carmen’s Way, Trunk Line, Second Line, Great Northern Road, etc. due to the lack of a legal crossing area (controlled intersections are spread out widely). There is a lot of pedestrian activity at Second Line/Great Northern Road, but is a challenging intersection to cross, even for a healthy individual.	The pedestrian crossing issues at these specific locations are noted, and we will ensure they are addressed in our recommendations for pedestrian crossings.
22	PIC #2	Interested in conversion to 4-lane roads (2 per direction) with exclusive left turn lanes and bicycle lanes, e.g. for Queen Street. Interested in effects of winter maintenance on roadway capacity (e.g. 4 lanes “converted” to 2 lanes)	Comments noted.
23	PIC #2	Interested in crosswalks through the town, especially for boardwalks and long streets	Pedestrian crossing issues at boardwalks and long streets may be considered in the Transportation Master Plan recommendations.
24	PIC #2	Concerned about clearing snow on proposed roundabouts and whether it is viable for large vehicles or cyclists to use the roundabouts. McNabb traffic is taking a shortcut through Lake Pleasant to avoid congestion at Tim Horton’s. Hwy 17 Bypass should not connect with Second Line.	Snow clearing, large vehicles, and cyclists should not have any difficulties with roundabouts as they are used throughout numerous municipalities in Canada today. McNabb traffic infiltration issues are too detailed for the Transportation Master Plan but noted for further investigation by the City. Connection options for Highway 17 with other streets would be considered at the Environmental Assessment phase by the Province.
25	PIC #2	Support: roundabouts, reducing lane widths to reduce speed and integrate bicycle lanes/improved sidewalks. Build on cycling master plan to improve accessibility and connectivity to allow effective use of active transportation	Support for these items is noted, thank you.

Comment #	Comment Source	Comment	Response
26	PIC #2	Lack of accessibility of different modes of transport, for disabled individuals in particular. Specific issues: lack of controlled pedestrian crossings (especially Boardwalk); parabus services; no accessible taxis; reduction in fee-for-services of gateway mobility; acquiring accessible city bus services; and; busing needs to have verbal announcement prior to each stop.	Accessibility issues are noted and will be addressed in the Transportation Master Plan.
27	PIC #2	Highway 17 should not go through the city; Second line should be a connecting link. Better signal timing to maintain steady flow and minimize pollution by idling cars.	A Highway 17 bypass should divert traffic away from the City - connection options for Highway 17 would be considered at the Environmental Assessment phase by the Province. Signal timing optimization is recommended for further study by the City.
28	PIC #2	Re: Planning Alternatives- Alternative #3, Transportation Strategy #1, and implementation of active transportation plans are preferred. Roundabouts/traffic circles should be investigated. Not in favour of one-way to two-way conversion in downtown. Would like to see more bike lanes (many streets are wide enough already).	Support for Alternative #3, roundabouts noted. Disapproval of one-way to two-way conversion downtown is noted. Additional bike lanes (spoke routes) recommended in the Cycling Master Plan are supported and recommended to be implemented.
29	PIC #2	Support: Active Transportation – building on the cycling plan; "Road Diets" for Bay and Queen	Support for these items is noted.
30	PIC #2	Issue of police enforcement- lack of police endorsement recommendations presented Problem with high traffic volume and speeding on McNabb Street (based on personal experiences) The lack of participation in the questionnaires should not be interpreted as not being a representation of the opinions of the entire community, especially with respect to "Unsafe driving/speeding". More people are driving on the roads; there doesn't seem to be a lack of population growth at all. Many currents roads are not in good condition and require resurfacing or complete reconstruction. Heavy trucks often take routes that are illegal to do so; no enforcement. Consideration of roundabouts is redundant; not capacity efficient on arterial roads. Cyclist lanes needed and enforcement on these lanes are required. Why is McNabb Street not being considered for "road dieting"?	Thank you for your comments. Where comments are not directly related to the Transportation Master Plan, they will be forwarded to City staff for further investigation, including McNabb street issues, road pavement condition, and truck route enforcement. Roundabouts are to be considered not only on arterial roads but lower traffic volume collector roads. More cyclist lanes are being recommended by the Transportation Master Plan, particularly the proposed spoke routes to the hub trail. McNabb Street from Great Northern Road to Black Road has been added as a potential road diet location.
31	PIC #2	Support: Planning Alternative #3 (especially with respect to public transit and active transportation); road dieting Access to the Hiawatha Highlands recreation area should be considered (e.g. hourly bus up Great Northern Road to Sixth Line and back down Landslide Road)	Support for these items is noted. If transit demand to this location is sufficient, Sault Transit or perhaps another provider could consider services to these areas.

Comment #	Comment Source	Comment	Response
32	PIC #2	Missed both PIC's and would like to receive details of PIC#2, details of the scope of the TMP, stage of the project, and summary of findings to date for insight into specific details/directions/expected results. It seems that traffic volumes have increased significantly over the last 20 years despite the claim that population growth has not increased significantly. Why was this, and how can we be sure that this will not occur again? Is this issue within the scope of the TMP? How will the shift in demographics (projecting 35 – 41% over age 60 by 2018) be factored into travel patterns and traffic volumes? How does the TMP relate to the Age-Friendly project? Is there sufficient detail on improved access while avoiding the need for mobility within the TMP? Again, is it within the scope of the TMP to address these matters? What can the TMP do NOW to address the volumes resulting from the relocation of the hospital, two schools, and ongoing commercial development (i.e. with respect to demand rather than mobility)? What are the ranking details used to assess the alternatives on page 12 of the PIC#2 boards? How are these metrics determined?	Website information and display boards have been forwarded.
33	PIC #2	Should the TMP Speak to capital expenditure needs in the future and invest more annually to stop deterioration of roads? (re: page 6) Is Third Lane between Old Goulais Bay Rd and GNR a truck route? (re: page 8) There is a possible need for N-S alternatives to GNR, widening or GNR north of Second Line, and road development east of GNR between Second Line and Third Line. Is it possible to predict the level of service on GNR in 20 years, north of Second Line, if only the Sackville extension and Black Rd/Third Line improvements are done? With regard the road diet concept, how will motorists be prevented from returning to driving in 4 lanes of traffic, once the lane markings are covered with snow pack? It would be helpful to justify the candidates for road dieting by showing projected traffic counts in the document. Will individual class EAs be needed for each road suggested for a lane reduction? Considerable property is required for roundabouts and they are not considered pedestrian friendly. There is a concern for developing motorist experience with roundabouts for safety reasons. It is suggested a further study is needed to make a recommendation on the one way versus 2 way downtown street flow. What is the potential cost of conversion (with respect to both monetary costs and travel time costs), and how many streets will be affected (there are more than the four streets mentioned involved as well)	The Transportation Master Plan recommends that the City investigate consistent funding sources to ensure that its roads remain in a state of good repair. Third Line is not considered a truck route between Old Goulais Bay Road and Industrial Park Crescent. The proposed Sackville Road extension should have a positive impact upon GNR traffic. GNR level of service at the intersection with Second Line will be assessed for the final report of the Transportation Master Plan. Landscaping and snow plowing will ensure that one lane of traffic in each direction will continue to occur with snow pack. Reduced travel space with snow windrows will also make it unsafe for 4 lanes of traffic to travel at once with or without road diet. The Transportation Master Plan final report will document existing and projected traffic volumes on the candidate road diet locations. Yes, an EA will be required for any changes to road cross section. Where only minor changes occur, a less extensive Class B schedule (versus Class C) may be appropriate. Understanding that there are pros and cons with roundabouts, the Transportation Master Plan simply recommends that they should be considered whenever intersection upgrades or modifications are warranted. The Transportation Master Plan will recommend further study for one-way to 2-way conversion.

Comment #	Comment Source	Comment	Response
34	PIC #2	Support: Transportation strategies #2 and #3 with the exception of roundabouts; new transit transfer station at the north end of the city; bicycle lanes along major roads; computerized monitoring of traffic flow to reduce congestion; one-way to two-way street conversion Roundabouts too confusing and not cost effective. Roads and sidewalks should accommodate for all users, including those with disabilities. One-way to two-way street conversion would be convenient for tourists travelling from the bridge to the downtown area.	Support items are noted. Disapproval of roundabouts is noted.
35	Study Website	Black Rd should be made into a 4-lane road (2 lanes in both directions) to accommodate the significant increase in traffic due to the hospital and development in that area. Traffic lights at Old Garden River Rd/Second Line and Black Rd/Second Line should be recalibrated so that the waiting times are reduced for both directions (ie. waiting for a green light to turn left onto Black Rd from Second Line is far too long). Second Line should be 4-lane from Black Rd to the hill (near Humane Society). A right-turn ramp should be added to turn right from Black Rd onto McNabb St to head westerly. New lights at Pine St and Northern Ave should be timed equally for both directions which will improve traffic flow.	The City is currently undertaking an Environmental Assessment for Black Road at Third Line. Signal timing comments are noted. Second Line number of lanes comment is noted. Need for a right-turn ramp from Black Rd to McNabb is noted. City will determine the need to assess these issues at a later date.
36	Study Website	I would like to see Queen Street traffic flow the opposite way coming off the bridge. Tourists would see the local businesses first, rather than the Casino. The old paper mill could be a trailer park, or something of that nature.	Comment noted. This issue could be addressed as the City considers one to two-way conversion in a possible future study.
37	Email re: Online Survey Report	I found the survey report most interesting. Please give me your opinion in terms of the weight value for this number of respondents. In other words, for our population, do you see the number of 1050 as a good representation for a feedback survey on which to make planning decisions for the future Transportation needs for our community? Should there be another effort at extracting more input from our community members?	The Public Opinion Questionnaire Report posed on the study website is summarizing and documenting views expressed by a group of citizens collected via the Internet tool. As much as these views and opinions are interesting and shed light on may issues faced by the transportation system in the City they are not (due to the limitations of the way the information was collected) representative to the views of ALL citizens - hence, should not be expanded to the entire population. The Survey Report represents views and opinions of people already with a keen interest and strong views about transportation and as such, is subject to a high sampling bias and not representative of the entire population. A public opinion survey, preferably telephone based, with a fully randomized sample of respondents would be ideal to properly gauge views and opinions of the City's residents.
38	Other	Why wasn't McNabb Street considered for "road diet"?	As part of the TMP, the City has identified road diets as a solution to better utilize existing roadway space. To facilitate the discussion and to provide some concrete examples at the public meeting and in the final report, the project team suggested 6 locations to assess the suitability for a road diet. As such, the 6 locations form only a preliminary list. As City staff and the public become more aware of the benefits of Road Diets, other locations may come up as well for further study, such as McNabb Street. Following your question, we did have a look at McNabb Street and have concluded that it appears to be a suitable candidate, and we can include it in the TMP final report. McNabb Street from Great Northern Road to Black Road has been added as a potential road diet location.

Comment #	Comment Source	Comment	Response
39	Other	Further to our phone conversation of yesterday, January 29, re: above topic, I want to confirm your comment that the study was not meant to have any credibility as far as providing strategy for the Master Traffic Plan here in Sault Ste Marie and provide me again with reason for it. As I told you I become involved with traffic to address driving behaviour. I intend to comment on the Plan after reviewing my notes and refreshing my recollection of real life experiences I've had driving,cycling or walking here.	Thank you for your e-mail and the subsequent voice message. On January 30, 2014 we discussed the following: 1. The Public Opinion Questionnaire can be downloaded from the study website but is not available in hard copy. 2. The Questionnaire represents opinion of citizens who choose to express one. This questionnaire is not representative of opinions of the entire community. The Report is clearly stating this in the Introduction section on page 1, second paragraph from the top. 3. You have raised the issue of police enforcement and noted lack of police endorsement recommendations in the TMP materials presented at the Open House. Your comment has been noted. 4. You asked what are the average traffic volume for an arterial road. In response I said that the magnitude of traffic on arterial road will depend on its location and can vary from 50,000 to 20,000 vehicles per day. 5. You mentioned that in your view there is a problem with high traffic volume and speeding on McNabb Street were your residence used to be (now you reside in another part of the City). You also mentioned that you alerted the City about this situation before.
40	Other	First and foremost I firmly believe that all roads/streets belong to each and everyone of us. Thus all users should do so with safety in mind and be treated in like fashion -drivers, cyclists and pedestrians observing the laws. In addition anyone using one should do so feeling safe without fear of intimidation. I've looked at the "Summary of Results" from last fall's questionnaire. It is obvious that of those who answered, "Unsafe driving/speeding" was a concern (Figure 9, page 10). I am not prepared to get into a long discussion re: statistical deviation and whether they represent the opinions of entire community. The lack of participation should not be interpreted as such. It is repeated again further down the page under Safety. Again on page 15 under Traffic Operations. It would appear it is important and ought to have been included in the planning of any conveyance. Strategies: Claim - lack of population growth = decreased traffic volume. I see more and more vehicles (line ups) on our roads; more people driving - easier financing, more disposal income, young folks getting drivers licences. Current roads - in good condition - they are not and many in need of resurfacing or complete reconstruction from subgrade up. Repair existing before planning new ones. Heavy trucks do use streets not legal to do so and often - no enforcement! Anticipated increase in traffic volume limited to a few arterial roads; I see other streets i.e. Wellington East, McNabb. What studies have been done to address increased residential areas of retired folk - these seem to be popping up in many places and will continue to grow as this population grows? Roundabouts/traffic calming Strategy 3 - from my application for one of these resulted in 1 day decision - no. Heaviest roads are arterial and traffic flow /speed cannot be hampered, no matter what. Any consideration is reduntant. Cyclist lanes - any effort to create these will be most welcomed - again needing enforcement. I used to cycle and to end any risk of injury have stopped altogether. Last but not least why is McNabb Street not being considered for "road diet"? Put people (cyclists, pedestrians, residents) on equal footing with drivers. I believe this can be acheived and still move traffic effectively. It just takes a willingness.	Thank you for your comments. They will be considered in the TMP process.
41	Other	I am following up on the public consultation held in January. Do you have an idea when the consultation report will be available??	Thank you for your email and for your comments at the public open houses. We are currently in the midst of drafting the final report at this time (May 2014).

Comment #	Comment Source	Comment	Response
42	Other	Thank you for the opportunity to provide comments. I live in the east end near the intersection of Bennett and Shannon and work in the downtown core. I strongly support the establishment of bike lanes on Queen Street which will allow me to cycle to and from work with greater confidence and convenience. I also support the proposed conversion of one way streets in the downtown core to two way streets. It will reduce confusion, improve conditions for retailers and improve access to our offices.	Thank you for your comments. Support for these items is noted.
43	PIC #2	I prefer Alternative 3 which includes some road improvements along with improved public transit and active transportation. Even though I usually drive a car, I strongly support the concept of 'road diets'. I would use a bicycle more if it was safer to do so. I strongly believe that solution to traffic congestion is NOT to build/widen more roads but to have fewer vehicles on the roads through active transportation and public transit. I was disappointed that the public transit plan does not include access to the Hiawatha Highlands recreation area; an hourly bus route up Great Northern Road to Sixth Line and then back down Landslide Road should be considered.	Thank you for your comments. Support for road diets, public transit and active transportation improvements is noted. Transit route suggestion is noted.
44	Study Website	I am in favour of Strategies 2&3 with the exception of Roundabouts instead of intersections. I find these would not be cost effective and too confusing for most drivers. Roads, cycling facilities and sidewalks should be built to accommodate all users including those with disabilities. I think a new transit transfer station in the north end of the city would be an excellent idea, so that all of those buses climbing the hill could stay in that area and not have to travel back to the downtown. This would definitely shorten travelling time for those using the transit system. I am also in favour of a bicycle lane, especially along major roadways. To alleviate congestion problems I am very much in favour of having digital computerized monitoring of traffic flow to properly regulate the changing of the traffic lights. This would make traffic flow so much smoother and eliminate backups. As for the conversion of Bay St., Queen St., Wellington and Albert Sts. to 2-way from one-way, I think that would also be more convenient, especially for any tourists travelling from the Bridge to the downtown area. It would eliminate confusion and assist with traffic flow which would decrease travelling time. It would also make it easier to access downtown businesses and the mall area.	Thank you for your comments. Disapproval of roundabouts is noted. Support for signal coordination, active transportation, public transit improvements and conversion of one-way to two-way streets is noted.

STUDY NOTICES

City of Sault Ste Marie Transportation Master Plan Study

NOTICE OF STUDY COMMENCEMENT

The City of Sault Ste Marie has initiated the Transportation Master Plan (TMP) Study. It will guide the development of the City's long-term transportation network in compliance with the provincial Policy Statement, and the City's Official Plan. It reflects the City's desire to develop a sustainable transportation system with a strong focus on efficient use of existing infrastructure, active transportation and transit.

This notice signals the commencement of the TMP Study. This study will be carried out through an open public process in accordance with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process (MEA, October 2000 as amended in 2011) which is an approved process under the Environmental Assessment Act. The TMP study will be carried out in two stages:

- Stage 1 will assess the current state of the transportation system and identify short term and quick implementation solutions; and
- Stage 2 will identify the transportation infrastructure needs and timing to accommodate planned growth in the City and will provide input for a potential Development Charges By-law and Official Plan updates.

A key component of the study will be consultation with stakeholders, regulatory agencies and the general public. Anyone with an interest in this study has the opportunity to get involved and provide input. Two Public Information Centres (PIC) will be held during the study to inform the process, present findings and receive public input. A Notice providing the time and location of the PIC will be published in local newspapers and posted on the study website.

An online questionnaire is provided to you as a mean to inform the TMP study process and ensure that your voice is heard and considered. The questionnaire is available at: www.surveymonkey.com/s/SSMTMP and will be accessible until November 30, 2012.

If you require additional information or would like to be placed on the project contact list, please visit us on the study website at www.cityssm-tmp.ca or contact one of the individuals below:

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City of Saul Ste. Marie Transportation Master Plan Study

NOTICE OF PUBLIC OPEN HOUSE #1

The City of Sault Ste. Marie has initiated a Transportation Master Plan (TMP) Study. It will assist the City in planning a sustainable network of roads, sidewalks, and bicycle lanes.

A goal is to provide sustainable travel choices – walking and cycling. The plan will also respond to the needs of residents and businesses, protect the environment, and support the economy.

This study follows the Municipal Class Environmental Assessment (EA) public process. We encourage everyone to get involved. Two Public Open House Meetings will be held. You are invited to attend the first Public Open House on:

Date: **Tuesday, November 27, 2012**
Time: **5:00 PM to 8:00 PM**
Location: **City Hall**
99 Foster Drive, Sault Ste. Marie

The Open House materials will be posted on the study website at www.cityssm-tmp.ca on November 29, 2012. We invite you to forward comments by December 14, 2012. Also let us know if you want to be added to our mailing list.

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City of Sault Ste. Marie Transportation Master Plan Study

NOTICE OF PUBLIC OPEN HOUSE #2

The City of Sault Ste. Marie has initiated a Transportation Master Plan (TMP) Study. It will assist the City in planning a sustainable network of transportation infrastructure providing mode of travel choices in accordance with the City's Strategic Plan and Corporate Values.

The plan will also respond to the needs of residents and businesses, protect the environment, and support the economy.

This study follows the Municipal Class Environmental Assessment (EA) public process. We encourage everyone to get involved. You are invited to attend the second of two Public Open Houses on:

Date: **Tuesday, January 28th, 2014**
Time: **3:00 PM to 7:00 PM**
Location: **City Hall Biggings Room, 1st floor,**
99 Foster Drive, Sault Ste. Marie

The Open House materials will be posted on the study website at www.cityssm-tmp.ca on January 24, 2014. We invite you to forward comments by February 14, 2014.

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Sault Ste. Marie Transportation Master Plan

Summary of Results for the Public Opinion Questionnaire

Final Report

February 2013

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INTRODUCTION

This report presents the results of the voluntary Transportation Master Plan (TMP) Questionnaire. The TMP Questionnaire is intended to reflect the desires of the people who live in Sault Ste. Marie with respect to the development of the City's long-term (2031) Transportation Master Plan. The Questionnaire was available online from Sept. 10 to Dec. 12, 2012 and was publicized at the TMP public open house, on the project website and in local newspapers. There were a total of 1,066 responses received.

This questionnaire was open to all citizens from the community who were interested in participating. While this questionnaire is a helpful and necessary part of capturing public views on transportation issues in the city, it has not provided a statistically accurate representation of all citizens' opinions.

The responses to the questionnaire are organized by question. For questions where written responses were provided, these responses have been summarized by theme. For questions where data was provided by respondents, tabulated tables and graphs are provided. Names and address of respondents have been withheld from the questionnaire summary.

1. **Where do you live?**

   A total of 1,055 people responded to this question providing either their address or nearest major intersection. This data has not been geocoded to obtain information on location of respondents.

2. **Where do you work or study?**

   A total of 1,032 people responded to this question providing the address or nearest major intersection to where they work or study. In some cases, respondents provided the name of their workplace, study location, or additional information if they were retired, worked from home or did not work or study.

3. **What is your age?**

   A total of 1,058 people responded by providing their age. **Figure 1** shows the breakdown of respondents by age category. Nearly half of the people who responded were in the 26 to 49 age group. The next largest share was the 50 to 65 age group, followed by 19 to 25 and more than 65. The smallest cohort of respondents is the 18 and under age category.

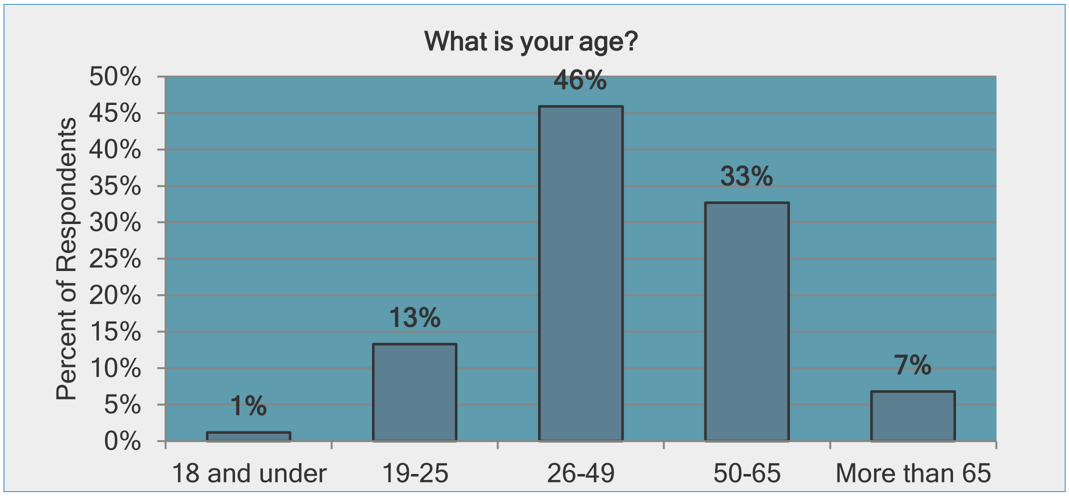

Figure 1: Age Grouping of the Respondents

4. How often do you travel to work or school?

Question 4 was intended to gauge frequency of travel to work and school in Sault Ste. Marie. Just over three quarters of the 1,049 respondents to this question indicated that they travelled to work or school five days a week or more as shown in **Figure 2**. The next largest share are those who have no work or school travel requirements, followed by those who travel less then five days a week. Only one percent of the respondents indicated they travel to work or school a few times a month.

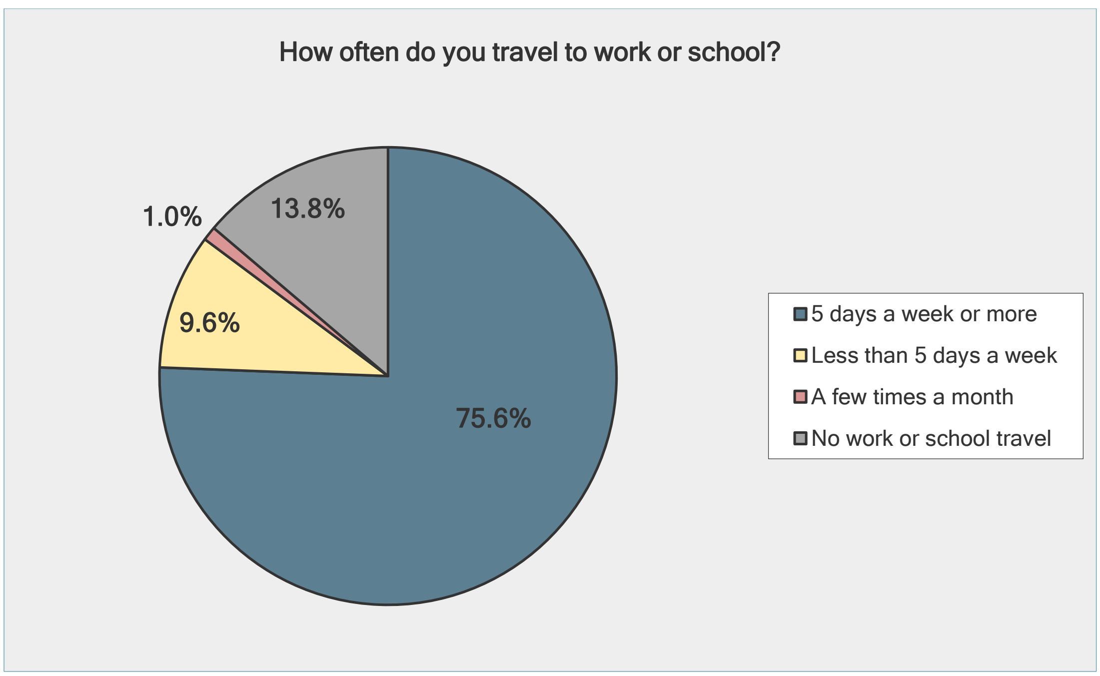

Figure 2: Frequency of Travel to Work or School

5. How far do you travel to work or school?

Of the 1,046 people who responded to this question, 60 percent travel over 3 kilometers to work or school. This is followed by roughly 23 percent who travel 1 to 3 kilometers. Approximately 13 percent do not go to work or school, while about 3 percent travel less than 1 kilometer to work or school. Additionally, there is a small share of people who work from home. **Figure 3** shows the shares of distance travelled to work or school in Sault Ste. Marie.

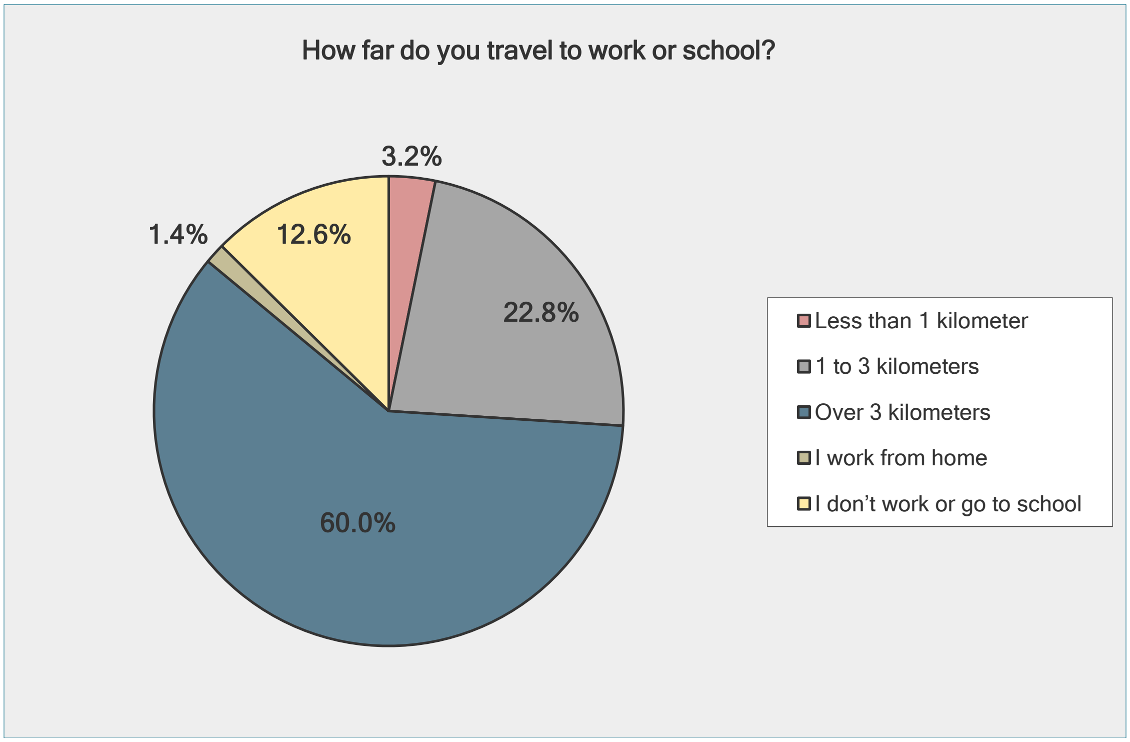

Figure 3: Distance Travelled to Work or School

6. How frequently do you use the following travel modes?

Four travel modes were evaluated to determine how frequently people use each mode of travel in Sault Ste. Marie. These modes include: car, bus, bicycle and walking. A total of 1,059 people responded to this question, however not all respondents answered for each mode leading to counts that do not aggregate to equal amounts. Nonetheless, it is possible to get a sense of the frequency of use of each mode as shown in **Figure 4** and **Table 1**.

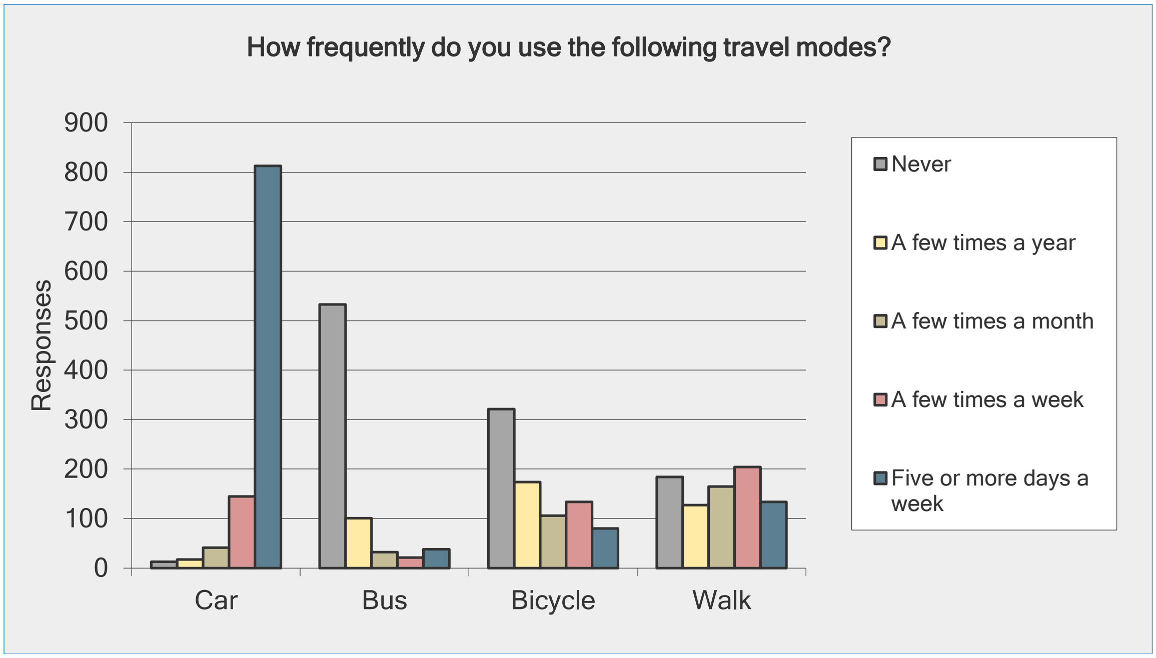

Figure 4: Travel Mode Frequency of Use

Table 1: Travel Mode Frequency of Use Response Counts

Answer Options	Five or more days a week	A few times a week	A few times a month	A few times a year	Never	Response Count
Car	79%	14%	4%	2%	1%	1029
Bus	5%	3%	4%	14%	74%	725
Bicycle	10%	16%	13%	21%	39%	815
Walk	16%	25%	20%	16%	23%	814
					Answered Question	1059

Among respondents, car is by far the most frequently used form of transportation, with roughly 79 percent of people travelling by car five days a week or more. Only one percent of people responded they never travel by car. Public transportation by bus is the opposite, with roughly five percent of people saying they use the bus five days a week or more. On the other hand, nearly three-quarters of those who responded to the bus frequency question suggested that they never use the bus. The share of people cycling as a mode of travel is more evenly spread between frequency categories from 21 percent of people cycling a few times a year to 10 percent cycling five days a week or more. There were roughly 40 percent of people who responded to the cycling question by saying they never use the bicycle as a mode of travel. Similarly, the shares of people that walk is evenly spread between use frequency categories from 23 percent who never travel by walking to 16 percent who walk five days a week or more.

7. What is influencing your decision to use the most frequent travel mode identified in the previous question?

Several factors were listed as influencing people's decision to use the most frequent travel modes identified in Question 6. **Figure 5** lists the major influencing factors ranked by importance. Respondents were able to select more than one option and as a result, the percentage values represent the percent of total response count rather than being additive to 100 percent.

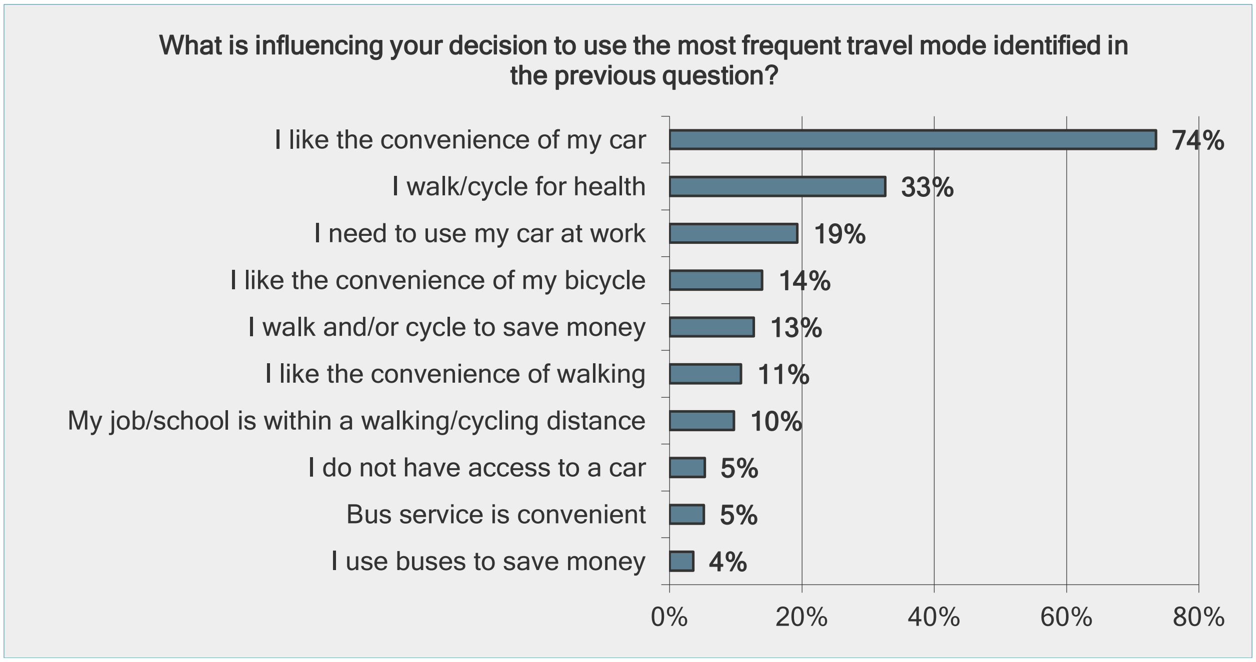

Figure 5: Major Influences on Mode Choice as a Share of Total Responses

At the upper end, roughly three-quarters of people listed the convenience of their car as the major influence on mode choice. Second to this, with one-third of people responding, was walking and cycling for health related reasons. At the lower end of the spectrum, people listed the lack of car access, convenient bus service and using the bus to save money as influencing factors.

Over 200 people provided other reasons for their influence on the most frequent travel mode, including: accessibility (disability), transit accessibility/operation, cycling facilities, distance, environmental factors, safety, household constraints, work constraints, weather/seasonal factors, and other considerations. More detail on these factors is provided below.

- **Accessibility for Persons with Disability:** Several people were either unable to drive due to health/disability reasons and this limited their use of a car as a travel mode, while others were unable to walk, cycle or take the bus due to health/disability and required the use of their car as their mode of travel.
- **Transit Accessibility/Operation:** Lack of nearby public transit options in certain areas and lack of convenient scheduling, especially during late/early hours, dissuaded many from using public transit as their most frequent mode of travel. There was an overall sense of limited incentive and encouragement to use transit in Sault Ste. Marie. Many people mentioned there were no

transit options available in rural areas outside city limits, and those who did have transit options available said travel time on the bus was much greater than travel by car making it too inconvenient.

- **Cycling Facilities:** A recurring theme in the questionnaire responses was that there were insufficient cycling paths and on-road cycling infrastructure available. Furthermore, many felt the current roads were too busy or under construction and could not be used as safe cycling routes, limiting cycling as a frequent choice of travel.
- **Distance:** One of the most important factors people listed as influencing car as their choice of travel mode was distance from their home to place of work, school, daycare, groceries, errands, etc. Several people mentioned they would cycle or take transit if there were options close by.
- **Environmental:** A good contingent of people responded that they travel by public transit, bicycle, and walking frequently for environmentally conscious reasons such as reducing greenhouse gas emissions.
- **Safety:** For many a car was perceived as the safer option to travel rather than walking or cycling. This was a major influence on people's decision to use their car as their most frequent mode of travel. For walking, there was a sense that certain street corners were unsafe and that sidewalks were not being cleared properly during the winter leading to slippery conditions. For cycling, most people felt uncomfortable sharing the roads with cars, but were open to cycling more often if dedicated cycling infrastructure was made available.
- **Household Constraints:** A number of people said there were household constraints either limiting their mode choice to car or forcing them to use other modes such as transit, cycle, or walking. For instance dropping and picking children up from school/daycare, visiting and transporting sick or elderly family members, and pet ownership were listed as reasons why people used their car. On the other hand, households with only one vehicle often forced one family member to use alternate modes of transportation.
- **Work Constraints:** Trades people using vehicles for work-related purposes and others required their car to travel from meeting to meeting. Many mentioned they preferred the reliability of using their car for work, while others said their work start/end time limited their ability to use public transit altogether.
- **Weather/Seasonal:** Many people do not cycle during the winter months or when there is snow. These people tend to drive during the winter and cycle during the summer months. Others found walking difficult in the winter in areas without sidewalks.
- **Other Considerations:** Several people who responded do not drive due to age or other reasons and this was the major influence on their mode of travel decision. Others listed access to the airport and border crossing as the reason why they use their car versus other modes.

8. Would you consider taking transit, walking or cycling?

Almost all questionnaire respondents provided an answer to whether they would consider taking transit, walking, or cycling. As illustrated in **Figure 6**, responses were split with roughly one third saying they were either very likely or not likely to consider taking alternative modes of transportation, while the remainder was either likely or somewhat likely.

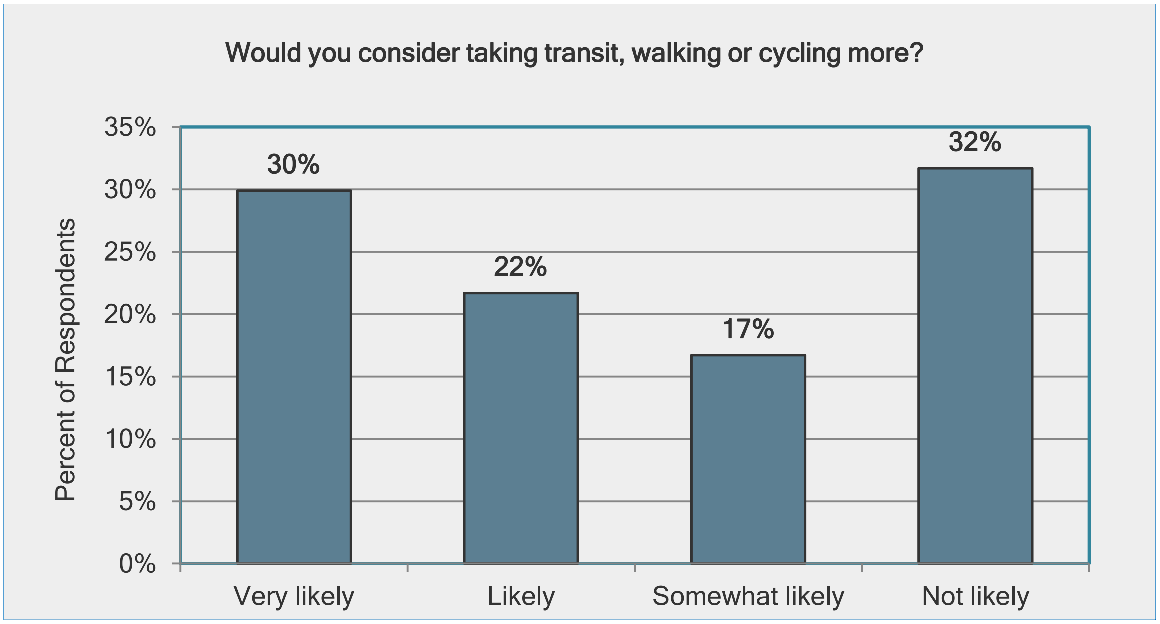

Figure 6: Attitude Towards Increased Use of Transit, Walking, and Cycling Modes

9. What conditions or changes to the existing transportation network would be required for you to take transit, walk or cycle more?

This question asked respondents to rate the importance of certain changes to the existing transportation network that would be required to induce more use of transit, walking, or cycling. A rating average was calculated based on the responses to allow them to be rank ordered. The rating average assigns weights from 1 to 4 based on the response, with lower weights signifying positive responses. Therefore lower rating averages show more favourable responses. The results in **Figure 7** show that separated bicycle lanes ranked as the most important change. Second to this was better sidewalk quality. More bicycle racks, shorter bus times, and frequent transit services ranked at the lower end of changes required.

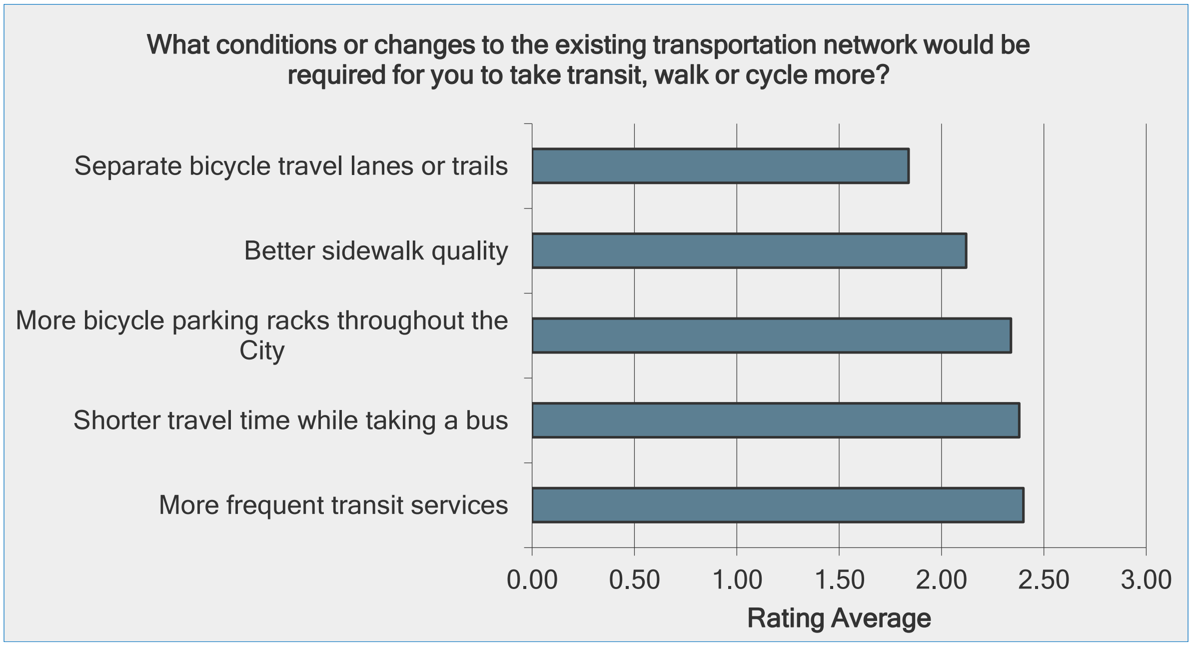

Figure 7: Changes to Existing Transportation Network Required to Induce Modal Shift

Roughly one-fifth of the 1,000 respondents to this question provided individual written answers. They have been grouped in the following categories: accessibility (disability), cycling facilities, safety, transit accessibility/operation, transit service coverage, traffic operations and road conditions, weather/seasonal, pedestrian facilities, and other considerations. These responses are summarized below.

- **Accessibility for Persons with Disability:** Better access for wheelchairs on public transit and more accessible public transit to the outskirts of the city and rural areas along with more accessible sidewalks were listed as conditions that would be required to provide better accessibility for people with disabilities.
- **Cycling Facilities:** More cycling paths, dedicated and non-dedicated, with consideration given to safety were a key condition many provided to increase cycling. There were several recommendations that cycling paths should be marked by lanes or coloured pavement and that existing cycling paths should be widened. Others respondents wished to see more continuous cycling routes that connect dedicated bike lanes to the Hub Trail and away from major thoroughfares.
- **Safety:** Several people felt driver education for the safety of pedestrians and cyclists would help encourage more people to use these modes of travel. Conversely, several people felt cyclists require better education on the rules of the road to increase the safety of drivers. A few people recommended traffic calming devices to slow vehicle speeds, better road conditions, and safer sewer grates (to prevent bike wheels being caught) as a means of increasing cycling.
- **Transit Accessibility/Operation:** A number of people pointed to the negative perception and lack of comfort of public transit as a limiting factor on their decision to take the bus. There were several recommendations for cleaner buses, more seats at bus stops, lower fares, more

frequent late night and early morning service, and better interconnections at transfers and between modes.

- **Transit Service Coverage:** Increased service coverage to reflect changing city dynamics, especially to the outskirt/rural areas, as well as an overall increase in network coverage and reduced distance to bus stops were all recommended as changes that would increase ridership.
- **Traffic Operations / Road Conditions:** A key theme many people touched on was better enforcement of traffic laws and speed limits to increase safety for people travelling by alternative modes. For walking in particular, more cross walks and longer cross walk signal times were recommended. For cycling, several people suggested better road maintenance and reduced traffic speeds to increase cyclist safety.
- **Weather/Seasonal:** A reality many people mentioned is they feel winter is too cold to walk, cycle, or wait for transit comfortably. Respondents recommended better snow clearing from sidewalks, paved shoulders, bus stops and the Hub Trail, to increase walking, transit, and cycling in the winter.
- **Pedestrian Facilities:** There is a demand for more sidewalks and sidewalks on both sides of the street in certain areas to increase walkability.
- **Other Considerations:** For many there were no changes that would encourage more use of transit, walking or cycling, due to their current situation (work, car ownership, distance, children, etc.)

10. In your view, what are the most IMPORTANT transportation issues of concern the City should address?

Driving related issues were the top ranked issues by respondents, as shown in **Figure 8.** Road congestion, poor traffic signal coordination, and unsafe driving ranked as the top three most important issues of concern. Cycling paths were in the middle of the ranking, while pedestrian issues such as providing safer pedestrian crossings and lack of sidewalks were the lowest ranked issues of concern.

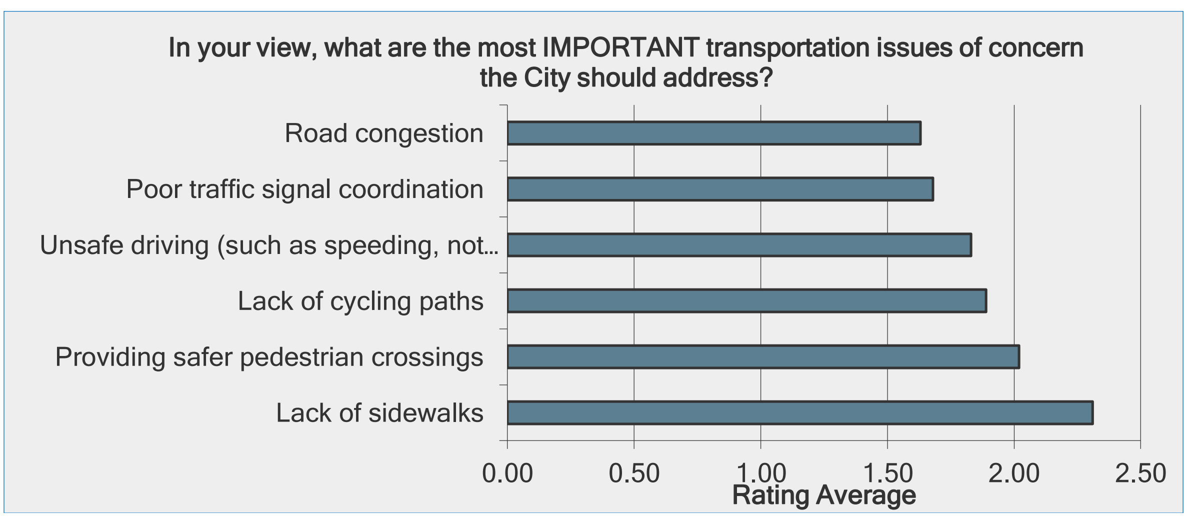

Figure 8: Ranking of Most Important Transportation Issues Identified by Respondents

Nearly all respondents answered this question and several provided additional comments, which are provided below. They have been organized in the following categories: accessibility (disability), cycling facilities, safety, traffic operations/road conditions, traffic signals, transit accessibility/ operation, walking facilities and other considerations.

- **Accessibility for Persons with Disability:** Several people suggested sidewalks need to be improved for AODA (Accessibility for Ontarians with Disabilities Act) access and more funding for Parabus service and special transit for seniors and those with disabilities.
- **Cycling Facilities:** Driver awareness of cyclists, bike share programs, dedicated cycle paths on major roads and better traffic enforcement of cyclists were all listed as important transportation issues the City should address.
- **Safety:** Safety was repeatedly listed through questionnaire results as a critically important issue the City should address. Common suggestions included: lowering speed limits, better road lighting, better pavement markings, snow clearing on sidewalks, and more stringent traffic enforcement of drivers and cyclists.
- **Traffic Operations / Road Conditions:** Many respondents suggested greater focus should be paid to road conditions and road quality as well as road design, including more right hand turning lanes and better road signage.
- **Traffic Signals:** A key theme brought up by most respondents had to do with two traffic signal issues: better coordination of traffic lights and the desire for flashing red lights indicating four-way stop during late evening and early morning. These two issues were stressed by many as a means to improve traffic flow. Other signal issues included: removal of advanced greens (or replacement with delayed greens) at certain intersections, removal of some lights altogether and replacement with stop signs, and more sensors to activate light changes.
- **Transit Accessibility/Operation:** Transit service was an important issue many felt the city should address. Key points included: more frequent service during regular and off peak hours, better service to outlying areas, more bus shelters, and transit to the airport. People also suggested transit fares should be lowered, comfort levels on buses increased, and consideration given to bus driver customer service training.
- **Walking Facilities:** Operation of walking facilities was raised as an important issue. These concerns included: timing of crosswalks to be re-evaluated, overpasses constructed near schools and parks, and improved signage on the Hub Trail.
- **Other Considerations:** Other important issues included: reducing volume of electric bikes (e-bikes) and scooters on roadways, better construction scheduling/management of roadwork, more roundabouts instead of traffic lights, and a bypass of the TransCanada highway around the City.

11. In your view, what should be the key guiding principles of the Transportation Master Plan for the City?

Nearly all 1,066 respondents gave feedback on what they thought the guiding principles of the TMP should be for the City. The top rated principles, as shown in **Figure 9**, were improving the operation and coordination of signalized intersections and making walking and cycling safer. This sentiment has been reaffirmed in the detailed responses received throughout the questionnaire. On the other end, the principles which received the least support were investing in transit and making transit service more frequent and better connected, as well as adding capacity for cars and investing in new roads.

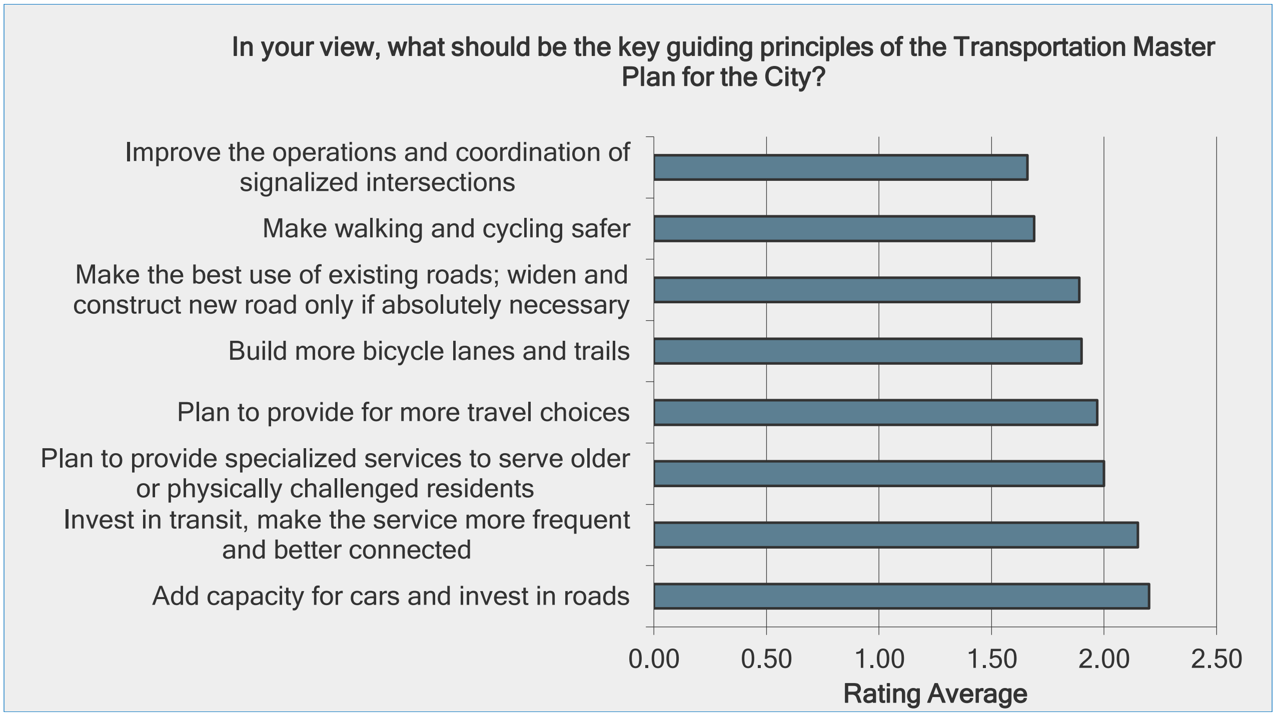

Figure 9: Ranking of Key Guiding Principles of the TMP

Individual responses were also provided to this question. They have been grouped in the following categories: accessibility (disability), cycling facilities, traffic operations/road conditions, traffic signals, transit accessibility/ operation, safety, walking facilities, and other considerations. These responses are summarized below.

- **Accessibility for Persons with Disability:** In addition to planning to provide specialized services to serve older or physically challenged residents, many people suggested that the City should plan to provide more AODA facilities and longer pedestrian crosswalk times due to the aging population.
- **Cycling Facilities:** There were several suggestions to focus on cycling infrastructure as a guiding principle for the TMP, including: repairing existing bicycle facilities and building grade-separated cycling facilities in addition to building more bicycle lanes. Other cycling related issues included accommodating cycling facilities for the aging population, assessing the growing e-bike community, assessing the potential for bike share programs, and developing a plan to better encourage and incentivize cycling.
- **Traffic Operations / Road Conditions:** Many people felt better repair and maintenance of existing road infrastructure should be a key principle for the TMP. There was also support for the City to provide better construction schedule management on roadwork projects. Specific elements that respondents wanted to see in terms of traffic operations include: more right

turning lanes, road widening, additional lanes, and assessing the use of roundabouts and speed limit reduction as means to calm traffic.

- **Traffic Signals:** There were many responses that signal operations, beyond improving signal timing and synchronization, should be a key principle for the TMP. Key issues included: changing signal lights to flashing four-way stops in the evening, removing traffic signals altogether, and making sure walk signal activation buttons were working properly.
- **Transit Accessibility/Operation:** Beyond investing in transit and making the service more frequent and more connected, many felt transit services should be more accommodating in general. Cleanliness of buses, more bus shelters, reduction in transit fares, service during off-peak and night hours, as well as access to recreational facilities were all mentioned as recommendations.
- **Safety:** Safety was a recurring theme for many people. An education and awareness program for all modes was a frequent comment. This included driver education regarding cyclists and pedestrians as well as cyclist education on the rules of the road.
- **Walking Facilities:** General improvement to walking paths was a key guiding principle many felt would encourage walking. Improvements such as: more paths and sidewalks, greater snow clearing efforts and more crosswalks between intersections on long road stretches to add safety were all common suggestions.
- **Other Considerations:** There were several other considerations people provided as items that should be considered in the TMP. Other considerations listed included: more oversight to transportation demand management (TDM) in general, assessing the potential for more snowmobile paths, a TransCanada highway bypass around the city, and assessing rail grade crossing separation need.

12. What additional recreational or commuter cycling routes should be considered for Sault Ste. Marie?

This question was related entirely to cycling route recommendations in Sault Ste. Marie. Respondents were able to select more than one option and as a result, the percentage values represent the percent of total response count rather than being additive to 100 percent. As seen in **Figure 10**, combination of urban and recreational cycling routes was by far what most respondents wanted considered for Sault Ste. Marie. There were others who suggested either recreational or urban routes.

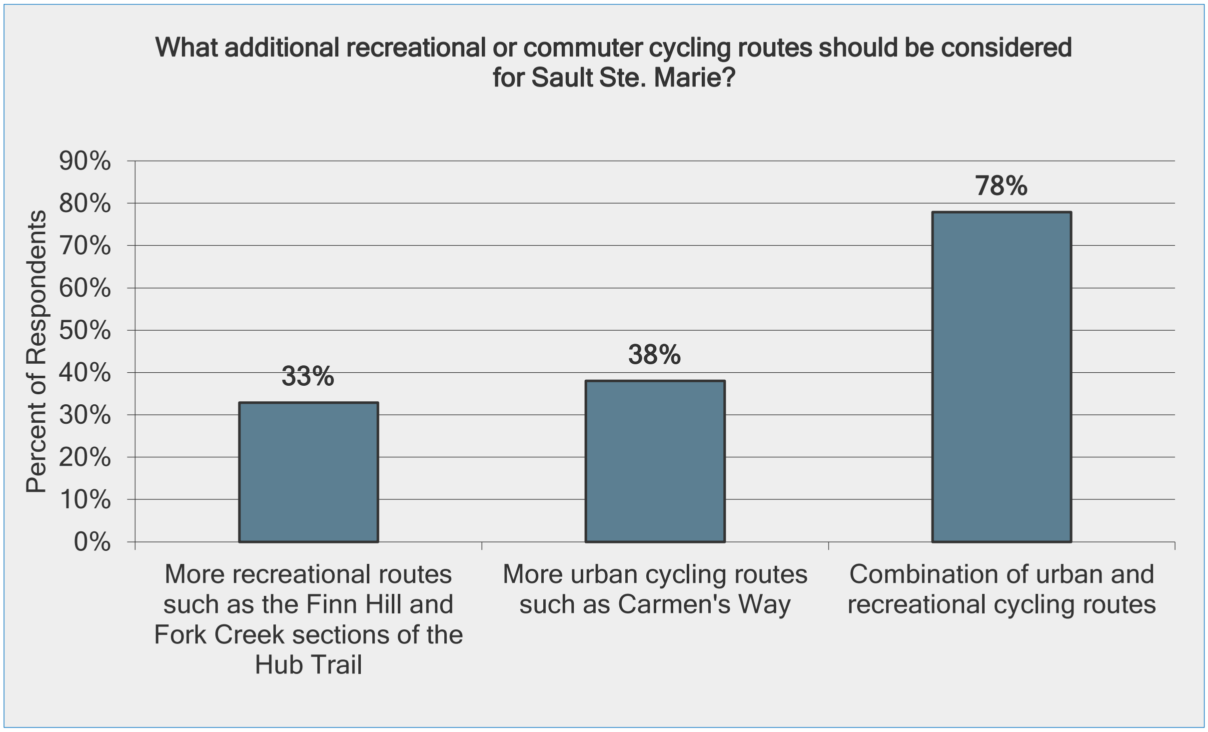

Figure 10: Suggested Additional Recreational or Commuter Cycling Routes

Beyond the choice of recreational and urban cycling routes, many respondents provided other considerations for cycling infrastructure. These considerations have been organized and summarized below as follows: rural connectivity, urban connectivity, cycling route operations, Hub Trail issues, specific route recommendations, and no action.

- **Rural Connectivity:** Better cycling route connectivity to rural areas and better safety for cycling in rural areas was suggested. Others would like the City to assess the suitability of cycling routes on major roads versus minor roads.
- **Urban Connectivity:** Beyond the desire for more urban cycling routes in general, there were many who wanted to see dedicated bike lanes with demarcations and better connection of urban cycling routes to work, school, shopping, and healthcare amenities. There is a general sense that the Hub Trail has been an excellent addition to the City, but that it is too circuitous for urban needs and “spokes” need to be added to complete the trail.
- **Cycling Route Operations:** Safety on cycling routes was a key theme for many. Suggestions to increase safety levels mostly revolved around cycling route operations. These suggestions included: more dedicated cycling routes, year-round snow clearing of cycling infrastructure, better lighting on routes, and better demarcation and signage on cycling routes.
- **Hub Trail Issues:** As mentioned above, the Hub Trail has been very well received by most people in the City, however there were several suggested improvements such as: extend the Hub Trail to the airport, completion of “spokes” or a cross-town arterial, better linkage to major amenities, provision of parking at Hub Trail entrances, year-round operation and better signage.

- **Specific Route Recommendations:** The following were recommended as potential cycling routes:
    - Hiawatha Highland
    - Garden River Road
    - Great Northern Road
    - Queen Street
- **No Action:** Despite strong support for cycling, many people responded that no additional recreational or commuter routes were needed due to cost and perceived lack of use.

13. Do you have any comments with respect to the development of the long-term Transportation Master Plan?

Respondents were given the opportunity to provide additional comments with respect to the development of the Sault Ste. Marie TMP. Many of these comments were common themes throughout the questionnaire responses. Responses were organized and summarized as follows: accessibility (disability), transit accessibility / operation, planning, traffic operations, traffic signals, road conditions, safety, cycling facilities, walking facilities, Hub Trail improvements, and ATV and snowmobile facilities.

- **Accessibility for Persons with Disability:** Due to the aging population, the elderly and disabled should be incorporated in all designs including increased transit options. Many people wanted the City to consider a reduction in fares for elderly and those with disabilities as well as considering more flexible and comprehensive Parabus service.
- **Transit Accessibility/Operation:** A key theme throughout the questionnaire responses was to improve public transit coverage and provide better transfer points and interconnection between bus routes to access amenities. Along with these issues, reduced fares, reduced distance between stops, increased frequency, and service times during off-peak and night were recommended. In terms of general operations, people requested better bus shelters, more seats at shelters, schedules and maps at all stops, safer terminals, clean buses, bike racks on buses, improved bus access for people with children and strollers, and public transit to the airport and recreational areas.
- **Planning:** There was an overall sense that the development of this long-term TMP must be congruent with other plans and take into account an aging demographic, and future labour and housing locations. Several people want to see a good communication strategy for the long-term plan including more citizen engagement. Finally, respondents wished to see a focus on value-for-money solutions provided in the TMP.
- **Traffic Operations:** Vehicle speeds and traffic enforcement were key themes in responses received. Generally people wanted to see better traffic and speed limit enforcement along with speed reduction strategies such as reducing the speed limit, applying speed bumps, two-way traffic flow in the downtown core, and roundabouts. Another theme commonly touched on was providing better driver education leading to better traffic and cyclist safety.
- **Traffic Signals:** Evening and nighttime flashing red light four-way stops were strongly recommended. Many people referenced Sault Michigan where this is common practice and have mentioned they regularly run through red lights late in the evening or early morning.

Better synchronization and timing of traffic lights was another key theme. There was a perception among many that traffic light synchronization problems are causing congestion, forcing drivers and passengers to wait longer, generating emissions due to idling, and forcing people to speed to make the next light. Others felt fewer advance greens during low traffic periods will reduce wait times, while longer advance greens during high peak times would increase flow. Several people suggested removing traffic lights altogether and replacing them with four-way stop intersections. Many people believed there were too many traffic lights in the City in general.

- **Road Conditions:** Road widening and road extensions, especially on current dead-end roads, are common requests as well as the inclusion of medians on major arterials. A key theme was to repair existing roadways and work on better construction management of roadwork including more thoughtful detours ensuring schedules are met.
- **Safety:** There is a general sense of a lack of safety while cycling and walking in Sault Ste. Marie and most respondents felt this needed to be addressed in the TMP. Many felt that stronger police enforcement for unsafe driving was required.
- **Cycling Facilities:** A common attitude was safe and accessible cycling facilities on streets are required, including dedicated facilities on major routes, to promote safe cycling in the City. In terms of cycling specifics, there were requests for more North-South and East-West routes, snow clearing on cycling routes in the winter, more bike racks, cycling education campaigns, and police enforcement of cycling rules. There is a general sense that the Hub Trail has been a huge success, but is primarily for recreational use as opposed to travel to work, school, and running errands.
- **Walking Facilities:** Many respondents requested crosswalk improvements and additional sidewalks to be considered in the TMP. For crosswalks these requests included: more grade-separated overhead crosswalks, more mid-block crosswalks on longer street sections, longer walk light times, and better lighting of all pedestrian crossings. There were a large number of requests for more sidewalks in areas with no sidewalks as well as on streets with sidewalks on only one side of the road. Repair and resurfacing of existing sidewalks as well as better snow removal were also issues raised.
- **Hub Trail Improvements:** Most respondents enjoyed the success of the Hub Trail so far and expressed a desire to have more trails like it. There were several requests for better signage to be added on the trail as well as winter snow clearing. Furthermore, people wanted to see better linkage of Hub Trail with amenities and “spokes” created to the centre of the City as well as outer regions.
- **ATV and Snowmobile Facilities:** Additional ATV and snowmobile trails were requested.

City of Sault Ste. Marie

December 2013

Transportation Master Plan

Appendix C: Pedestrian Crossing Policy Guideline

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1. INTRODUCTION

1.1 Paper Objectives

The objective of this paper is to assist the City of Sault Ste. Marie to make consistent and justifiable decisions on how and when to implement pedestrian crossings. It will address issues relating to the type of measures that can be used to assist pedestrians at intersections and mid-block locations and will provide guidance about the conditions to implement these measures. This document is intended to provide a best practice resource and a guideline for implementing traffic control features rather than a description of design details.

The City of Sault Ste. Marie has recently initiated a Transportation Master Plan (TMP) study to develop a pragmatic 20 year plan to develop a sustainable transportation system friendly to motorists, pedestrians, and cyclists, responsive to the needs of the natural environment, and supportive of the City's economy. The City has requested as part of the Transportation Master Plan study that a pedestrian crossings policy discussion paper be included so that residents of the City can be informed of current and future pedestrian crossing opportunities.

This paper will outline the current forms of pedestrian crossings available in the City, provide a summary of current practices elsewhere, and provide recommendations on the way forward for future pedestrian crossings within the City.

1.2 Forms of Pedestrian Crossing

The Ontario Highway Traffic Act (HTA) defines the rules of the road, including conditions under which pedestrians can cross a road. The HTA identifies the responsibilities and rights of pedestrians and drivers at different forms of pedestrian crossings. Interpretation of rights and responsibilities are further defined through case law. **Appendix C-1** summarizes key HTA and case law references.

The Highway Traffic Act indicates that when a pedestrian is about to step from the boulevard onto the roadway, there are fundamentally two different forms of pedestrian crossings. The crossing may be either:

- A protected crossing where vehicles must yield to pedestrians.
- An unprotected crossing where pedestrians must yield to vehicles.

Protected crossings include those locations with traffic control requiring a vehicle to yield or stop, such as a traffic control signal, an intersection pedestrian signal, a pedestrian crossover with flashing lights, a stop sign, or a crossing guard.

An unprotected crossing may or may not have warning signage and in some jurisdictions crosswalk pavement markings. Unprotected crossings may also have no designation or traffic control measures, but are locations where there is measurable pedestrian crossing activity.

Either form of crossing may be appropriate given a range of pedestrian demand. There is generally a higher degree of concern for pedestrian safety at unprotected crossing points. However, both forms of crossing must be designed to maximize safety.

2. CURRENT PRACTICE IN SAULT STE. MARIE

Pedestrian crossing facilities in the City of Sault Ste. Marie currently consist of signalized intersections (approximately 80 intersections) with pedestrian signals with push button or automatic activation, and pavement markings. There are no pedestrian crossovers (PXO) and no intersection pedestrian signals (IPS) in the City. School crossing guards are provided at key locations that are signed and marked school crossings during school season. Common pedestrian treatments include curb depressions, warning signage, pavement markings, and in some locations (mostly Downtown and at Wellington Street and Shannon Road), the use of textured surface in lieu of crosswalk lines.

As part of this study, HDR Corporation developed a voluntary Transportation Master Plan (TMP) Questionnaire. The TMP Questionnaire was intended to reflect the desires of the people who live in Sault Ste. Marie with respect to the development of the City's long-term (2031) Transportation Master Plan. The results of the survey are documented in the report entitled "Sault Ste. Marie Transportation Master Plan Summary of Results for the Public Opinion Questionnaire" (February 2013).

Approximately 1,000 persons responded to the TMP Questionnaire, or 1.3% of the City's population of 75,000 from the 2011 Census. While the questionnaire was not intended to be statistically significant, the results of the TMP survey are intended to provide at least a snapshot of travel attitudes and characteristics that represent the City.

The survey indicated that a 68% majority of respondents felt that providing safer pedestrian crossings was either important (264 out of 882) or very important (332 out of 882). 49% of the respondents felt that unsafe driving (including not yielding to pedestrians at pedestrian crossings) was a very important concern the City should address. There were several comments received in regards to seeing more pedestrian crosswalks added as well.

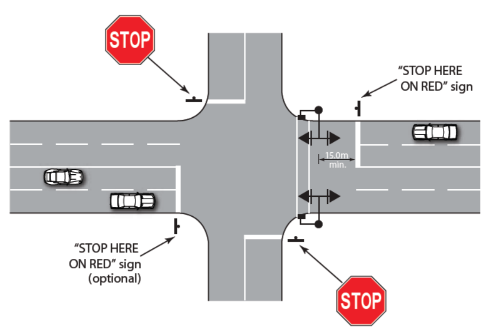
3. TYPES OF PEDESTRIAN CROSSINGS

This section presents different types of protected and unprotected pedestrian crossings. All of these crossing treatments are identified in Ontario Traffic Manual (OTM) Book 15, and are suitable for implementation under different circumstances. The choice of one treatment over another is based on meeting thresholds and warrants, as well as engineering judgement. It is up to each municipality to evaluate the different crossing options and choose a treatment that is appropriate for a specific location.

3.1 Types of Protected Crossings

Protected crossings include those locations where there is traffic control that requires a vehicle to yield or stop, such as a traffic control signal, an intersection pedestrian signal, a pedestrian crossover with flashing lights, a stop sign, or a crossing guard. The protected crossing options are defined in **Table 1**.

Table 1: Protected Crossing Types

Type	Description	Image
Traffic Control Signals	At signalized locations a pedestrian crossing is protected during the WALK and flashing DON'T WALK phase of the cycle. Traffic control signals can accommodate pedestrian crossing through traditional signals at intersections or at mid-block. Warrants and design requirements of traffic control signals are documented in the Ontario Traffic Manual Book 12. Signals are either implemented at intersections, accesses, or mid-block where there are pedestrian desire lines and demand is high.	 HDR Photo from Site Visit
Intersection Pedestrian Signals	An alternative form of traffic control signal that accommodates pedestrian crossing is the Intersection Pedestrian Signal (IPS) or half-signal. It is used in an increasing number of jurisdictions, including: City of Hamilton, City of Burlington, Region of Waterloo, York Region, and City of Oshawa. Pedestrian crossing is controlled on the main street by standard traffic signal heads. A pedestrian indicates the desire to cross by pushing a button that would activate the signal to stop the traffic on the main street. At all times, the side street traffic is controlled by a "stop" sign and vehicles entering the main street from the side street must yield right-of-way to all main street traffic and pedestrians.	 Image from OTM Book 15

Type	Description	Image
Pedestrian Crossovers	Protected pedestrian crosswalks are defined as pedestrian crossovers (PXOs) and represent protected crossings for pedestrians. Section 140 of the Highway Traffic Act of Ontario requires motorists to yield to a pedestrian in a crossover when the pedestrian is upon half of the road of which the vehicle is travelling or when a vehicle is close enough to endanger a pedestrian. The presence of a pedestrian is what triggers the motorist's requirements to yield. The design of a pedestrian crossover is prescribed in the Highway Traffic Act Regulation 615, Section 20 and in Book 15 (Section 3.2.3) of the Ontario Traffic Manuals. The design consists of overhead illuminated signs with flashing amber beacons, regulatory signs at and approaching the crossover and pavement markings on the roadway. PXOs present different rules of right-of-way than marked crosswalks without flashing amber beacons.	 Image from MTO Online Drivers Handbook
Stop Control	Pedestrian crossings are protected at stop controlled intersections where pedestrians are crossing the minor street at two-way stop controlled intersections and for all legs of an All-Way stop intersection. Vehicles must yield to pedestrians crossing under these circumstances.	 Stop controlled crossing; image extracted from Google Earth Pro
Crossing Guard	Adult crossing guards provide protection for pedestrians crossing the street. Vehicles must yield to a crossing guard within the crosswalk at both protected and unprotected crossings. Crossing guards are stationed at school crossing locations and school crossing signs are situated in advance of and at the crossing guard location. The crossing is also typically marked with pavement markings.	 Crossing guard at a school crossing; image extracted from Brampton.ca

Type	Description	Image
Pedestrian Grade Separation	Grade separated crossings are protected by the physical separation from vehicles through either an overpass or an underpass. Grade separation provides the highest form of protection for pedestrian crossings, but is also the most expensive option for protected crossing as it requires more property and a more complex implementation process. In many instances, grade separated crossings require pedestrians to divert their route from more direct connections and may have limited accessibility if the design includes stairs or steep ramps. Grade separation may be recommended if other forms of protected crossing are not appropriate and/or when there are insufficient gaps and obvious safety concerns for pedestrian crossings, which may be attributed to high traffic volume, high vehicle speeds, or long crossing distance such as high speed freeways and expressways. Grade separation may also be appropriate in developed areas with established vehicular and pedestrian traffic volume, but with limited opportunity for other types of crossing.	 Grade separated pedestrian crossing on University Avenue in the City of Waterloo; image from Google Earth Pro

3.2 Unprotected Crossings

An unprotected crossing may or may not have warning signage and in some jurisdictions crosswalk pavement markings. A non-protected crossing may also have no designation or traffic control measures, but are locations where there is measurable pedestrian crossing activity.

At 2-way stop intersections, an unprotected pedestrian crossing can be accommodated by the provision of warning signage or a crosswalk across the major road. However crosswalk markings across a major street may give pedestrians the false impression that they have the right-of-way. Pavement markings at unprotected crossings may encourage pedestrian crossing activity at unprotected locations. For this reason, many jurisdictions do not mark crosswalks where pedestrians do not have the right-of-way prior to entering the crosswalk. In some instances crossings of a major road are signed to prevent potential confusion with respect to the right-of-way, indicating that pedestrians should yield to traffic on the major road and / or wait for a suitable gap.

According to OTM Book 15, “marked or unmarked uncontrolled crossings are to be discouraged where there is a higher likelihood of conflicts given the lack of formal right-of-way designation for pedestrians…wherever possible; pedestrians are to be encouraged to use crossing locations with traffic control devices”.

Consideration for unprotected crossings should be based upon engineering judgment in all cases relative to the overall roadway environment and local context.

Five criteria should be considered:

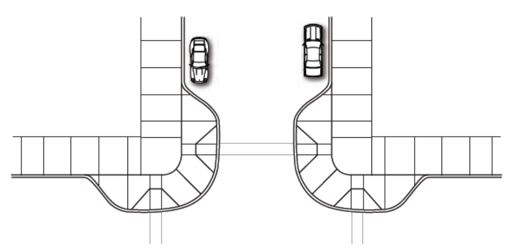
1. Suitability and consideration for controlled crossing
2. Motorists and pedestrian behavior
3. Vehicle volumes and speed (exposure)
4. Geometry
5. Spacing of crossing opportunities

Roadway features which delineate unprotected pedestrian crossings and which should increase driver or pedestrian awareness or simplify the crossing process include:

- Refuge islands and centre medians
- Bulb outs (curb extensions)
- Textured pavement or high-visibility markings
- Standard warning signage
- Specialize pedestrian signage (e.g.: Courtesy Crossing, or “Wait for Gap” sign)
- Above ground flashing beacons
- Barriers to control pedestrian flow
- Delineators

The use of some of these features at unprotected crossing points may also increase a pedestrian’s sense of security. The safety benefits must be weighed against potentially more aggressive pedestrian behaviour, likelihood of increases in pedestrian crossing activity, and the resultant exposure to conflict with vehicles. Each feature is briefly described in **Table 2**.

Table 2: Unprotected Crossing Types

Type	Description	Image
Refuge Islands / Centre Medians	The presence of pedestrian islands simplifies the pedestrian crossing movement, and provides a safe refuge in the center of the road. Refuge islands reduce the distance required to cross and increase the available gaps for pedestrians. They allow pedestrians to concentrate on crossing one direction of traffic at a time. Islands are commonly used for mid-block crossings. Pedestrian refuge islands are suitable for wide two-way streets with four or more lanes of moving traffic travelling at higher speeds. They are useful to persons with mobility disabilities, and very old or very young pedestrians who walk at slower speeds.	 Image from Google Earth Pro of Block Line Road in the City of Kitchener, ON
Bulb-outs (Curb Extensions)	Curb extensions reduce the distance that pedestrians have to walk. With the reduced crossing distance, pedestrians require smaller gaps to cross and pedestrian delays will also be shorter. The extensions create a traffic calming effect – vehicles slow down, making it safer for pedestrian to cross. They also improve the visibility of pedestrians.	 Image from OTM Book 15

Type	Description	Image
Textured Surfaces / High Visibility Markings	Textured surfaces and high-visibility (e.g. zebra) markings are ideally suited for crossing in low speed, high traffic volume and pedestrian environments. They increase drivers' awareness of possible crossings at an unprotected crossing. The use of these features such as textured pavement is not preferred at unprotected crossings on high volume roads. Many municipalities use textured crosswalks in downtown areas.	 Image from Ottawa.ca
Standard Warning Signage	A number of pedestrian crossing signs are contained in the Ontario Traffic Manuals: Book 5 Regulatory Signs, Book 6 Warning Signs, Book 11 Markings and Delineation, and Book 15 Pedestrian Crossing Facilities. They include a Pedestrian Ahead sign. The manuals also list a number of signs that can be used at school crossings. More recently, some jurisdictions have used the florescent yellow-green sign, including the City of Kingston, for school crossings and the City of Belleville for courtesy crossings. According to OTM Book 15, it may be desirable to focus pedestrians to crossing points where sight distance is greatest and unanticipated conflicts are lowest through such signage.	 Image from OTM Book 6
Special Message Signs	Given a wide variation in right-of-way types at unprotected crossings, some jurisdictions have implemented special message signs that explicitly identify the right-of-way such as "Two Stage Pedestrian Crossing", "Wait for Gap" or "Courtesy Crossing".	 Image from OTM Book 6
Flashing Beacons	Flashing beacons are typically used in protected crossings with Pedestrian Crosswalk Ahead warning signs to make drivers more aware of the crosswalk ahead and of the need to slow down and drive with caution. For unprotected crossings, flashing beacons can also be implemented with a Refuge Island when there is a safety concern of vehicles colliding with the refuge island.	 Image from HelloTrade.com

Type	Description	Image
Barriers	Barriers or railings placed along the top curb can be used to channelize pedestrian crossing to preferred crossing points and discourage pedestrians crossing at undesirable locations (where sight distance constraint or conflicting flows exist). However, pedestrians who have entered the roadway upstream or downstream of the barrier may also have difficulties exiting the roadway around barriers. In some environments, barriers may be viewed as aesthetically unattractive.	 Image from Google Earth Pro of Lothian Road, City of Edinburgh, UK
Delineator Posts	Delineator posts can be used to alert drivers to the boulevard, increasing their detection of the presence of a crossing. Reflective tape can significantly improve night visibility of protected and unprotected crossings.	 Image from Globalindustrial.com

3.3 Railway Line Pedestrian Crossings

There have been concerns raised by the City of pedestrians crossing railway tracks at unprotected locations. Due to the location of the City, several active rail lines cross the city and act as barriers to the movement of vehicles and people. One specific area is along the Trunk Road / Wellington Road corridor where the Huron Central Railway runs parallel with the road. There have been several instances where pedestrians were seen crossing these tracks at locations where no protection is provided (i.e. road crossing protected by gates). Not only is this a very dangerous situation, but also illegal as the pedestrians are trespassing on private property. Pedestrians likely cross at these locations because it is the most direct route for them to take. Having to walk to the nearest road crossing is likely very inconvenient and will add to the journey time (especially under poor weather conditions). Along the Truck Road / Wellington Road Corridor east of the downtown, railway crossing spacing ranges from 300-700 m to east of the Downtown to Boundary Road.

There are several options for the City to consider and limit illegal crossings at unprotected locations. These options include installing dedicated pedestrian crossings (gated, mazed, etc.) and/or update fencing along the rail lines and provide signage to pedestrians directing them to the nearest protected crossing. Both options are relatively expensive to implement, but the costs could be shared between the City and the rail companies. The effectiveness of fencing is also in question as fencing is already provided in certain locations. Damaged fencing has been repaired to no avail as the new fences have, on many occasions, been damaged within days. The City could increase education efforts, provide pamphlets / hold an education campaign for the residents situated near rail lines outlining the risks of crossing rail tracks at unprotected locations.

Removing or closing of any of the existing pedestrian railway crossings is not recommended and should be avoided. A removal of any of the crossing(s) could result in an increased frequency of unprotected, dangerous and prohibited crossings.

3.4 Design Features

Table 3 shows the typical design features and approximate installation cost associated with installing alternative forms of pedestrian crossings.

Table 3: Alternative Pedestrian Facilities

Facility Type	Description of Traffic Control	Installation Cost
Traffic Control Signals	Pedestrian walk/don't walk indicator Pedestrian crosswalk markings	\$80,000 - \$120,000
Mid-block Pedestrian Signals	Pedestrian walk/don't walk indicator Pedestrian crosswalk markings	\$60,000 -\$80,000
Intersection Pedestrian Signals (IPS)	Pedestrian walk/don't walk indicator Push button to activate signal to stop traffic Pedestrian crosswalk markings Side street traffic is stop-controlled No parking is permitted on both sides of signals	\$60,000 - \$80,000
Pedestrian Crossovers	Overhead flashing lights "Push Button to activate early warning system" "Pedestrian Advance (Wc-7) No passing sign Pedestrian crosswalk markings No passing solid demarcation between lanes "X" pavement marking	\$40,000
Stop Control Pedestrian Crossing	Pedestrian Crosswalk markings	\$600 - \$2,000
Crossing Guard	School crossing signs and advance warning signs	\$10,000
Unprotected Pedestrian Crosswalks	Pedestrian crosswalk markings and signs	\$ 2,000

Note: Costs shown are estimated typical installation costs based in 2009; actual costs vary based on site conditions.

Unprotected crossing facilities typically do not exhibit the same design features that protected crosswalks provide (such as pedestrian walk/don't walk indicators) as the configuration of protected and unprotected crossings should be significantly different to allow the public a clear understanding of whether driver or pedestrian has the right-of-way.

4. IMPLEMENTATION GUIDELINES

The following section is a literature review of current standards and guidelines for criteria under which to implement different types of pedestrian crossings.

4.1 Ontario Traffic Manual

The standard practice for traffic control in Ontario is defined by the ***Ontario Traffic Manuals (OTM),*** **Book 12** for traffic signals and **Book 5** for regulatory signs (including stop signs); and is defined by the ***2006 School Crossing Guard Guide*** document for school crossing guards. The manuals are designed to be used as a guideline by traffic practitioners. In 2010, ***OTM Book 15 for Pedestrian Crossing Facilities*** was published and contains information for pedestrian crossing facilities.

The manuals incorporate current best practices in the Province of Ontario and have recommended thresholds for the implementation of:

- Traffic control signals
- Mid-block pedestrian signals
- Pedestrian crossovers (PXOs)
- Intersection pedestrian signals (IPS)
- All-way stop signs
- Crossing guards and school patrollers

Municipalities have generally followed the standards defined by the manuals, while some have adopted modified warrant thresholds to better reflect local characteristics.

4.2 Signal Warrants

The OTM provides recommended thresholds based on vehicle volume, pedestrian volume, pedestrian delay and accident frequency. The signal justification for mid-block and intersection locations is based on the criteria summarized in **Table 4**. The OTM Book 12 is currently being updated and will include a 4-hour warrant.

Most jurisdictions surveyed follow the guideline prescribed by the manual. Consideration beyond OTM Book 12 have been given for crossings requiring specialized treatments such as audible signals, countdown signals, timing operations based on lower pedestrian walking speed for seniors and assisted pedestrian crossing or pedestrian grade separation. While there is no warrant for accommodating seniors, a reduction of 0.1 to 0.2 m/sec from typical walking speed assumptions are considered adjacent to seniors' residences or facilities.

Table 4: OTM Book 12 Signal Justification Method

Justifications	Threshold
Justification 1 – Minimum Vehicle Volumes	The 8 hour average vehicle volume must exceed the following thresholds: *Restricted Flow (Urban) Conditions* ▪ Total Traffic Volume Entering Intersection: 720 vph (1 lane approach) or 900 vph (2 lane approach); and ▪ Crossing Traffic Volume: 170 vph (full intersection) or 255 vph (T-intersection) *Free Flow (Rural) Conditions* ▪ Total Traffic Volume Entering Intersection: 480 vph (1 lane approach) or 600 vph (2 lane approach); and ▪ Crossing Traffic Volume: 120 vph (full intersection) or 180 vph (T- intersection)
Justification 2 – Delay to Cross Traffic[1]	The 8 hour average vehicle volume must exceed the following thresholds: *Restricted Flow (Urban) Conditions* ▪ Main Road Traffic Volume: 720 vph (1 lane approach) or 900 vph (2 lane approach); and ▪ Crossing Traffic Volume: 75 vph *Free Flow (Rural) Conditions* ▪ Main Road Traffic Volume: 480 vph (1 lane approach) or 600 vph (2 lane approach); and ▪ Crossing Traffic Volume[1]: 50 vph
Justification 3 – Volume / Delay Combination	▪ If Justifications 1 and 2 are satisfied to 80% of the threshold
Justification 4 – Minimum Four Hour Vehicle Volume	Where the intersection experiences excessive delays for four or more peak hours of the day, but do not have the prolonged demands throughout the day to meet an eight hour warrant. ▪ Where the highest volume minor street approach accommodates a heavy right turn volume[2] ▪ On the minor street, the 'highest volume approach' need not be specified as the same approach during each of the four highest hours of the day.
Justification 5 – Collision Experience[3]	▪ 5 or more reportable collisions of types preventable by traffic control signals occurred during each of the three preceding twelve month periods ▪ >= 80% of the requirements specified in Justification 1 and Justification 2
Justification 6 – Pedestrian Volume[4] and Delay	Pedestrian volume justification is based on an exposure approach: *Pedestrian volume justification* (**Exhibit 1**): ▪ 8-hour vehicle volume > 7,000 and net 8-hour pedestrian volume > 276. ▪ 8-hour vehicle volume = 2,601 to 7,000 and net 8-hour pedestrian volume > 476. ▪ 8-hour vehicle volume = 1,440 to 2,600 and net 8-hour pedestrian volume > 1,000. *Pedestrian delay justification (***Exhibit 2***):* ▪ Net total 8 hour volume of delayed pedestrians = 75 pedestrians or more

Note:

1. The crossing volume consist of the sum of: the number of pedestrians crossing the main road; plus total left turns from both the sideroad approaches; plus highest through volume from one of the side street approach; plus 50% of the heavier left turn traffic.
2. Engineering judgement may be required to determine a portion of the right turn volume should be excluded from the approach volume with evaluating it against the volume on the other minor street approach and the overall signal justification thresholds.
3. On the condition that adequate trial of less restrictive remedies with satisfactory observance and enforcement have failed to reduce collision frequency.
4. Pedestrian volume is adjusted by a factor of 2 for senior citizens, disabled pedestrians and children under 12.

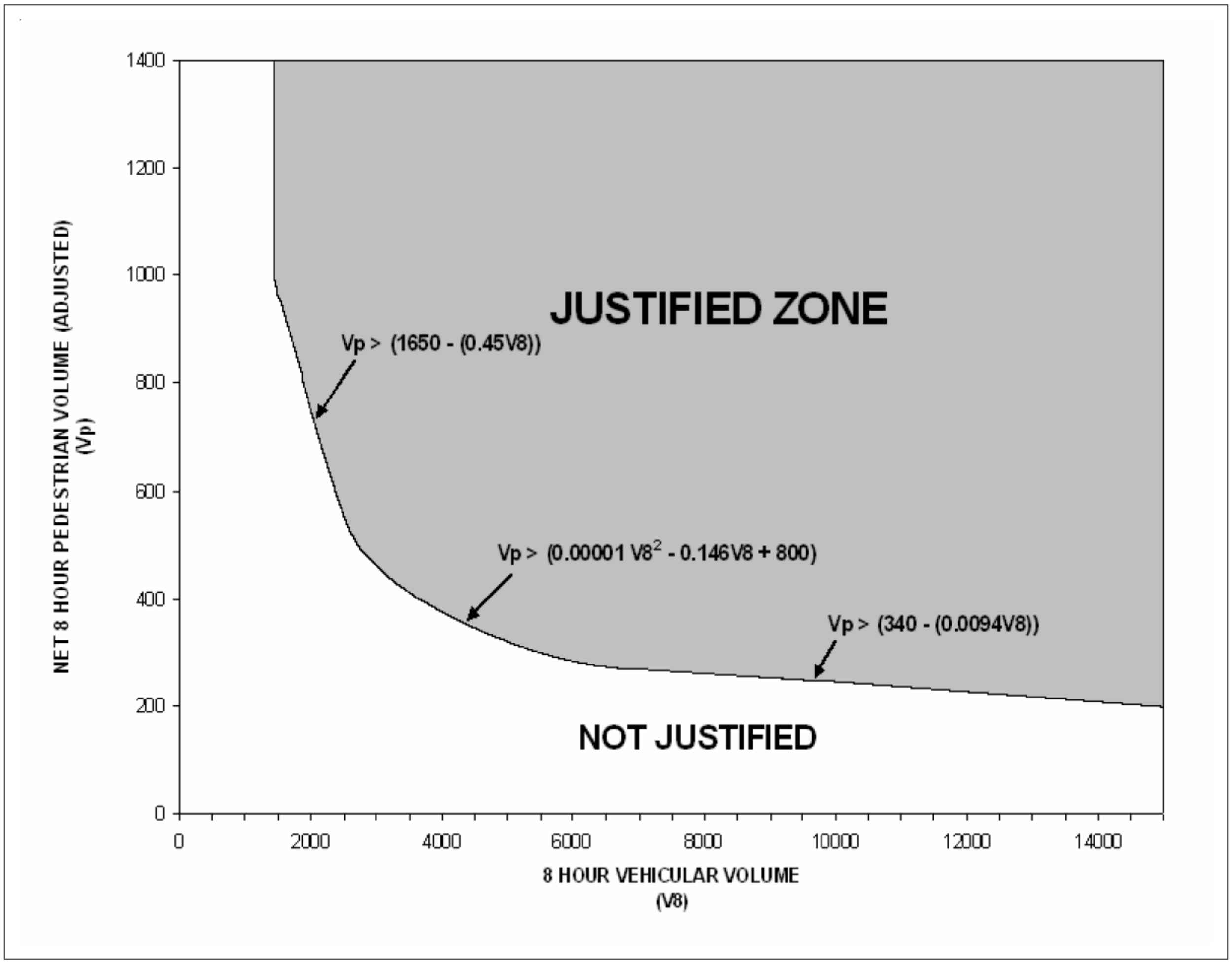


Exhibit 1: 8 Hour Pedestrian Crossing Warrant

Source: OTM Book 12 (Figure 21)

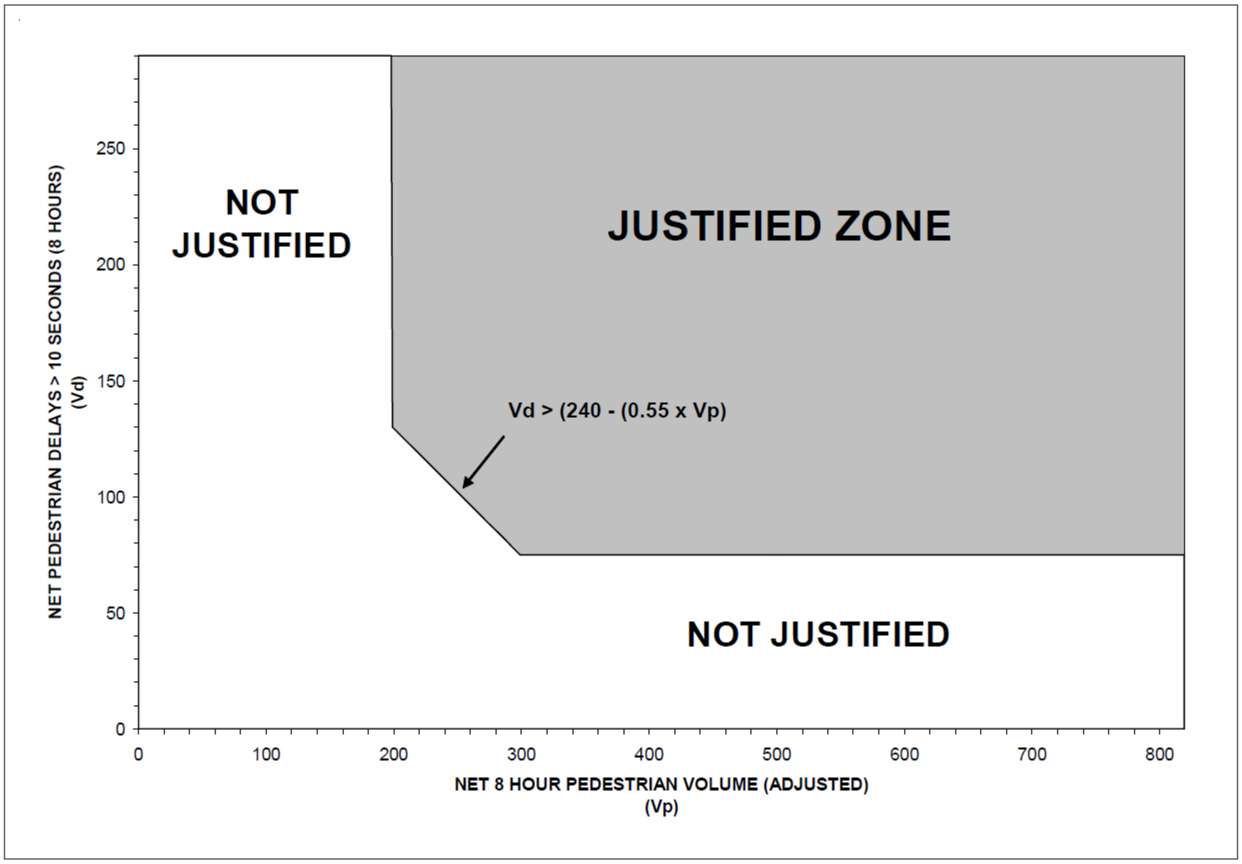


Exhibit 2: Pedestrian Delay

Source: OTM Book 12 (Figure 22)

4.3 Intersection Pedestrian Signal Warrants

The City of Sault Ste. Marie currently does not have any IPS' or defined policy on Intersection Pedestrian Signal (IPS) warrants, however, there are two types of warrant methods used by other municipalities: the OTM method and the Priority Points Method.

4.3.1 Ontario Traffic Manual Method

According to the Ontario Traffic Manual (OTM) method, "if the pedestrian crossing under consideration is to be at an intersection, justification should be made on the basis of Signal Justification 6 being fulfilled but the crossing vehicular traffic should be so light as to not meet one of the other justifications (1-4)."

4.3.2 Priority Points Method

The City of Hamilton in cooperation with Ministry of Transportation Ontario developed the Priority Points Method, which is based on a cumulative scoring of different criteria under consideration. The criteria includes combined "pedestrian volume and delay", collision frequency, distance of upstream / downstream protected crossing location and vehicle operating speed.

As a minimum, there should be at least **100 pedestrians** entering the main street during the 7 highest hours of the day and there should also be fewer than **5,000 vehicles** total per day on the intersecting side street approach. **Table 5** summarizes the priority point system where a cumulative score of 80 is required for warrant.

The City of Burlington and the City of Hamilton were the first users for IPS' in Ontario. These municipalities have implemented and monitored the effectiveness of the IPS since 1998. Other jurisdictions such as the City of Mississauga, City of Pickering, City of Barrie and the Region of York have adopted this control type in various capacities.

Standard practice also includes implementation of pedestrian features within acceptable environmental conditions:

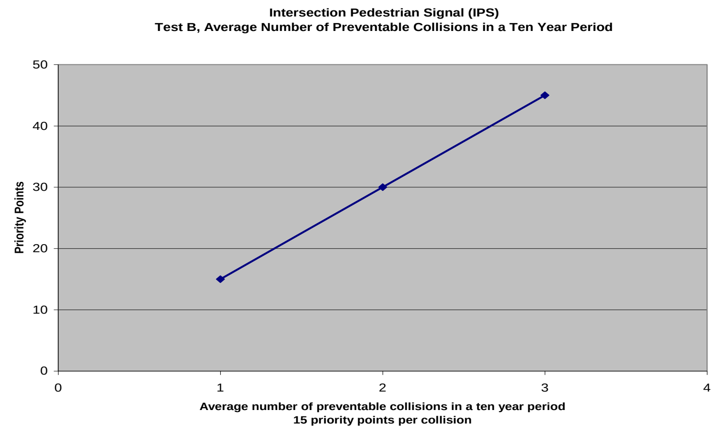
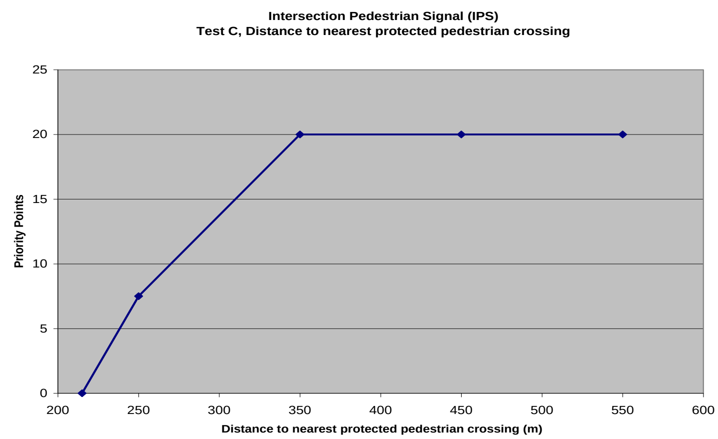
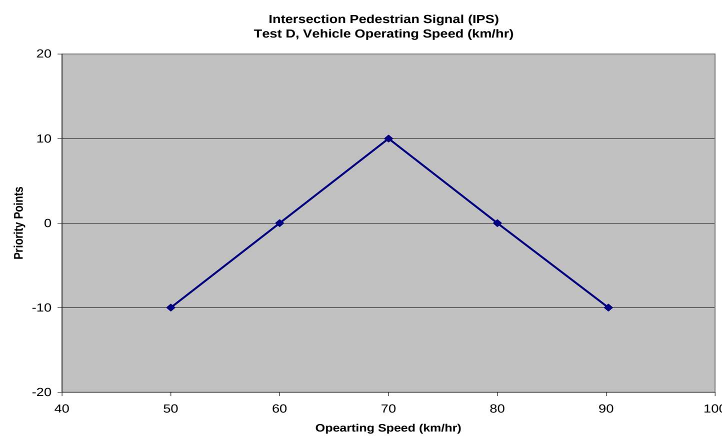
- Minimum Distance of 215 metres from nearest traffic control signal or stop sign on a two-way street or 125 metres on a one-way street
- Adequate sight distance must be available for both pedestrians and vehicles for the operating speed of the roadway
- Parking prohibition within 30 metres of crossing
- Posted speed of less than 60 km/h, and
- Fewer than 5,000 vehicles per day on the intersecting side street approaches.

4.3.3 Comparison of IPS Warrants

The Priority Points Method allows for greater detail by directly assessing pedestrian delay, spacing of protected crossings and operating speeds. However this method is supportive of IPS implementation on higher speed roads (70 km/h vs. 60 km/h roads) and roads with very high volumes that generate long pedestrian delays despite modest pedestrian volumes. The sensitivity of the warrant to the spacing of protected pedestrian crossings is limited to the range of 215 metres to 350 metres. The Priority Points Method also has greater data requirements (pedestrian delay and vehicle speed).

The OTM method provides an IPS warrant methodology that is consistent with traffic signal warrants. The OTM methodology is a generally accepted source in Ontario. The additional data collection associated with the Priority Points Method has not been proven to merit change from the use of the OTM method.

Table 5: IPS Cumulative Point System

<table>
<tr><td>Test A – Pedestrian Volume and Delay[1]</td><td>Priority points = $\sqrt{(Avg.delay)X(7hrVol)_{adjusted}}$</td></tr>
<tr><td>Test B – Average Number of Preventable Collisions in a ten year period</td><td>
</td></tr>
<tr><td>Test C – Distance to Nearest Protected Crossing</td><td>
</td></tr>
<tr><td>Test D – Vehicle Operating Speed</td><td>
</td></tr>
</table>

Note: Pedestrian volume is adjusted by a factor of 2 for assisted pedestrians (senior citizens, disabled pedestrians and children under 12).

4.4 Pedestrian Crossover Warrants

The OTM Book 15 prescribes the following criteria as summarized in **Table 6** for the installation of Pedestrian Crossovers.

Table 6: Pedestrian Crossover Warrant

Warrant	Threshold
Volume	Less than 35,000 AADT Pedestrian volume justification (**Exhibit 1**): ▪ 8-hour vehicle volume > 7,000 and net 8-hour pedestrian volume > 276; or ▪ 8-hour vehicle volume = 2,601 – 7,000 and net 8-hour pedestrian volume > 476; or ▪ 8-hour vehicle volume = 1,440 – 2,600 and net 8-hour pedestrian volume > 1,000; Pedestrian delay justification: ▪ Net total 8 hour volume of delayed pedestrians = 75 pedestrians or more

Standard practice also includes implementation of pedestrian features within acceptable environmental conditions:

- Minimum distance of 200 metres from nearest traffic control
- 100 metres and 120 metres sight distance required for operating speeds of 50 km/h and 60 km/h respectively
- Posted speed of less than 60 km/h
- Parking prohibition and other sight obstruction within 30 metres of crossing
- Not more than 4 lanes of two-way traffic and 3-lanes one-way traffic, and
- No heavy turning traffic.

4.5 All-Way Stop Warrants

All-way Stop intersections also provide for protected pedestrian crossings. OTM Book 5 outlines an all-way stop sign warrant. However, All-way Stops are generally not implemented as a pedestrian crossing facility.

4.6 Pedestrian Crossing Guard

The **2006 School Crossing Guard Guide**, published by the Ministry of Transportation (MTO) and the Ontario Traffic Council (OTC) is the most common guideline used by municipalities across Ontario. These municipalities include the City of Mississauga, Town of Aurora, Town of Markham, Town of Richmond Hill and City of Kingston.

The guideline outlines the procedure for investigating requests for school crossing guards and proposes warrants based on the existence of adequate gaps in traffic to permit students to safely cross the roadway. The investigation applies to requests for school crossings at mid-block locations with or without traffic controls, intersections with 2-way stop control, 4-way stop control and signalized intersections.

The MTO/OTC recommended thresholds for consideration of School Crossing Guard and the applicable conditions within the context of the subject site are summarized in **Table 7**.

Table 7: MTO/OTC Crossing Guard Warrant

A school crossing warrant is approved if:

- There are less than 4 safe gaps in traffic in 50% of the five minute timed intervals on a road having a posted speed limit of not more than 60 km/h, and
- The number of students using the crossing meets or exceeds the minimum number of 5 to 10 students,

Or

- The designated crossing point is close to meeting the warrant based on less than 4 safe gaps in traffic in 50% of the five minute timed intervals on a road having a posted speed limit of not more than 60 km/h, and
- The number of students using the crossing meets or exceeds the minimum number of 5 to 10 students, and
- Student / vehicle conflict is observed or the potential for conflict is high due to poor crossing sight lines because of road geometrics, high volume of traffic or the lack of a logical crossing point resulting in students crossing at various locations.

Note: On any arterial or other road supporting 2, 4, 6 or more lanes of traffic with any volume of traffic when the speed limit is in excess of 60 km/h, Crossing Guards shall not be used to stop traffic

The shortcomings of a gap survey are the additional data requirements. Also, at locations where an adult crossing guard is already stationed, a gap survey would be skewed by the presence of the crossing guard.

The Institute of Transportation Engineers (ITE) recommends traffic and pedestrian volume threshold to be included in warrant analysis.

In accordance to the **Design and Safety of Pedestrian Facilities** prepared by the ITE Technical Council Committee 5A-5 in 1994, recommended thresholds include crossing guards at uncontrolled locations, at stop sign and at signalized locations. The minimum volume guidelines are presented in **Table 8**.

Table 8: ITE Minimum Volume Guidelines

a) At uncontrolled crossings, in each of any two daily hours:

- Urban Areas - 350 or more vehicles and 40 or more school children
- Rural Areas – 300 or more vehicles and 30 or more school children

b) At stop sign controlled intersection crossings, undivided highways of four or more lanes:

- 500 or more vehicles per hour during any period

c) At traffic signal-controlled intersection crossings:

- 300 or more turning traffic per hour

It should be noted that although vehicular flow and pedestrian volume provide an indication of crossing opportunity, a gap survey is beneficial at gauging realistic traffic conditions and crossing opportunities which may occur.

An alternative solution for establishing a basic warrant for a crossing guard is through the use of an "exposure index". This method has been implemented at the Town of Oakville and the Town of Ajax. The exposure index provides a simplified approach to gauge hazards in comparison to the gap analysis. It is a numeric indicator of the potential hazard or conflict of pedestrians when crossing a roadway, which can be established through the product of pedestrian volume (elementary school-aged children) and total approach vehicle volume.

This index is a cross product of the pedestrian and vehicle volume during the peak one hour of the three critical school activity hours (8:00 to 9:00 am; 12:00 to 1:00 pm; 3:00 to 4:00 pm) and is defined as:

Exposure Index = Peak Hour Vehicular Volume x Peak Hour Pedestrian Volume

If this predetermined index is exceeded, then a pedestrian crossing guard may be warranted. Different types of control at crossing would warrant for different level of exposure index. This is justified upon the inherent difference in the type of conflicts, among the different type of controls.

The advantage of the exposure index is that the exposure accounts for crossing locations with low traffic volumes, but high pedestrian traffic, and it enables the traffic practitioner to quickly assess a crossing location without the need for intense data collection.

There is a fundamental difference in the operation of intersections under traffic signal control and intersections under all-way stop control. This should be considered in the warrant analysis.

During the green phase of signal operation, vehicles are permitted to turn across the adjacent parallel pedestrian crossings, which are on "WALK" phase. As these two movements are permitted simultaneously, there is an inherent vehicle-pedestrian conflict and a potential safety issue for pedestrians. In theory, at all-way stop locations, vehicles are always stopped when pedestrians are crossing the roadway. Therefore, no vehicle-pedestrian conflict should occur.

Pedestrians crossing at a signalized intersection will only be subject to vehicles turning right and left turns on a green signal, and right turns on a red signal. All other traffic is stopped facing a red signal. The timing of gaps is irrelevant since they are pre-set as part of the intersection timing plan and will only vary if the pedestrian push button is not activated.

In the ITE minimum volume guidelines, a threshold of 300 or more turning vehicle volume is used and recommended. It should be noted that while there may be 300 or more turning vehicles at a crossing, there may be very few pedestrian crossings as well.

However, similar to the unsignalized crossing locations, an exposure index of pedestrian volume and ***turning*** traffic volume could be developed. This procedure is recommended if crossing guards are to be considered at signals.

4.7 Pedestrian Grade Separation

Documented and accepted warrant thresholds for grade separation are not available. Consideration for grade separation is usually based on the lack of alternative crossing options. Such is the case when some form of protected crossing is warranted, but installation of warranted devices are not practical due to limiting constraints such as road geometry / environment or spacing of adjacent traffic control devices. Pedestrian grade separation may be considered when there are high pedestrian volumes, high risk of conflict with vehicles, a high posted speed limit, limited opportunities for safe at-grade crossing and where the road environment and geometry is not conducive to at-grade crossings. Often times however, pedestrian grade separations are not effective or well used because of perceived safety issues, poor maintenance, and because the grade separation actually increases travel time.

4.8 Supplementary Features

The use of supplementary features, such as islands do not have warrant thresholds identified in the OTM, but thresholds have been established by other jurisdictions as shown in **Table 9**.

Crosswalk warrants and implementation guidelines are contained in the Transportation Association of Canada (TAC) Pedestrian Crossing Control Manual.

In these guidelines the pedestrian volume is converted into equivalent adult units (EAU's) where children, seniors and the disabled are given preferential treatment to account for their higher vulnerability. Children and the disabled receive a weighting factor of 2 and seniors a factor of 1.5.

We are not aware of thresholds for the use of bulb-outs, textured pavement at pedestrian crossings/high visibility markings, specialized pedestrian signage, flashing beacons, barriers or delineators.

Table 9: Supplementary Control Features Warrants

Traffic Control Feature	Threshold	Source
Refuge Island	100 pedestrians over peak 8 hours of the day Documented pedestrian safety concerns	City of Toronto
Flashing Beacon	3 accidents per year for 3 years	MUTCD
Crosswalk Lines	For a 2-lane (7.5 m) cross-section : Traffic volume > 400 veh/h AND Equivalent Adult Units (EAUs) > 15 / hour For a 4-lane (15 m) cross-section : Traffic volume > 300 veh/h AND Equivalent Adult Units (EAUs) > 15 / hour	TAC

4.9 Removal of Unprotected Pedestrian Crosswalks

The use of crosswalk markings at unprotected locations firstly provides a visual cue to drivers that pedestrians may cross at this location, and secondly offers the benefit of directing pedestrians to a preferred crossing location where alternative protected crossings are not conveniently available. The crosswalk can focus pedestrian activity and direct pedestrians to locations where sight distance is greatest or unanticipated conflicts are lowest. However, unprotected crosswalks offer disbenefits of potentially encouraging pedestrians to cross at unprotected locations. There is also the potential that pedestrians who do not understand the rules of the road may mistakenly interpret the crosswalk markings as a protected crossing.

As vehicle volumes and speed on the roadway increase the exposure and risk to pedestrians, the disbenefits of unprotected crosswalks outweigh the benefits. According to the *Pedestrian Facilities Users Guide – Providing Safety and Mobility*, March 2002 by the U.S. Department of Transportation, marked crosswalks should not be used under the following conditions:

- Where the speed limit is 65 km/h or higher.
- On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 or greater.
- On a roadway with four or more lanes with a raised median or crossing island that has (or will soon have) an ADT of 15,000 or greater.

5. RECOMMENDED PEDESTRIAN CROSSING POLICY GUIDELINES

Following a review of relevant pedestrian crossing design guidelines, it is recommended that the City of Sault Ste. Marie follows the policy and implementation guidelines as detailed below and as warranted by the OTM Book methodologies and thresholds, to accommodate protected pedestrian crossings as shown in **Table 10**. Any of the protected and unprotected pedestrian crossing treatments identified in this document and in the Ontario Traffic Manual (OTM) Book 15 are suitable for consideration and implementation by the City of Sault Ste. Marie.

Table 10: Recommended Pedestrian Crossings

<table>
<tr><th>Type</th><th>Recommendation</th><th>Implementation Costs</th></tr>
<tr><td rowspan="2">Intersection Pedestrian Signals</td><td>▪ Where there is a documented safety problem (i.e. visibility or measured sight distance constraints, collision trends, or frequent vehicle-pedestrian conflicts) identified and protected crossings are not warranted, consideration should be given to implementation of traffic control signals.
▪ Where signals are not warranted, existing courtesy crossings should be maintained or considered where there is high pedestrian activity, operating speeds are 50 km/h or less and the spacing of crossing opportunities exceed 300 m.
▪ It is also recommended that a minimum of 90 metre separation be maintained between a courtesy crossing and adjacent signalized intersections. Courtesy crossings should include supplemental signage conveying to pedestrians that they do not have the right-of-way.
▪ To accommodate all users, all new and reconstructed intersections will have Audible Pedestrian Devices.</td><td>▪ Pedestrian walk / don't walk indicators and crosswalk markings
▪ $80,000 to $120,000</td></tr>
<tr><td colspan="2">It is recommended that the City include pedestrian walk/don't walk signals, audible pedestrian signals, push buttons, and markings at any new signalized intersection. At busier intersections, the City might want to consider pedestrian countdown signals to warn pedestrians on how much time is left to cross the intersection. When updating existing traffic signals, pedestrian signals and pavement marking should be updated as well. The City should maintain and repaint any faded pedestrian crosswalks at existing traffic signals. Pedestrians should be directed to use signalized intersections were appropriate through signage or public education campaign.</td></tr>
<tr><td>Crossing Guard</td><td>▪ It is recommended that the exposure-based approach be adopted as part of the warrant analysis as an initial screening tool for pedestrian crossing guard requests. If warrants are not met and there is uncertainty about the impacts of the traffic volume on crossing opportunities for a particular site, then a gap survey is recommended and results compared to OTC School Crossing Guard Guide.
▪ With the exception of school crosswalks patrolled by a trained crossing guard, marked unprotected</td><td>▪ School Crossing signs, advance warning signs
▪ $250-500 for signs and installation
▪ Estimated annual cost of $10,000/guard.</td></tr>
</table>

Type	Recommendation	Implementation Costs
	crosswalks should be discouraged. Consideration should be given to the delineation of high contrast markings to distinguish pedestrian desire lines in highly urban areas where drivers are aware of very high pedestrian activity (40 or more people over two hours). In these locations, pedestrian signage should acknowledge that pedestrians do not have the right-of-way over vehicles (e.g. OTM Book 6 Wc-28 sign). ▪ In other areas of high pedestrian/vehicular activity and/or high vehicle speeds, pedestrian markings at unprotected locations should not be implemented with pedestrians encouraged to cross at protected crossings (signalized intersections) through signage or a public education campaign.	
Unprotected Crossings	▪ At locations where unprotected crosswalks are maintained, warning signage should be implemented as appropriate (OTM Book 6 Wc-3, Wc-7 signs or specialized signs) to increase drivers' awareness of pedestrian activity. ▪ Pedestrian refuge islands or centre medians should also be considered as a passive feature at unprotected crossing points where right-of-way is available and lane alignment is not compromised (e.g. integrated with centre turn lanes). ▪ Textured Crossings are beneficial not only for identifying pedestrian crossing location, but for the surrounding streetscape as well. Textured crossings offer aesthetically pleasing surrounding and can enhance the character of the intersection/location. ▪ Other measures such as reflective delineator poles and pavement markings may be considered at the boulevard of unprotected crossing locations in order to draw the driver's attention to potential crossing activity.	▪ Signage, paint, and other pavement markings ($2,000) ▪ Refuge Island / Centre medians ($200,000)
	At unprotected crossings, signage and other markings should be used to warn pedestrians and drivers of the crossing. The City should continue repaint and maintain any faded/worn pedestrian markings and signs, an activity currently carried out under the City's reflectivity program. Refuge Islands / Centre Medians should only be considered when the road is undergoing reconstruction as the costs can be included in the budget of the reconstruction.	
Removal of Crosswalks	▪ It is recommended that the City should remove unprotected crosswalks on high speed or high volume multilane roads, where the crosswalk is not specifically intended to direct pedestrians away from crossing at locations with poor sight lines or unanticipated conflicts. The City should direct pedestrians to the nearest signalized intersection through signage in order to cross safely. The City should consider the removal of unprotected crosswalks under the following circumstances: • Where the speed limit is greater than 60 km/h;	▪ Costs will be minimal as mostly manpower involved.

Type	Recommendation	Implementation Costs
	• On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 or greater; and • On a roadway with four or more lanes with a raised median or crossing island that has (or will soon have) an ADT of 15,000 or greater. ▪ The removal of crosswalks should include public notification.	

Note: Costs shown are estimated typical installation costs based in 2009; actual costs vary based on site conditions.

It is also recommended that the City of Sault Ste. Marie proactively address pedestrian safety needs and establish a program of reviews of pedestrian crossings either through on-going traffic operations studies or annual corridor reviews. Compliance with the pedestrian crossing practices will be reviewed, and necessary roadway and traffic control modifications programmed and implemented. Streetlight warrants and maintenance should also be monitored.

Other features and crossing treatments may be considered for implementation by the City of Sault Ste. Marie on a site-by-site basis to enhance pedestrian safety based on the needs of the particular site.

It is recommended that the City of Sault Ste. Marie continue to maintain all pedestrian railway crossings in existence and continue to work closely with the railway line owners in ensuring adequate and safe crossings are provided. Current legislation dictates that crossings are to be inspected annually.

APPENDIX C-1:

Summary of Ontario Highway Traffic Act Applicable to Pedestrians

A) Signalized Intersections

HTA References

- *Definitions 144(1) – Intersection* includes any portion of a highway indicated by markings on the surface of the roadway as a crossing place for pedestrians
- Yielding (144(7))- When under this section a driver is permitted to proceed, the driver shall yield the right-of-way to pedestrians lawfully within a crosswalk
- Duty at Traffic Lights 144(22) Pedestrian Crossing – where portions of a roadway are marked for pedestrian use, no pedestrian shall cross the roadway except within a portion so marked
- Duty at Traffic Lights 144(25, 26, 27) No pedestrian approaching a traffic control signal and facing a solid or flashing “don’t walk” indication shall enter the roadway. No pedestrian approaching a traffic control signal and facing a red or amber indication shall enter the roadway, unless they are facing a “walk” indication.

Case Law

- Flood v. Wellband (1951) – Pedestrians … “who chose to cross against the lights, or at a point where they are not supposed to cross, they will generally found at least partially responsible for any collision that results”
- Flynn v. Saunders (1947) – “A pedestrian who has commenced crossing an intersection with the green light in his or her favour is entitled to complete the crossing if the lights change before he or she reaches the other side, and drivers who have stopped for the lights must ascertain that the crossing is free before proceeding”
- R. v. Potapchuk (1963) as it pertains to the appropriateness of a signal – “It was immaterial for purposes of the prosecution whether or not the erection of the lights had been approved, but that any departure from the required specifications would become material and important if the defence established that by reason of such departure the accused did not and, if keeping reasonable lookout could not have seen the signal”

B) Pedestrian Crossovers

HTA References

- Duty of Driver 140(1) – When a pedestrian or a person in a wheelchair crossing a roadway within a pedestrian crossover … “ the driver of the vehicle or street car shall yield the right-of-way to the pedestrian or a person in a wheelchair by slowing down or stopping if necessary.”
- Municipal By-laws 140(5) – “No municipal by-law that purports to designate a pedestrian crossover on a highway on which the maximum speed limit is in excess of 60 kilometres per hour is valid.”
- It is the pedestrian’s duty to not walk , run or move the wheelchair into the path of a vehicle or street car that is so close that it is impracticable for the driver of the vehicle to yield the right-of-way

Case Law

- R. v. Knutson (1989) – “One can stop in the middle of the highway and still be said to be crossing it.”

C) School Crossing (179)

HTA References

- School Crossing Stop Sign 176 (1-6) – Where a school crossing stop sign is displayed by no person other than the crossing guard, any vehicle or street car approaching the stop sign shall stop before reaching the crossing.

D) Unprotected Crossings at Intersections

HTA References

- Walking along Highway 179(1) "Where sidewalks are not provided on a highway, a pedestrian walking along the highway shall walk on the left side thereof facing oncoming traffic and, when walking along the roadway, shall walk as close to the left edge thereof as possible"

Case Law

- Alter v. Soloway (1931), Petijevich v. Law (1969) "A pedestrian crossing at an intersection who has exercised care by looking before proceeding to cross, must, once into vehicular traffic and beginning to cross, be allowed to continue crossing in safety and to finish it. A pedestrian has the right to assume that anyone who might come up to the crossing he or she has already entered will exercise care by reducing speed or stopping."

E) Unprotected Crossings not at Intersections

Case Law

- Rainey v. Kelley (1922), Roubell v. Kitchener (1945) "In the absence of statutory provisions or by-law a pedestrian is not confined to a street crossing or intersection and is entitled to cross at any point although greater care may then be required of him or her in crossing."

City of Sault Ste. Marie

December 2013

Transportation Master Plan

Appendix D: Cycling Discussion Paper

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1. INTRODUCTION

The City of Sault St. Marie completed its first Cycling Master Plan (CMP) in 1995, based on the concept that all roadways should be developed to accommodate cycling. Since the completion of the 1995 CMP, the demand for cycling in the City has increased and to account for increased cycling demand, a Cycling Master Plan Update was completed in 2007. The updated CMP maintains the principle upon which the original plan was developed and adds alternative pathways for less experienced cyclists on or along major roadways.

The purpose of the 2007 Cycling Master Plan Update was to provide general design considerations that should be utilized to make all road and destinations within the City cycling friendly. Also, the preferred cycling routes and specific design standards were recommended. The updated CMP provides a number of education, enforcement, encouragement and engineering principles for the City to use to develop a safe cycling network.

This Cycling Working Paper has been prepared as part of the overall Transportation Master Plan for the City of Sault Ste. Marie. The purpose of this paper is firstly to review the goals and recommendations as well as their status from the 2007 Cycling Master Plan Update, secondly to review the status of cycling within the City based on the public opinion survey, and finally to review industry design guidelines and existing practices to provide recommendations for design standards for the City with respect to on-road facilities.

2. STRATEGIC FRAMEWORK

Cycling has become a practical, cost effective and environmentally friendly mode of active transportation in Ontario. Promoting and encouraging cycling through the provision of facilities and programs helps to build healthy communities, reduce emissions of greenhouse gases and other harmful pollutants, reduce congestion, and provide opportunities for economic development. Cycling activities consist of both utilitarian (i.e. commuter) and recreational trips.

As outlined in the City's 2007 Cycling Master Plan Update, the successful development and implementation of a cycling network requires a strategic framework that engages education initiatives, facilitates compliance with traffic safety, rules and regulations, encourages trail use and supports and helps establish an integrated multi-use transportation network that responds to users of all ages, skills and levels of ability.

The visions, goals and objectives identified in the 2007 Cycling Master Plan Update, including the "Four E's" of Cycling (Education, Enforcement, Encouragement, Engineering) and guiding principles, were reviewed and will continue to form the basis of the cycling component of the Transportation Master Plan.

2.1 Principles

The 2007 Cycling Master Plan Update provided a set of Principles which were established to guide the strategic framework, and development and implementation of the Cycling Master Plan. These principles were reviewed and incorporated in the preparation of the 2014 TMP.

3. CYCLING IN SAULT STE. MARIE (SSM)

3.1 Current Provincial Trends

Cycling has become an increasingly popular means of transportation, exercise and recreation in North America. The latest Ontario Ministry of Transportation (MTO) statistical estimates indicate that 630,000 Ontarians ride a bicycle on a daily basis, and that 48 percent of almost 13 million Ontarians ride at least once a week during the spring, summer and fall[1]. The Draft Cycling Strategy paper by MTO (November 2012) indicates that approximately 50 percent of Ontario cyclists are using cycling as a mode of transportation for commuting to work and/or school, for shopping, running errands or visiting. Ontarians have recognized cycling as an integral and necessary part of a community's transportation system and an alternative mode of transportation to the automobile.

3.2 Level of Cycling Activity in SSM

As part of this study, HDR Corporation developed a voluntary Transportation Master Plan (TMP) Questionnaire. The TMP Questionnaire was intended to reflect the desires of the people who live in Sault Ste. Marie with respect to the development of the City's long-term (2031) Transportation Master Plan. The results of the survey are documented in the report entitled "Sault Ste. Marie Transportation Master Plan Summary of Results for the Public Opinion Questionnaire" (February 2013) and are summarized in this report.

Approximately 1,000 persons responded to the TMP Questionnaire or 1.3% of the City's population of 75,000 from the 2011 Census. While the questionnaire was not intended to be statistically significant, the results of the TMP survey are intended to provide at least a snapshot of travel attitudes and characteristics that represent the City.

Out of 815 respondents to a question about cycling frequency, the majority (61%) indicate that they cycle very infrequently (never cycle or only cycle a few times a year), whereas 39% cycle at least a few times a month. This proportion is lower but still comparable to provincial data where about 48% of persons in Ontario cycle at least once per week. With respect to frequent usage, 10% of respondents in the City cycle 5 times per week, typically for commuting. This is higher compared to provincial data, where about 5% of persons in Ontario commuter to work via bicycle. The results of this question are summarized in **Exhibit 3-1**.

[1] Draft Cycling Strategy, Ontario Ministry of Transportation, November 2012

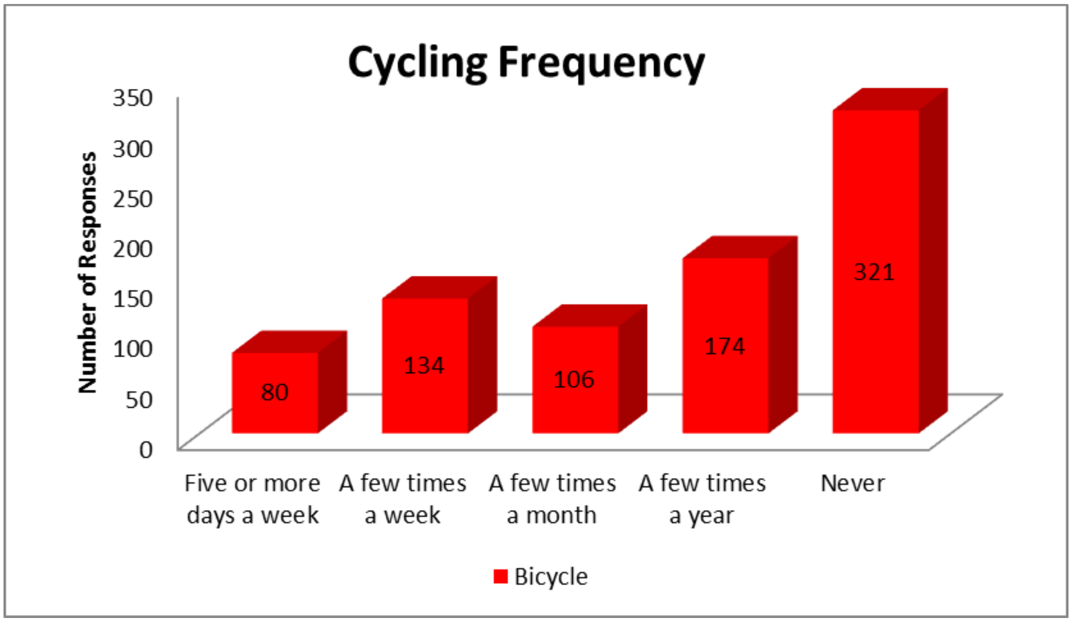


Exhibit 3-1: Survey Findings: Cycling Frequency

Another survey question asked if residents would consider cycling, walking, or using transit more instead of driving. The majority of respondents, about 68%, indicated that they were at least somewhat likely to consider alternative travel modes, with 30% indicating they were very likely to switch. Survey responses to this question are summarized in **Exhibit 3-2**.

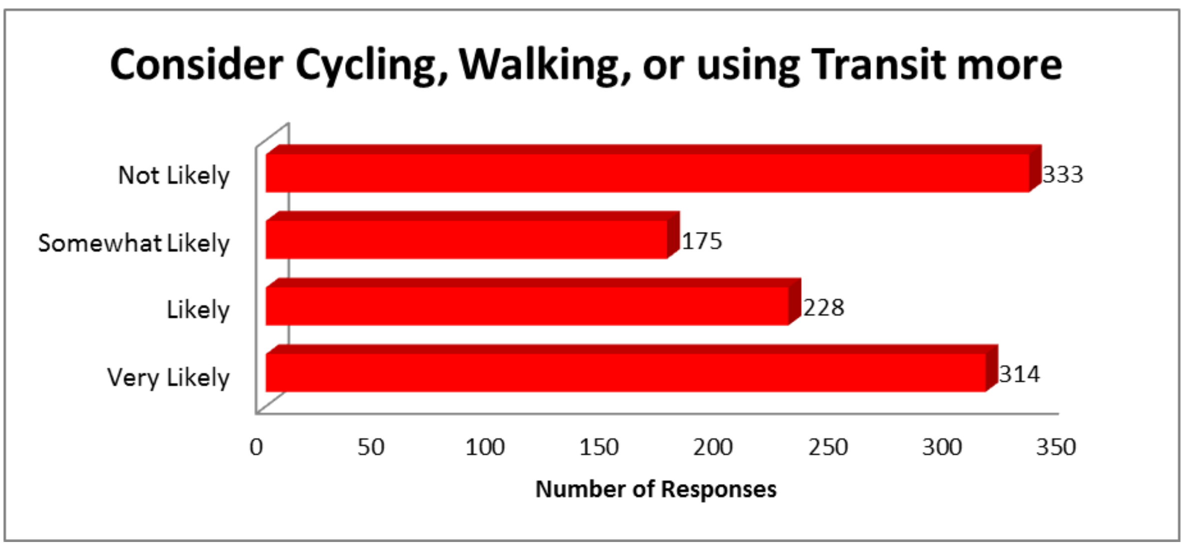


Exhibit 3-2: Survey Findings: Consideration for non-auto travel

A strong majority of respondents indicated that they felt that separate bicycle travel lanes or trails as well as more bicycle parking facilities through the City would be a very important factor in changes to the cycling network to increase cycling usage. Of those responding to the questions, 36% felt it was very important to provide more bicycle parking facilities, while 58% felt it was very important to provide separated bicycle lanes or trails to increase cycling usage. Only 25% and 18% respectively to each question responded that these improvements were not important. The results of this question are summarized in **Exhibit 3-3**.

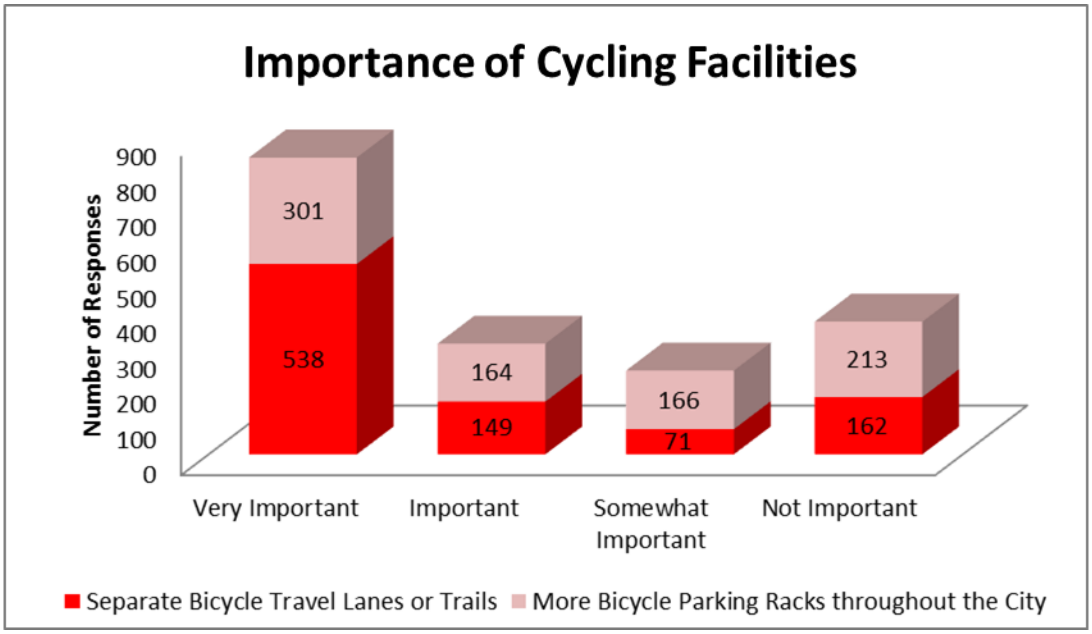


Exhibit 3-3: Survey Findings: Importance of Cycling Facilities

Similar to the previous question, it was found that a strong majority of respondents, about 49%, indicated that a lack of cycling paths is a very important factor for the City to address, with only 12% deeming it not important. The results of this question are summarized in **Exhibit 3-4**.

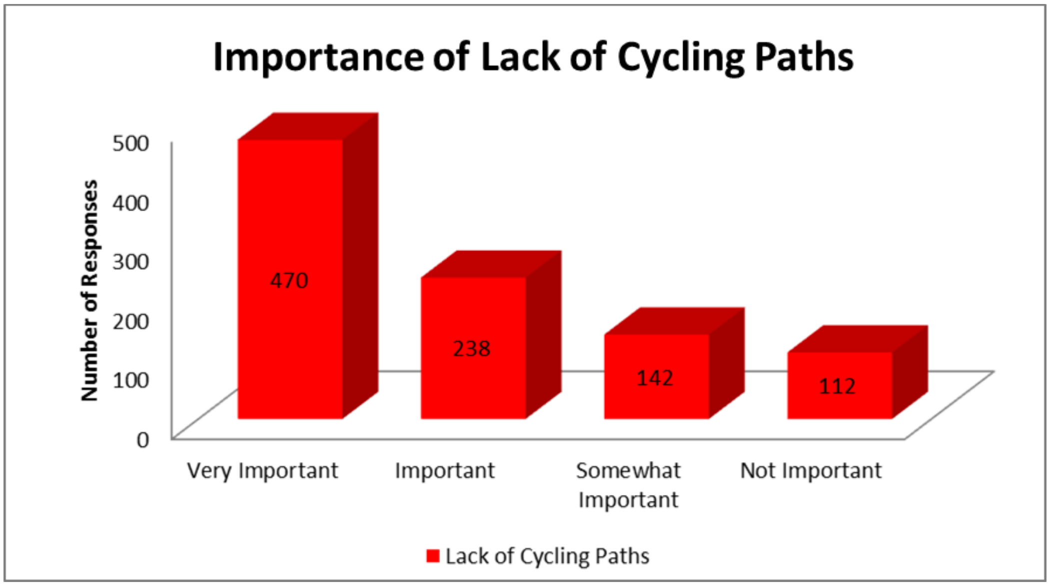


Exhibit 3-4: Survey Findings: Importance of the Lack of Cycling Paths

When asked about the importance of certain active transportation issues in regard to the overall TMP, the respondents felt strongly that building more bicycle lanes and trails as well as making cycling safer is a very important guiding principle in the City's TMP. 59% felt that it was very important to make walking and cycling safer while 48% feel it is very important to build more bicycle lanes and trails. Only 8-12% felt that these issues were not important. The results of this question are summarized in **Exhibit 3-5**.

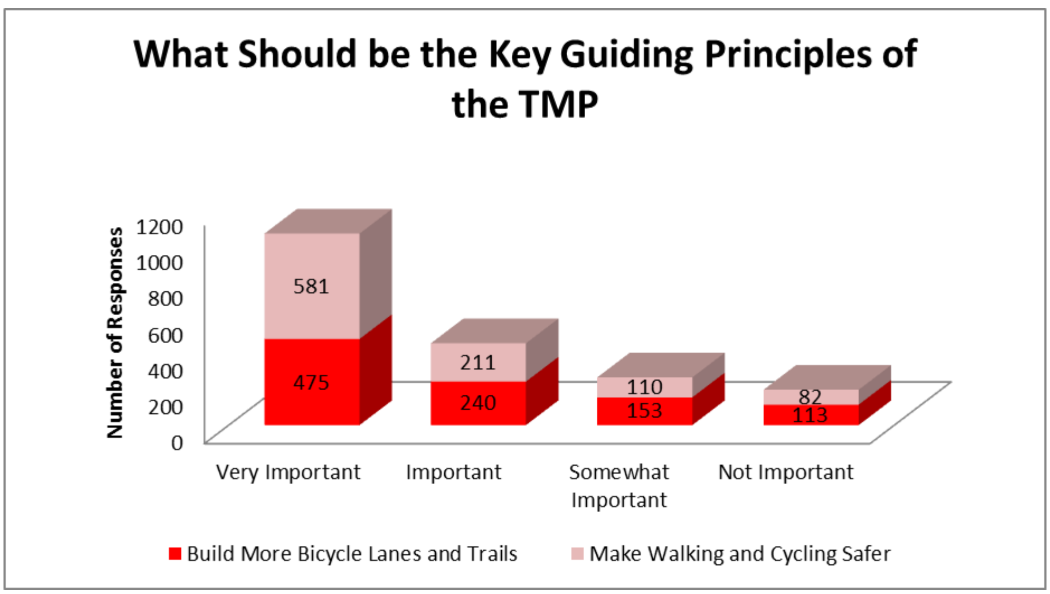


Exhibit 3-5: Survey Findings: Key Guiding Principles

A standalone cycling question on the Survey asked what additional recreational or commuter cycling routes (more recreational routes such as Finn Hill and Fork Creek sections of the Hub Trail; more urban cycling routes such as Carmen's Way; or a combination of both) should be considered. A large majority of respondents indicated that a combination of both recreational and utilitarian cycling routes should be considered, and this question is summarized in **Exhibit 3-6**.

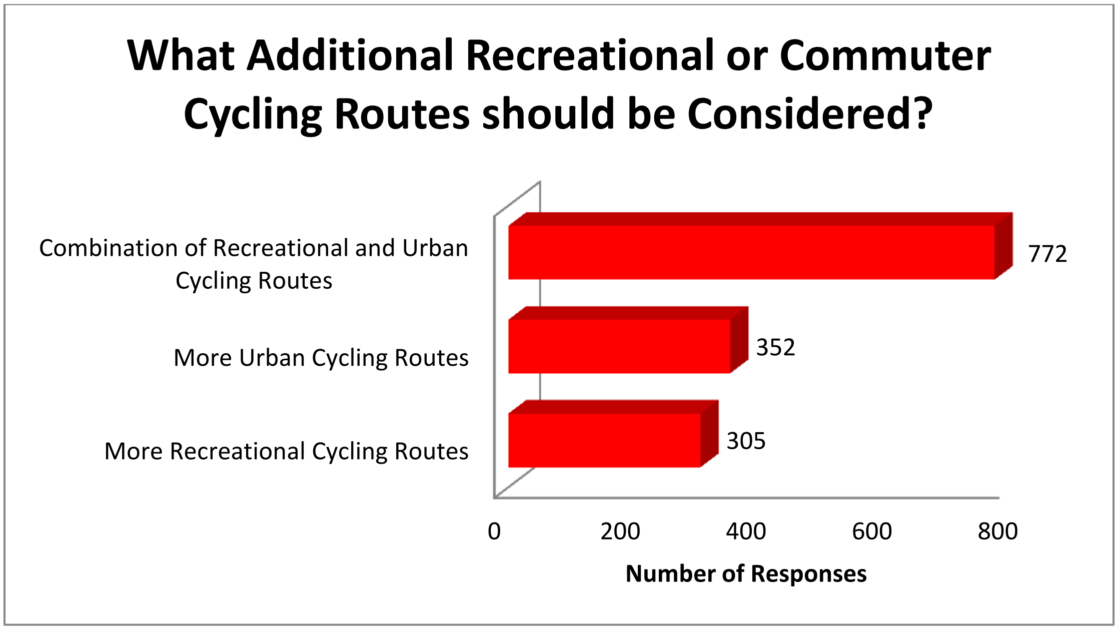


Exhibit 3-6: Survey Findings: Additional Recreational or Commuter Cycling Routes

4. NEED FOR CYCLING SUPPORTIVE INFRASTRUCTURE

On-road bicycle routes typically form the ‘spine’ of a bicycle network which allows for the efficient and safe bicycle travel to/from major destinations/attractions.

As documented in the 2007 Cycling Master Plan Update, there are several different varieties of on-road bicycle features that can be implemented on the City’s roads.

Signed Only Route	▪ Typically installed on low volume, quiet residential streets where no changes to the road are required.
Signed Route on Wide Outside / Curb Lane	▪ Similar to Signed Only routes with the exception that the shared curb lane is wider than normal (typically for snow storage and this is common in Sault Ste. Marie). Also installed on low volume streets.
Signed Route with Painted Sharrow Symbol	▪ Can be used in similar situation with signed route on wider lanes but with higher traffic volumes. The sharrow symbol increases the drivers’ awareness of cyclists on the road. Cost of implementing sharrows is approximately $250 / km based upon typical unit costs in Ontario of symbol painting.
Paved Shoulders	▪ Are typically located on rural roads where there is no curb and gutter. The paved shoulder must be widened to accommodate cyclists. Typically painted with edge lines, can be used to provide additional travel space for both cyclists and pedestrians.
Bicycle Lanes	▪ Are typically identified on urban roads through pavement markings and signage. Bicycle lanes are usually located on roads with higher volumes due to the separation provided. Cost of implementing bicycle lanes is approximately $3,000 / km (assuming that widening is not required) based upon typical unit costs in Ontario of symbol and striping painting only.

Currently in the City of Sault Ste. Marie, there are three main types of road classifications: Arterial, Collector, and Local. The City of Sault Ste. Marie’s current road classifications for urban and rural roads are as follows (as stated in their 1996 Official Plan):

- **Arterial Streets** – are designed to facilitate the safe movement of large volumes of traffic at moderate rate of speed over extended distances. A design width of up to 36 m shall be protected for arterial streets. Access shall be restricted to other arterial streets, collector streets, and streets serving major commercial / industrial uses. Access from abutting uses shall be controlled and permitted only where approved by the Commissioner of Public Works and Transportation.

- **Collector Streets** – are designed to facilitate the safe movement of traffic from residential, commercial, and industrial areas to or from the arterial street network. A design width of up to 26 m shall be protected for collector streets. Limited access is permitted from abutting uses subject to the approval of the Commissioner of Public Works and Transportation.
- **Local Streets** – are designed to facilitate the safe movement of traffic within a residential area. A design width of up to 20 m shall be protected for local streets. Individual access from abutting land uses is permitted. Local streets shall be designed to discourage through traffic, thus, restricting their usage to provide access to the abutting land uses and enhancing safety.

Arterial Streets in the City (such as Great Northern Road, Second Line and Trunk Road) mainly consist of four (4) lanes of traffic. These roads would be suited for more experienced cyclists only and not for leisure or recreational riders, as they share the road with large volumes of traffic moving at moderate speeds. To provide increased safety for cyclists travelling on arterial streets, it is recommended to accommodate cyclists (together with pedestrians) on multi-use pathways with a separation from the travel lane, instead of on-road bicycle lanes adjacent to vehicular traffic. On-road bicycle lanes may also be considered, but would require major reconstruction to widen the paved road surface for the bicycle lanes and thus are dependent on the timing for when reconstruction is required.

Collector Streets in the City (such as Boundary Road and Shannon Road) are typically two (2) wide lane roads. These are well suited for the installation of bicycle lanes with very little required other than paint and/or signage. All cyclists (experienced and recreational) would be able to cycle on these roads. However, there is concern from the City in regards to winter maintenance as the edge of these wide lanes are typically used for the storage of snow.

Similarly on local roads, while the roads meet the Signed Only Route standards, the City prefers to use the edge of road and boulevard for snow storage and has concerns regarding the liability of maintaining a bicycle route (even if only signed) during the winter months.

Although arterial roads are typically four (4) lanes and collector roads are two (2) lanes, there are instances of four (4) lane collector roads in the City. In these instances, the volumes on these roads do not warrant the need for four (4) lanes, so another feature to consider is the impact of Road Diets in the City. Currently the City is undertaking an Environmental Assessment study for a road diet scheme along Queen Street east of Pim Street where four (4) lanes may be reduced to three (3) lanes to accommodate on-street cycling lanes. Road Diet opportunities are discussed further in Appendix F of the Sault Ste. Marie Transportation Master Plan Report.

5. EXISTING CYCLING INFRASTRUCTURE

5.1 Cycling Network from the 2007 CMP-Update

The 2007 Cycling Master Plan (CMP) Update combined the Hub Trail (completed in 2006) with a series of cycling routes occurring outside and within the perimeter to create a comprehensive network of on and off road trails connecting destinations throughout the City ("The Route", which is illustrated in **Exhibit 5-1**). The concept behind the Cycling Routes is to integrate and link exterior routes or "spokes" stemming from the Hub, together with interior routes or "spokes", which represent the inner workings of the Hub. This plan also provides construction methodologies as well as a hierarchy of trails to be developed, implemented, and maintained.

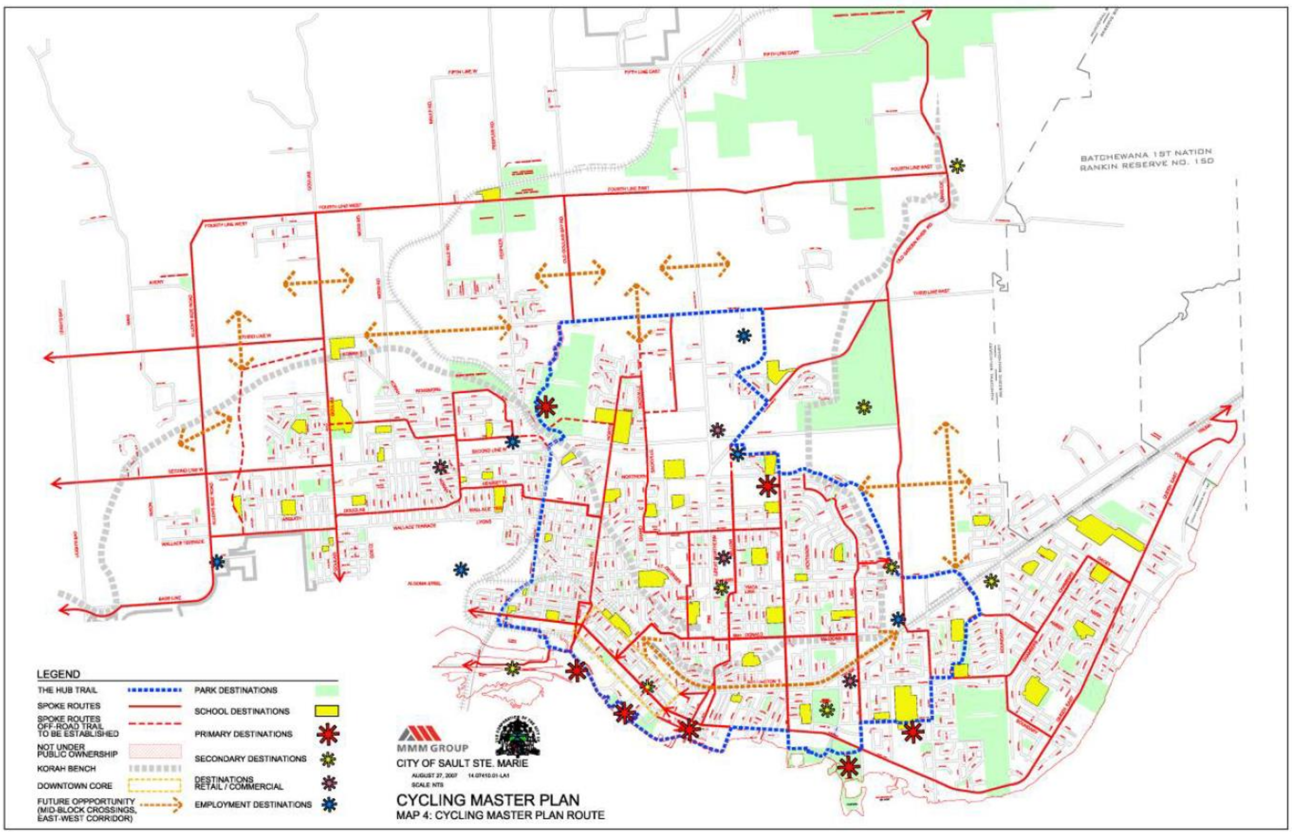


Exhibit 5-1: Sault Ste. Marie Cycling Master Plan Route (2007)

The 2007 CMP Update highlighted destination areas and created linkages between neighbourhoods and facilities reflecting the culture and community of Sault Ste. Marie. The Route serves both recreational and utilitarian cyclists, encouraging healthy, sustainable outdoor pursuits and community building activity. When complete, the Route will provide an enjoyable and safe opportunity for local residents and visitors to travel, explore, and commute to the many attractions, features, and commercial and recreational facilities offered in the City of Sault Ste. Marie.

The recommendations for "The Route", as outlined in the 2007 Cycling Master Plan Update, are outlined and briefly discussed in **Section 5.2**.

5.2 Status of Recommendations from the 2007 CMP Update

As part of program implementation and monitoring, the TMP documents the current status of the Hub Trail recommended in the 2007 CMP. **Table 5-1** describes the key sections of the 2007 CMP Update Hub Trail network along with their current status. As of the writing of this paper, the Hub Trail network is almost complete with a few small sections still left to be connected.

The Spoke Network is still to be implemented by the City. Once the City has determined an ideal situation in regards to the installation and maintenance of on-street cycling lanes, the Spoke network can be implemented. The Spoke Network is outlined in the 2007 Cycling Master Plan Update.

Table 5-1: Status of CMP Update Recommendations

Route	Destinations and Route Description	Destinations	Status
Hub Trail: ▪ Four season multi-use route network ▪ Provides connections and continuous spine for the City's trail system ▪ 22 km loop around the City, generally following the shape of Korah Bench • North section rides the top of the Bench • South section is located below the Bench connecting the Waterfront boardwalk to other walking and cycling trails ▪ Designed to: • Provide easier access to destination areas for local users and visitors, accommodating a wide range of skill levels and non-motorized transportation options including walking, cycling, in-line skating and skateboarding. • Provides alternative travel routes that offer considerable variation in trip length and purpose.	Identifies and connects trail users to various primary and secondary destinations across the City (refer to Appendix C for Appendix A – Map: Destinations Areas from 2007 CMP Update)	▪ Waterfront District: City Hall to Canal Drive	▪ Completed
		▪ Queen Street West	▪ Between Canal Drive and Carmens Way still to be completed
		▪ The Truck Route: Queen Street to Second Line	▪ Completed
		▪ Fort Creek Conservation Area	▪ Completed
		▪ Third Line: Fort Creek CA to the Hospital	▪ Completed
		▪ Hospital District: Third Line to Terrance Avenue	▪ Completed
		▪ Pine Street Extension District: Terrance Avenue, Old Garden River Road to Pine Street Extension	▪ To be confirmed due to recent Second Line Road Re-construction and Pine Street extension construction
		▪ Sault College / Finn Hill District	▪ Section on Northern Avenue between Pine Street and Willow Avenue still to be completed
		▪ McNabb Street / South Market District: Black Road to Cambridge Place	▪ Completed
		▪ Sutton Park District: Cambridge Place to Shannon Road	▪ Completed
		▪ Algoma University College District: Bennett Boulevard to Queen Street	▪ Mark Street section between Churchill Boulevard and Hugill Street still to be completed.

Route	Destinations and Route Description	Destinations	Status
		▪ Bellevue Park District: Queen Street to Pine Street	▪ Still to be completed.
		▪ Queen Street East District: Pine Street to City Hall	▪ Waterfront section completed ▪ Queen Street section to be confirmed due to recent Queen Street Reconstruction

5.2.1 Implementation Challenges

The City has concerns with regards to additional costs for winter maintenance for on-street bicycle lanes, traffic safety concerns, and potential liability issues.

Typical cross-sections in the City for routes where potential on-street cycling can be implemented consist of wide two lane roads where on-street cycling lanes can be easily painted without the need for reconstruction. However, the City uses the edges of these wide lanes for the storage of snow. If on-street cycling lanes were to be implemented, then the City would have to push the snow further out onto the boulevard / sidewalk of the roads, increasing the cost associated with the maintenance.

In addition to cost, reducing storage space for snow would increase snow bank heights and thus impacting driver sight distance particularly when pulling out of driveways.

The City understands that painting cycling lanes and/or shared symbols, and providing signage on primary and secondary cycling routes identified in the Cycling Master Plan will benefit and encourage active transportation. However, maintaining bicycle lanes throughout the winter will add additional burden to the residential tax base resulting in a low overall benefits as very few people cycle in winter. Conversely, it might not be practical to keep cycling lanes open and clear of snow and ice in winter months. City Council has the authority to pass a seasonal use by-law that will permit closure of the painted cycling lanes for the winter months.

The City had expressed an interest into what other municipalities (with similar size and climate to Sault Ste. Marie) have done or are considering with regards to on-street bicycle lanes. The following section outlines the existing practices for several communities with on-street bicycle lanes which are situated in a winter climate.

6. IMPLEMENTATION AND MAINTENANCE PRACTICES ELSEWHERE

This section considers standards for the implementation and maintenance of on-road bike lanes based on established guidelines and practices elsewhere. It also uses the results of a telephone and email-based survey of Canadian municipalities comparable to Sault Ste. Marie in terms of size and climate to obtain a picture of the state of the existing practice with regard to seasonal and year-round on-road cycling facilities.

6.1 Best Practices

There are several sources that provide guidelines, standards and recommendations for on-road bike lane implementation and maintenance. A review of the relevant contents of these is provided in this section.

6.1.1 Provincial Implementation Standards

The *Ontario Bikeways Planning and Design Guidelines (March 1996)*[2] describes practices for the implementation of on-road bike lanes. In summary, these guidelines recommend that a delineated bike lane should be considered where significant bicycle demand is anticipated and motorized traffic speeds or volumes are sufficient to have safety implications for shared bicycle and motorized vehicle lanes. High volumes are usually the primary motivating factor in urban areas and high speeds in rural areas.

According to the guidelines, steps taken to implement the bike lane may include repainting, replacing road lanes, widening existing roads, adapting shoulders previously designated only for emergency vehicles, or removing parking. It may be convenient and cost-efficient to implement bicycle lanes at a time when road maintenance is also being carried out on the related stretch of road. For example, when lane markings are being repainted, the municipality may consider adding bicycle lane markings at the same time.

In addition to markings, bicycle-sensitive signal actuation may also be required to improve the attractiveness of the lane and help to encourage its use.

Configurations for implementing the on-road bike lanes as recommended by the Ontario design guidelines are shown below in **Exhibit 6-1**. The configurations may vary depending on whether on-street parking is also allowed and whether there is a curb. A 1.0 m wide bike lane is acceptable where there are low motorized volumes and few roadside obstructions, without adverse edge conditions (curb or gutter). The adjacent traffic lane should be at least 3.5 m wide. However, where the bike lane runs along a curb, the lane should be at least 1.5 m wide to avoid the possibility of hitting pedals on the curb, or conflicting with catch basins or gutter slopes. Where there is on-street parking the bike lane should be located between the parking and motorized travel lanes. The recommended minimum width is 1.5 m, or 1.8 m if there are high levels of through volumes or parking movements.

[2] Ontario Bikeways Planning and Design Guidelines, Ontario Ministry of Transportation, March 1996.

More recent thinking suggests that bike lanes should be placed between sidewalks and parked cars, and such designs have been proposed recently on Eglinton Avenue in the City of Toronto.

The more recently updated OTM Book 18 (May 2013), however, continues to support the bike lane between the parking and motorized travel lanes. The recommended cross sections with bike lanes and on-street parking from the 1996 Ontario Bikeways and Design Guidelines are provided in **Exhibit 6-1** while cross sections from OTM Book 18 May 2013 are provided in **Exhibit 6-2**.

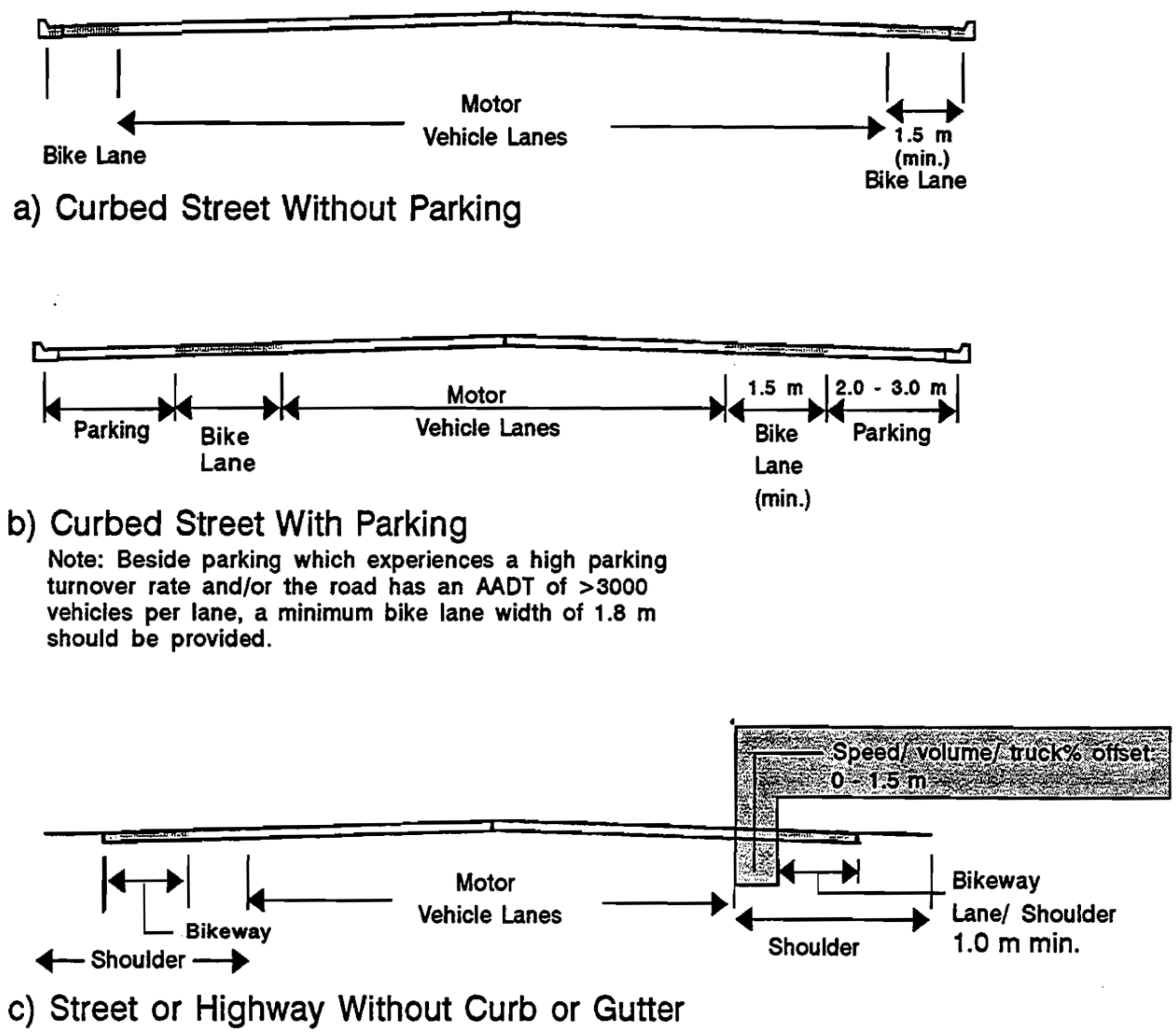


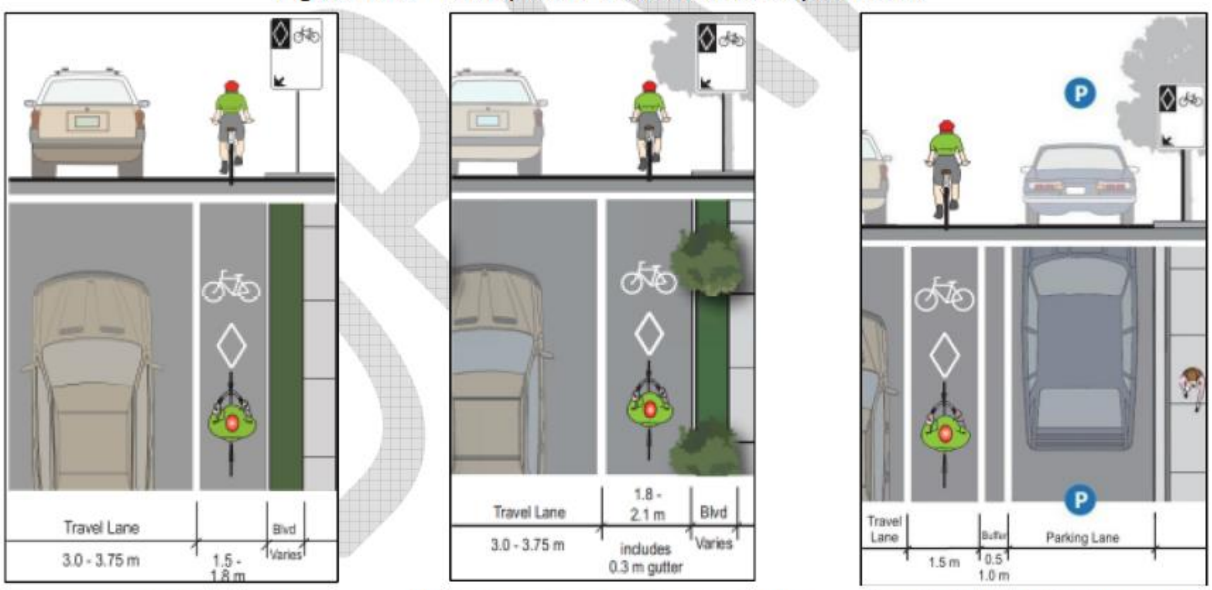
Exhibit 6-1: Bike lane delineation and width (Ontario Bikeways Planning and Design Guidelines, 1996)

Conventional Bicycle Lane, Halton Hills
Credit: MMM, 2009

Conventional Bicycle Lane, Burlington
Credit: City of Burlington, 2012

Bicycle Lane Adjacent to On-Street Parking
Credit: City of Winnipeg, 2011

Figure 4.18 – Examples of Conventional Bicycle Lanes



Conventional Bicycle Lane

Wide Conventional Bicycle Lane

Bicycle Lane Adjacent to On-Street Parking

Figure 4.19 – Cross-Sections of Conventional Bicycle Lanes

Exhibit 6-2: Bicycle Lane Cross-Sections – OTM Book 18 May 2013

TAC bikeway design guidelines[3] also recommend a 1.5 m bike lane width (with 1.2 m as the minimum), as well as markings of obstacles (including catch basins) in a way such as is shown in **Exhibit 6-3**, to prevent unsuspecting cyclists from running into hazards. The TAC guidelines also recommend identifying bike lanes as such clearly by using a bicycle symbol of the form and dimensions shown in **Exhibit 6-4**.

[3] Bikeway Traffic Control Guidelines for Canada: Transportation Association of Canada, December 1998

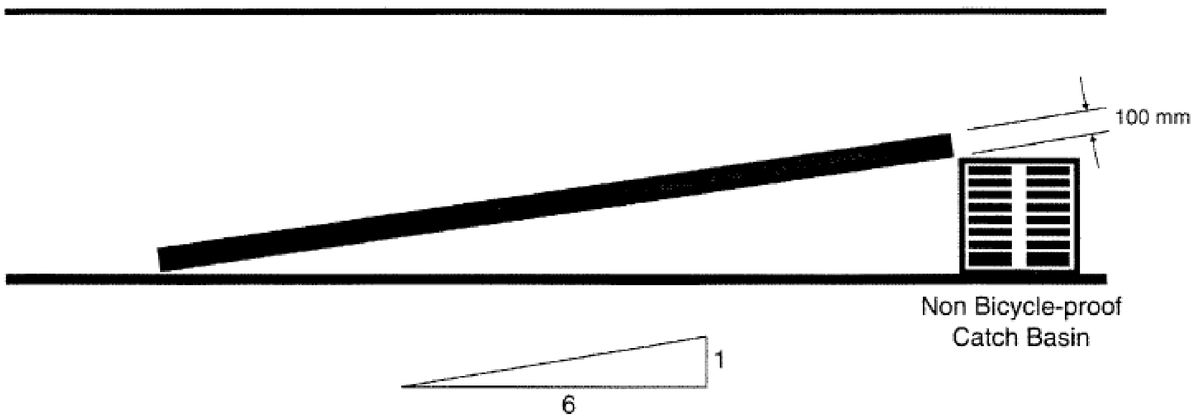


Exhibit 6-3: Recommended Bike Lane Obstacle Marking (TAC, 1998)

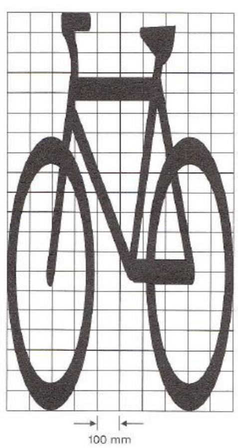


Exhibit 6-4: Bicycle lane indicator (TAC, 1998)

In locations that feature both high volumes and high travel speed, buffered bike lanes (bike lanes with an additional separation space between them and the motorized vehicle lanes) may be considered[4]. An example of one of these is shown in **Exhibit 6-5**.

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[4] Progress Report on the Update of Ontario Bikeway Planning and Design Guidelines: Ontario Ministry of Transportation, 2012.

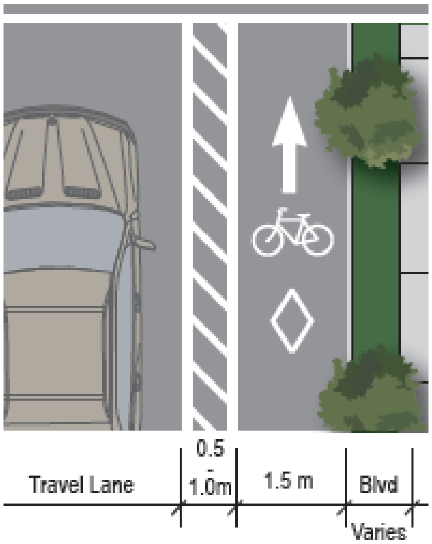


Exhibit 6-5: Implementation of buffer spaces (MTO, 2012)

6.1.2 Provincial Maintenance Standards

The Ontario Bikeways Planning and Design Guidelines emphasize the need to have a system for the reporting of problems and maintenance requirements by the users such that any problems with the bike lanes can be efficiently brought to the attention of those responsible for maintaining the facilities.

Suggestions for improving the usability of bike lanes include adjusting road maintenance schedules so as to maximize the length of the cycling season, and communicating effectively to users if the lanes will not be cleared of snow. If the lanes are cleared, it is suggested that plowing be used but not de-icer fluid or salt, as these materials can have a damaging effect on bicycle wheels. This may not be practical however because eliminating salt application on roads with cycle lanes is not an option for the City, and thus reinforces the notion that the cycling lanes may require a by-law that states that no maintenance on these lanes is required during the winter months.

Necessary maintenance as identified in the Guidelines includes maintenance of lane delineation markings, and maintenance and replacement of bike lane signage. These are in addition to the regular maintenance tasks for the roadway that the bike lane is on.

Surface quality should be maintained to a standard so as to be traversable by high-pressure bicycle tires, without raised or lowered utility covers or drainage grates that cause an obstacle to cyclists; in addition, these are often metallic which can become very slippery in wet or icy conditions. As far as possible, utilities such as these should be located outside the travelled part of the bike lane.

If maintenance is not regularly conducted on the bike lane, cyclists may be discouraged from using it because of the presence of debris, potholes, cracks and surface wearing that may cause damage to bicycles or falls. Bicycles are more susceptible to these conditions than motorized vehicles and so a maintenance schedule (sweeping and resurfacing) at a higher frequency than for roads should be considered and implemented.

6.1.3 The VTPI Guidelines

The Victoria Transport Policy Institute's (VTPI) guide to best practices[5] identifies a series of recommended maintenance practices for on-road bike lanes. These include:

- Applying a regular schedule of surface inspection and expedited repair of potholes, gaps and other hazards;
- Applying a regular schedule of sweeping to eliminate accumulation of debris, sand, gravel, leaves and other material that covers the surface. This should be removed from the area rather than pushed to the side where it can be blown or washed back into the path of travel;
- Ensuring that when the surface is repaved the overlay extends smoothly and with no ridges across the bike lane as well as the motorized vehicle lanes, to avoid creating any discontinuities that affect cyclists;
- Configuring bike lanes so that they cross rail lines at a 90 degree angle, using extra roadside space if necessary, as other crossing angles create hazards from the possibility of catching wheels in the rail;
- Applying non-skid roadway markings to delineate and indicate bike paths to prevent slip hazards in wet or icy weather;
- Cutting back vegetation from the edge of the road so that cyclists travelling close to the roadside are not impeded in their visibility or obstructed by tree roots distorting the surface, branches overhanging the bike lane and leaves falling into it;
- Removing snow and ice from the bike lanes in addition to the motorized vehicle lanes (where feasible); and
- Refreshing markings to ensure bike facilities remain clearly delineated.

6.1.4 FHWA Guide

The Federal Highway Administration (FHWA) guide to Implementing Bicycle Improvements at the Local Level[6] emphasizes the importance of establishing a reporting policy that encourages cyclists to report maintenance problems and observed hazards afflicting the bicycle lanes. A spot improvement form, with copies distributed among cyclists, is recommended. Other recommended maintenance practices include:

- Using edge treatments and shoulder surfaces that reduce the possibility of debris accumulating in the bike lanes;
- Including estimated maintenance costs and procedure guidelines at the time of designing bicycle facilities in the project description and budget;
- Establishing maintenance responsibilities prior to construction;
- Refreshing bike lane markings at the same time as other work (such as vehicle lane markings) is carried out, noting also that some markings may need more frequent repainting.

[5] Pedestrian and Bicycle Planning—A Guide to Best Practices. Victoria Transport Policy Institute, April 2013.
[6] Implementing Bicycle Improvements at the Local Level, FHWA Report RD-98-105, 1998.

6.2 Survey of Other Municipalities

A survey of municipalities of a comparable size (population 40,000 to 150,000) and climate profile to Sault Ste. Marie in Saskatchewan, Manitoba, Northern Ontario and New Brunswick was conducted to gauge the existing practices with regard to bike lanes and the extent of seasonal bike lane maintenance. The survey consisted of sixteen questions (the full list can be found in Appendix D-1), of which up to eleven applied to any specific respondent (some were asked based on the responses to previous questions). Respondents included:

- City of North Bay (Ontario)
- City of Timmins (Ontario)
- City of Barrie (Ontario)
- City of Thunder Bay (Ontario)
- City of Fredericton (New Brunswick)
- City of Saint John (New Brunswick)
- City of Brandon (Manitoba) and
- City of Prince Albert (Saskatchewan).

All municipalities had on-road bike facilities to some degree, although the extent of the network, and the approaches to seasonal maintenance, varied widely. Full documentation of the responses to individual responses is given in Appendix D-2.

6.2.1 Implementation

Except for Brandon, which plans to implement an on-road bike lane soon, all surveyed municipalities have on-road bike lanes to some degree, although the extent of implementation varies widely. North Bay, Timmins and Prince Albert have fewer than 10 km of bike lanes along a single corridor. Fredericton, Thunder Bay and Fredericton have networks of 10-50 km, while Barrie has an extensive network. All municipalities except for Timmins use both paint and symbols to delineate their lanes (Timmins uses painted lines only), and most use regulatory signs as well.

6.2.2 Maintenance

The great majority of surveyed municipalities had seasonal bike lanes only, with the only year-round lanes being in Barrie, and others closed in winter because of the conditions. Barrie includes bike lanes in plowing and so they remain open, although there may be delays in clearing the lanes because of operational constraints. Brandon anticipates that its bike lane, when opened, will be available year-round with winter plowing.

There are a variety of approaches to closing bike lanes and notifying potential users of their closure. Thunder Bay has a by-law that lists bicycle lanes and their time in effect as being from May 1st to November 14th. Prince Albert is considering adding bike lanes to their traffic law, while other cities do not have documentation. The most common approach to winter bike lanes is not to maintain them but not formally to close them either.

In Timmins, North Bay, Fredericton and Saint John, cyclists can continue to use the lanes if weather permits, but they are not sanded or maintained. In these locations, along with Fredericton and Prince

Albert, no specific time period for bike lanes being open is designated, other than the time from when the snow melts to when the snow falls.

All the municipalities with seasonal lanes use the bike lanes for snow storage to some degree, although these may be cleared when the full road is cleared, and in Saint John medians are used for storage first. The extent of snow storage depends on the degree of snowfall; while in Fredericton the policy is to plow to the curb, and there may be times after heavy snow when the bike lanes may be required for storage.

Several of the municipalities noted that complaints had been received from the public about the lack of all-year maintenance of the bike lanes. However, in most cases these are not numerous and often are outnumbered by complaints about lack of maintenance of sidewalks and off-road trails (primarily for use by pedestrians in winter) and insufficient sweeping and refreshing of the lane markings at the beginning of the cycling year in spring.

Overall, numerous reasons were cited for not considering, or not attaching a priority to, year-round on-street bike lanes. Additional cost and potential liability issues were a concern if year-round maintenance were to be carried out. While several respondents observed that there is minimal if any demand for bike lanes in winter because of the harsh conditions, meaning that municipal councils do not feel they are a priority considering the cost. Barrie, which does plow the bike lanes, does not have a separate account for budgeting snow removal for bike lanes (bike lane implementation and maintenance costs are included in their road maintenance and snow removal budget), but estimate the operating cost of a bike lane to be equivalent to that of an additional road lane, as approximately $13,900 per lane kilometre per year, or $4,100 per lane kilometre per winter.

Saint John also noted in their response that some bike lanes are on roads which are not high priority for snow clearance and where packed snow is acceptable. However, while motorized vehicles may be able to drive on packed snow it would present a hazard for cyclists, so if the bike lane were to be open in winter the classification and snow clearance priority of the whole road would need to be upgraded.

While several survey respondents noted that all-year bike lanes would be a positive development, only Fredericton and Brandon, along with Barrie where there already are all-year lanes, appear to be considering implementing these. However, all respondents do have or are planning to implement on-road bike lanes despite constraints that, in most cases, mean they cannot be used year-round. Therefore, seasonal restrictions do not appear to be a barrier to implementation of on-road bike lanes, based on the prevailing practice in cities comparable to Sault Ste. Marie.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the assessment of existing conditions, guidelines for implementation and maintenance, and practices in other municipalities, the City of Sault Ste. Marie should move forward with implementation of on-road bike lanes identified in the Cycling Master Plan. All other communities surveyed have implemented or plan to implement on-road bike lanes, despite most of them having no plans to maintain them through the winter. Therefore, the prevalent current practice for cities comparable to Sault Ste. Marie is seasonal bike lanes.

We recommend a similar system of seasonal lanes for Sault Ste. Marie. Over time, these can be expanded to a more extensive and interconnected network with consideration for all-year operation depending on the extent of demand. In many similar communities the demand for all-year bike lanes is so low as to be outweighed by the cost of their implementation. However, it is important to establish rules and clear indications of when the lanes are open or whether they will be maintained, so that potential users are aware of the situation. Codifying the periods of availability in bylaws as well as posting signs is a way of communicating and confirming this.

If on-road bike lanes are to be installed, they would benefit from the application of guidelines and recommendations that have been identified in our review of best practices. These include implementing a reporting program so as to be able to quickly address deterioration of lane quality and potential hazards to cyclists, clearing and sweeping lanes in spring as soon as they are reopened to remove accumulated debris, following Ontario and TAC guidelines for bike lane widths and markings, including the use of materials that will not become slippery in wet conditions, and avoiding or clearly identifying bike lane obstacles such as catch basins and resurfacing ridges. The ongoing maintenance procedures and schedules should be established before implementing each lane.

Overall, bike lanes should form a connected network (which can include connections to off-road and shared routes), rather than being isolated, in order to provide safe routes through the city for cyclists and enable fulfilment of the goals and objectives identified through the cycling TMP and the public opinion survey.

APPENDIX D-1: Bike Lane Survey Questionnaire

Sault Sainte Marie Bike Lane Snow Clearance Questionnaire

On behalf of the City of Sault Sainte Marie, HDR Corporation is investigating maintenance practices with regard to bicycle lanes in winter followed by other medium-sized Canadian municipalities that experience extensive snowfall. We would appreciate it if you could take a minute to answer a few questions regarding your experience with bike lanes maintenance:

1. Does your municipality have on-road bike lanes?

If you do have on-road bike lanes:

2. How extensive is your bike lane network (approximate length or number of corridors)?
3. Are they delineated with paint, or symbols, or both?
4. Do the bike lanes remain open for the entire year, or only seasonally?

If you have all-year bike lanes:

5. What is your approach to clearing on-road bike lanes of snow?
6. Is there a dedicated operating budget available for maintenance to account for snow clearing, or is it reallocated from the existing budget as required?
7. How much does your municipality spend on an annual basis to maintain the on-road bicycle lanes? Has the addition of bicycle lane maintenance prompted budget increase?
8. What is the estimated cost for maintaining and operating a 1 km of on-road bicycle-lane in your municipality? (if known)

If you have seasonal bike lanes:

9. What are the periods for which the bike lanes are open?
10. Do you have a bylaw or other official documentation establishing the rules for when bike lanes are open and maintained? Is it possible for us to get a copy of this? Is there someone we could contact for more information about it?
11. In the winter are the bike lanes used for snow storage?
12. What prevents you from allowing all-year operation (e.g., cost, legal issues)?
13. Is all-year operation something you have considered implementing?
14. Were there any public complaints about the lack of maintenance through the winter?
15. Are you aware of any other municipalities that have on-street cycling facilities that are not-maintained during the winter? If so, do you have the name of someone I can contact at these municipalities?

If you do not have on-road bike lanes:

16. Does the prospect of higher operating & maintenance costs associated with on-road bike-lanes serve as a deterrent to you installing bike lanes?

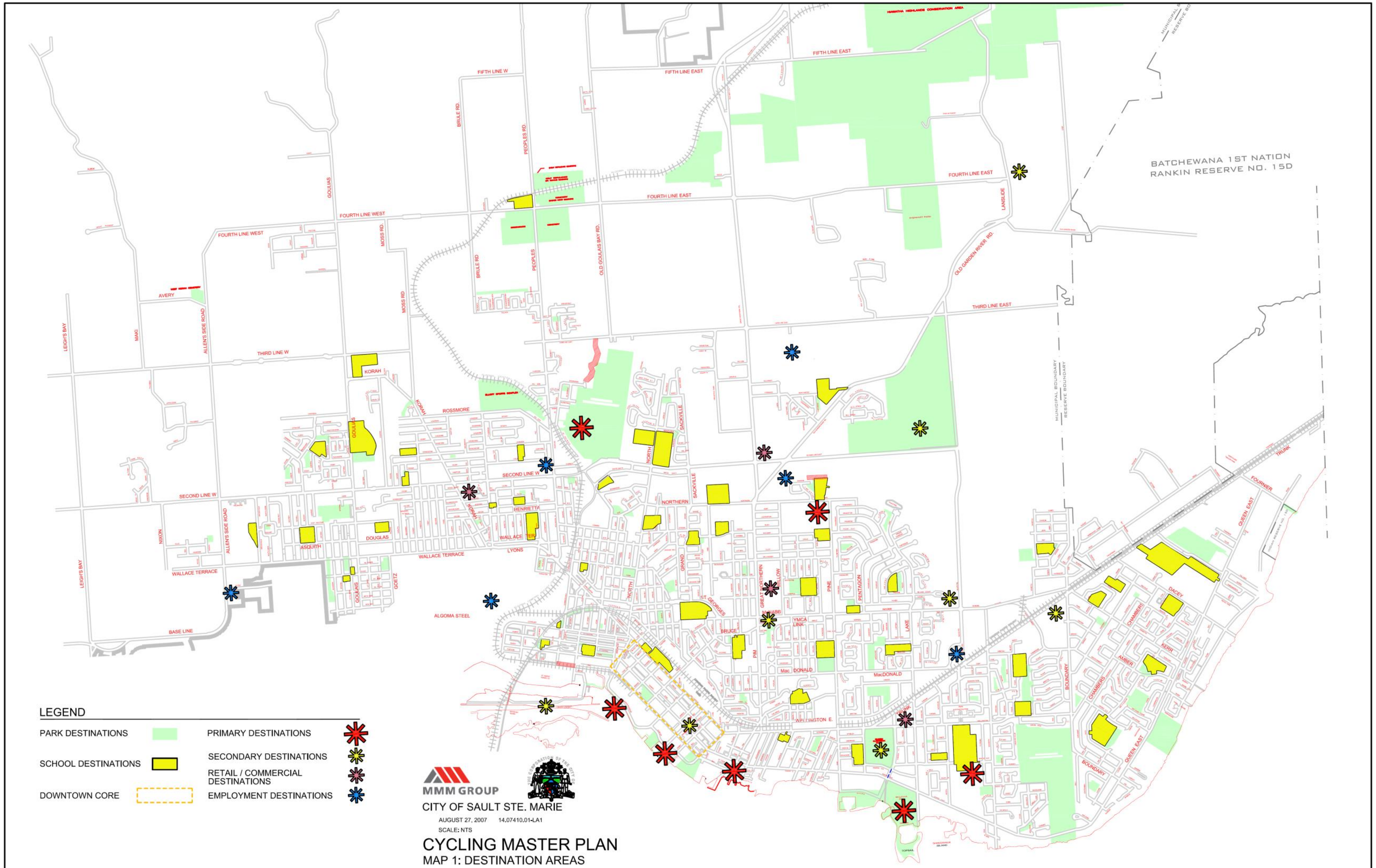
APPENDIX D-2: Bike Lane Survey Responses

	Location	Timmins	North Bay	St John	Fredericton	Barrie	Thunder Bay	Prince Albert	Brandon
1	Does your municipality have on-road bike lanes?	Yes, but very few locations.	Yes	Yes	Yes	Yes, please refer to attached link for route information.	Yes	Yes	No
	If you do have on-road bike lanes:								
2	How extensive is your bike lane network (approximate length or number of corridors)?	The on-road bike network is located along a section of Airport Road and Lafleur Drive. Less than 10 kilometres.	3 km each way. There are also approximately 10 km of separated parallel bike lanes (combine with sidewalks)	20 km of lanes	45 km of lanes	Please refer to map at http://www.barrie.ca/Living/ParksTrails/Trails/Documents/Bikes_Trail_Park_Map.pdf	30 km (8 major corridors)	One corridor about 1km in length	One will be implemented soon.
3	Are they delineated with paint, or symbols, or both?	Delineated with paint, but no symbols.	Paint and symbols.	Paint and symbols (symbols not always maintained, some with signs)		The City has a combination We delineate and have signed routes	We use the diamond, arrow, and bike symbols. As well as regulatory signage.	These are delineated by paint and signs	Not applicable
4	Do the bike lanes remain open for the entire year, or only seasonally?	Open seasonally only.	Open seasonally only.	Note officially closed, but are not maintained in winter	Seasonally, open when the snow goes away	All year	Open seasonally only.	They are not a priority in snow plowing and therefore are only open seasonally	Future lane anticipated to be maintained year-round through normal plowing
	If you have all-year bike lanes:								
5	What is your approach to clearing bike lanes of snow?	Not applicable	Not applicable	No special attention is given (not cleared as part of maintenance)	Not applicable	Winter control on roads is performed in accordance with the Minimum Maintenance Standard for Municipal Highways as prescribed by O. Reg 239/02 of the Municipal Act. Inasmuch as the bike lanes do not run through full road sections of road we clear with the road section to the curb. There is often a time lag in pushing banks back beyond the main travel lanes simply due to accumulation of snow and operational capacity (time, equipment and space to move the snow to). As a practice, parking lanes and other lanes like bike lanes do not have a formal level of service defined at this time.	Not applicable	Bike Lanes are not a priority and are therefore not cleared	Not applicable
6	Is there a dedicated budget available for maintenance to account for snow clearing, or is it reallocated from the existing budget as required?	Not applicable	Not applicable	Not applicable	Not applicable	Snow clearing and snow lifting has many specific accounts. There are not specific accounts for snow clearing of bike lanes.	Not applicable	Not applicable	Not considered at present. Additional costs for stencils, signs and painting have been considered.

	Location	Timmins	North Bay	St John	Fredericton	Barrie	Thunder Bay	Prince Albert	Brandon
7	How much does your municipality spend on an annual basis to maintain the on-road bicycle lanes? Has the addition of bicycle lane maintenance prompted budget increase?	Not applicable	Not applicable	Not applicable	Not applicable	On-road bike lanes are included in the general operating budgets for the road, and are not separately accounted for. Specific pavement marking, sign, surface operations, moving of temporary barriers etc. are not broken out at this time. It is reasonable to base expenditures on an operating cost of a bike lane to be that of an additional lane (based on the character of the roads on which they are constructed and other factors). Bike lanes have not yet prompted a specific budget change or increase. Unless very specific activities or significantly expensive activities are added, the incremental added lane would be unlikely to prompt a budget increase	Not applicable	Bike lane maintenance is done out of regular maintenance operations and it is not known at this time what that cost would be	Not applicable
8	What is the estimated cost for maintaining and operating a 1 km of on-road bicycle-lane in your municipality? (if known)	Not applicable	Not applicable	Not applicable	Not applicable	The best available estimate for the operating cost of a bike lane would be that of an additional road lane. The rationale for this is that it would require an additional pass of operational activities such as sweepers, it is perhaps less in area, but has additional signs and pavement marking, etc., hence a reasonable assumption would be equivalent to a travel lane. The annual operating cost per lane kilometre of roads reported to OMBI (reporting year 2011) is $13,867. The winter operating cost is $4,082 per lane kilometre.	Not applicable	Not applicable	
	If you have seasonal bike lanes:								
9	What are the periods for which the bike lanes are open?	Completely weather dependent and at users judgement	They can be used when weather allows, but are not sanded or maintained.	Not officially closed, but are not maintained in winter	Seasonally, open when the snow goes away (on average May to November)	Not applicable	May 1 to November 15 - Generally coincides with our snowfall and removal schedule	Until the snow falls and after the snow melts	Not applicable
10	Do you have a bylaw or other official documentation establishing the rules for when bike lanes are open? Is it possible for us to get a copy of this? Is there someone we could contact for more information about it?	No bylaw in place	No	No, there is no official mention of bike lane closures	No bylaw - trails master plan mentions seasonal lanes but there is not other notification	Not applicable	065-2011 and 110-2007 General Traffic bylaws. 079 - 2012 addendum to 065-2011 to include dedicated bicycle lanes from May 1 to November 14	We are currently looking at adding more rules and regulations with regards to Bike lane and Bike use within the City into our Traffic Bylaw, however this has not yet been passed	Not applicable
11	In the winter are the bike lanes used for snow storage?	Yes	Sometimes--they may be cleared if the full road is cleared	Sometimes - medians first, then lanes could be used	Policy is to plow to curb; lanes may be used for storage after heavy snowfall	Not applicable	Yes	Yes	Not applicable

	Location	Timmins	North Bay	St John	Fredericton	Barrie	Thunder Bay	Prince Albert	Brandon
12	What prevents you from allowing all-year operation (e.g., cost, legal issues)?	Harsh winters would make it very hazardous to mix cyclists and motorists on the roads that have room for cyclists.	Extra cost would be required, and there is no real demand for them in winter	Cost issue. Some roads with bike lanes are priority 4 for clearance which means can allow packed snow, but if bike lanes were to be maintained road priority would also by raised	Cost and liability issues; they are not marked as closed, so if there is no snow cyclists could still use them	Not applicable	Operating costs, justifying numbers of users	Cost, council priorities	No concerned / aware of issues
13	Is all-year operation something you have considered implementing?	No	No	No, would require extra costs in snow removal	Yes, there are financing and liability issues to be considered, but may move to all-year lanes in future	Not applicable		At this time Council has not supported this idea	Not applicable
14	Were there any public complaints about the lack of maintenance through the winter?	Yes, but sidewalks are in more demand	There may be occasional complaint but there are more requests to open the off-road trails to use for walking	No, complaints tend to be about not sweeping in spring markings needing refreshing, cyclists seem to accept snow situation	Yes, some people do complain	Not applicable	Yes - we do get regular complaints from a small number of individuals	Year	Not applicable
15	Are you aware of any other municipalities that have on-street cycling facilities that are not-maintained during the winter? If so, do you have the name of someone I can contact at these municipalities	No	No	No	Provided St. John contact	Not applicable	Not aware of any	Not applicable	Not applicable
	If you do not have on-road bike lanes:								
16	Does the prospect of higher operating & maintenance costs associated with on-road bike-lanes serve as a deterrent for you installing bike lanes?	No	There have been discussions, but considering the low number of cyclists it has not seemed practical.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	No

APPENDIX D-3: Cycling Master Plan Map



City of Sault Ste. Marie

December 2013

Transportation Master Plan

Roundabouts

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HDR

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1. INTRODUCTION

Roundabouts are becoming more popular in North America based on the multiple opportunities to improve safety and operational efficiency and provide other benefits. In this paper we document a review of the safety and operational considerations as well as the site selection process applicable to Sault Ste. Marie. This Discussion paper is part of the 2013 Transportation Master Plan process.

2. BENFITS OF ROUNADBOOUTS

Roundabouts are used widely in Europe and have been gaining popularity and acceptance across North America due to their numerous operational benefits. While operating within their capacity, roundabouts generally have lower overall delay than signalized and all-way stop-controlled intersections. The delay reduction is most notable in off-peak periods. Through reduced delay, and stop-start traffic movement at roundabouts, a reduction of vehicular emissions and noise is often a side benefit.

Paradoxically, while roundabouts often reduce delay compared with a traffic signal, they also tend to reduce speed using geometric design rather than relying on traffic control devices (which can easily be ignored).

Because roundabouts can handle U-turns, they can help justify the elimination of left turn movements at each individual access along a roadway. The central island and splitter islands offer the opportunity to provide attractive entries or centerpieces to communities through the use of landscaping, monuments and art (which again can have a slowing effect on traffic).

Exhibit 1: Roundabout in Picton, ON (HDR)

Due to the reduction in vehicle speeds, roundabouts can improve pedestrian crossing opportunities. Additionally, the splitter refuge islands provide the ability for pedestrians to focus on one directional stream of traffic at a time.

Roundabouts can provide a transition area between high speed rural and low-speed urban environments. They can also be used to demarcate commercial areas from residential area (i.e. used as a "Gateway").

A roundabout, while requiring extra property *at* the intersection, may well reduce the amount of property required on the approach to the intersection as left and right turn lanes are not required. These differences are illustrated in **Exhibit 2**. Often the net amount of property required for a signalized and roundabout intersection is fairly similar albeit in different locations. In the long term, although the up front construction costs might be higher, a roundabout typically has a lower operating and maintenance costs that a traffic signal due to the lack of traffic signal equipment.

Rendering of a Roundabout

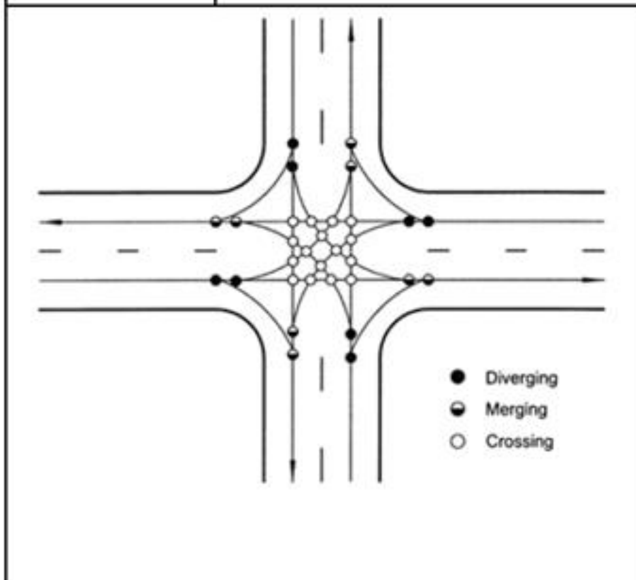
Rendering of a 4 legged Signalized Intersection

Exhibit 2: Property requirements

Extensive studies of comparing functionality and operational performance between signalized intersections and roundabout have shown that a roundabout performs better in all five comparative categories of the Level of Service, delay, queuing, traffic flow assignment and enforcement of speed limits.

Functionality / Operations

Description	Signalized Intersection	Roundabout
Level of Service (LOS)	The Volume/Capacity ratio governs the LOS. This is related to the number of lanes required for the anticipated traffic volume.	The LOS for a two lane roundabout is considerably higher than that of a signalized intersection with two through lanes.
Delay	Delay due to the signal control such as stopping at red light is unavoidable. Separate turning lanes & additional through lanes will reduce the delays.	Reduced delays due to the continuous flow of traffic including the left turn movements.
Queuing	Separate left turn lanes might be required to reduce queues and delays in through traffic.	Less queue & continuous queue move up due to moving traffic.
Traffic Flow assignment/control	Signal controlled flow. Controls assignment of vehicular flow by pre-timing operations.	Yield controlled. Vehicles entering must yield to traffic which is already inside the roundabout. Channelized approach & one way traffic eliminates the need for exclusive left turn lanes.
Speed Limits	Traffic speed controlled by posted speed limits.	Road geometry ensures vehicles slow down when entering, circulating & exiting the roundabout.



3. OPERATIONAL CONSIDERATIONS

3.1 Capacity

In the UK, an order of magnitude capacity figure for a single lane roundabout is about 2,000 veh/hr entering the intersection. A 2-lane roundabout is likewise considered to have a capacity of around 4,000 veh/hr. However, in North America research has shown that so far, roundabouts are not currently achieving these high values; therefore, order of magnitude capacity values of around 1,700 veh/hr and 3,500 veh/hr are more realistic figures at this time. Of course, these are rule of thumb numbers and a detailed operational analysis is required to confirm.

3.2 Operational Analysis

Currently, North America does not have home-grown operational analysis software available. SYNCHRO claims to analyze roundabouts but it is, at this time, not adequate. Available software includes:

- ARCADY – A UK software from Transport Road Laboratory (TRL) which bases its analysis on the geometry of the roundabouts using empirical research done in the UK over many years.
- SIDRA – An Australian software (SIDRA Solutions) which is also based on empirical research albeit focused on a gap analysis relationship.

US research has shown that both software programs tend to over-estimate capacity in the North American situation; however, they are necessary tools to obtain an indication of operational performance.

Jurisdictions such as the Ministry of Transportation (Ontario) also rely on more sophisticated simulation software such as VISSIM if they have doubts about a particular case.

4. SAFETY CONSIDERATIONS

The chief advantage of a roundabout is traffic safety; this aspect is discussed in more detail in this section. Roundabouts are safer than traditional signalized and two-way stop controlled intersections because the collisions most likely to result in an injury or fatality (head-on, angle, and turning collisions) are eliminated. The remaining collision types which can occur at roundabouts (sideswipe and rear-end) are often the least severe with respect to personal injury.

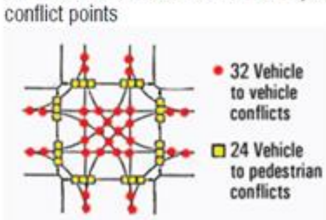
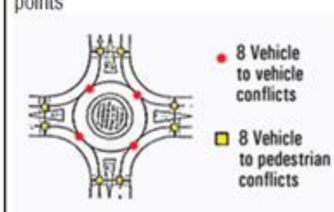
Roundabouts can also result in a reduced speed of vehicles through the intersection thereby also reducing the severity of collisions when they occur. Numerous studies have quantified this change in safety and results from *NCHRP Report 572 Roundabouts in the United States* are summarized in **Table 1**.

Table 1: Percent Collision Reduction When Converting to a Roundabout

Control Before	Environment	All Collisions	Injury Collisions
Signalized	All	47.8%	77.7%
Two-way Stop	Rural	71.5%	87.3%
	Urban	29.0%	81.2%
	Suburban	31.8%	71.0%
	Urban / Suburban	30.8%	74.4%

Note that the safety benefit has been shown for converting signalized and two-way stop controlled intersections; otherwise, roundabouts have improved both overall crash rates and, particularly, injury crash rates in a wide range of settings (urban, suburban, and rural) and previous forms of traffic control (two-way stop and signal).

Safety Impact

Description	Signalized Intersection	Roundabout
Conflict points	32 vehicle to vehicle & 24 vehicle to pedestrian conflict points 	8 vehicle to vehicle and 8 vehicle to pedestrian conflict points 
Severity of collision	The higher speed of vehicles entering the intersection could lead to severe collisions in situations such as driving through red light, late left turns, etc.	Reduces injury collisions by 76%. Lesser occurrence of severe collisions due to lower speed limits & ROW/Yield for vehicles that are inside the roundabout.
Frequency of collision	Higher than roundabouts due to higher number of conflict points, high vehicle speeds, etc.	Less than signalized intersections due to lower speeds that result in shorter breaking distances, longer decision making times, etc.
Pedestrian safety	Designated pedestrian signal phase facilitates pedestrian crossing.	Delay in securing acceptable gaps to cross the road. Travel path for a roundabout is longer and does not accommodate visually impaired users. The pedestrian need to be aware of vehicles at the roundabout.
Cyclists safety	Dedicated lanes can be provided.	No dedicated lanes provided. Cyclists are encouraged to use pedestrian crossings.
Driver attention at the approaches	Driver needs to be aware of all the surrounding traffic movements.	Driver needs to be aware of vehicles to the left before entering the roundabout.

5. SITE SELECTION

A *Roundabout Screening Tool* used by the Region of Waterloo is attached to this memo (**Appendix E-1**). This form is used to determine some of the key features around the decision making process. The Region of Waterloo and an increasing number of municipalities now follow a policy that says "if a traffic signal is warranted, then a roundabout should also be evaluated and compared with a traffic signal" before going ahead. If a roundabout looks promising at an intersection using this screening tool, a more detailed *Intersection Control Study* is undertaken that involves a comparative life-cycle analysis that trades off the slightly higher construction costs of a roundabout with the higher ongoing maintenance costs and collision costs associated with the traffic signal (an example is attached as **Appendix E-2**).

Typical criteria for locating roundabouts include the following:

- **Rural Intersection** – Roundabouts have been demonstrated to significantly reduce fatal and injury crash experience at rural intersections with high speed approaches.
- **Commercial Development** – Roundabouts are an aesthetically pleasing alternative to traffic signals.
- **New Residential Subdivisions** – Low cost, low noise, low maintenance intersection.
- **Schools** – Roundabouts slow traffic and when/if located near a school, can reduce traffic and provide a median refuge for pedestrians (a single lane roundabout is preferred in these situations).
- **Gateway Treatments** – Announcing a change of area from rural to urban or from commercial to residential; or a community focal point, etc.
- **Intersections with High Delay** – A roundabout can often offer significant advantages to either a traffic signal or stop controlled intersection with respect to reducing delay.
- **Interchanges** – Roundabouts can make more efficient use of a bridge structure between ramp terminals thereby reducing construction costs.

6. CONCLUSIONS

It is suggested that the City adopt a policy of considering a roundabout alternative at an intersection wherever the following instances occur[1]:

1. The City is considering implementing a new traffic signal.
2. The current traffic control type is signalized or two-way stop controlled.
3. There is a history of injury or fatal collisions.
4. There is a history of head-on, angle, or turning collisions.
5. There is a history of speeding at the intersection.
6. There is a transition point between high and low speed roads or a rural and urban area.
7. A gateway feature is required as an entry to a community.
8. Traffic calming is required.
9. An industrial area where 2 or 4-way stops would incur unnecessary stopping.

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[1] *Note: Much of this memo uses information from various US sources, including:*
NCHRP Report 672 – Roundabouts – An Informational Guide, 2nd Edition;
FHWA-SA-10-006 – Roundabouts, Technical Summary
NCHRP Report 572 – Roundabouts in the United States
NCHRP Report 674 – Crossing solutions at roundabouts and channelized turn lanes for pedestrians with vision disabilities
FHWA-SA-10-007 – Mini-roundabouts Technical Summary
Information from the Region of Waterloo is also included and is generally available on their website - http://www.regionofwaterloo.ca/en/gettingaround/roundabouts.asp*. Their website also includes educational material for drivers.*

APPENDICES

Appendix E-1

Roundabout Screening for New Dundee Road, Region of Waterloo

Region of Waterloo

REGION OF WATERLOO
ROUNDABOUT FEASIBILITY
INITIAL SCREENING TOOL VERSION 1.0

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a modern roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road improvements including auxiliary lanes, traffic control signals, four-way stop, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed to an Intersection Control Study to further investigate in more detail the feasibility of a roundabout.

1) Project Name/File No.:

   Doon South Community Road Network Review.

2) Intersection Location
   (Street/Road Names, distance from major intersection, etc.):

   New Dundee Road at Robert Ferrie Drive, approximately 2000 m from the intersection of New Dundee Road at Homer Watson Boulevard.

3) Brief Description of Intersection
   (Number of Legs, Lanes on each leg, total AADT, AADT on each road, etc. Attach or sketch diagram showing existing and horizon-year turning movements.):

   The proposed intersection will have a one lane cross section for the northbound approach. The eastbound and westbound approaches will have a two lane cross section. The southbound approach will have a shared through / right turn lane and an exclusive left turn lane. This lane arrangement assumes the intersection is under signal control. Existing and 2018 total traffic volumes are attached. Assume ADT is 10 times the PM peak hour.

4) What operational problems are being experienced at this location?

   This is a proposed intersection. For the 2018 horizon when with stop control on the northbound and southbound approaches, the northbound and southbound approaches operate at a level of service F and significantly exceed available capacity.

5) Is it a new intersection or is it a retrofit of an existing intersection? If existing, what is the existing traffic control?

    This is a realignment of an existing intersection.

6) Is the intersection in the vicinity of a railroad crossing *or another intersection?* If so, how close and what type of traffic control exists at the adjacent intersection(s)? Will queues be a problem?

    The nearest intersection is the intersection of New Dundee Road at Reichert Drive, which is approximately 153m to the west. That intersection currently has three approaches and is stop controlled for the northbound approach. Current RODEL analysis for the 2018 total traffic conditions indicates that EB queues at the roundabout will not block the intersection of New Dundee Road and Reichert Drive.

7) Would the intersection be located within a coordinated signal system?

    No.

8) Would the intersection be located on a Preferred Roundabout Corridor?

    No.

9) Is the intersection located within a corridor that is scheduled for improvements in the 10 Year Transportation Capital Program? What is the ultimate cross-section of the approach roads?

    No. The ultimate cross-section of New Dundee Road would be four-lanes if intersection is signalized, or two-lanes if intersection is a roundabout. Robert Ferrie Drive will have two-lanes.

10) What is the collision history of the intersection over the past five years? Is there a collision problem that needs to be addressed?

There have been no reported collisions at the intersection of New Dundee Road and Robert Ferrie Drive provided by the Region. The mid-block collision statistic between Reichert Drive and Pinnacle Drive was 4 injury collisions over a 5 year period.

11) Are persons with disabilities or horse and buggies frequent users of this intersection?

No.

12) What traditional road improvements are proposed for this intersection? (eg. traffic signals, all-way stop, auxiliary lanes, etc.) Please attach a sketch of the traditional road improvements. A sample sketch is attached (DOCS #529440).

Widening New Dundee Road to a four-lane cross section has been recommended. Adding a northbound approach with a one lane cross section and a southbound approach with a shared through / right turn lane and an exclusive left turn lane. Attached is a conceptual functional design.

If roundabouts are deemed to be the preferred intersection, configuration at intersections along New Dundee Road has been determined that a two lane cross-section on the mid-block link will be sufficient and would negate the need to widen New Dundee Road to four lanes.

13) If traffic control signals are being considered, are the traffic signal warrants met for the horizon year?

Traffic signals are warranted for the 2018 horizon year.

14) What size of roundabout is being considered for this intersection? (eg. Single-lane, two-lane entry or three-lane entry?) Please attach a Traffic Flow Worksheet and lane configuration diagram. Please attach a sketch showing how a roundabout would “fit” into the right-of-way. A sample sketch is attached (DOCS #529433).

A 60m diameter with two circulating lanes; two-lane flared entry from both directions on New Dundee Road and single lane entry from Robert Ferrie Drive. Attached is a conceptual functional design.

15) 20-Year Life Cycle Cost Estimate

Injury Collision Cost (ICC): $30,000

Discount Rate: (i): 6.0%

20 YEAR LIFE-CYCLE COST COMPARISON		
Cost Item	**Other Traffic Control**	**Roundabout**
Implementation Cost	$851,000	$1,074,000
Injury Collision Cost (Present Value)	$599,000	$169,000
Total Life Cycle Cost	**X $1,450,000**	**Y $1,243,000**

Notes:

- Implementation Cost
  = sum of costs for construction, property utility relocations, illumination, engineering (20%), contingency (20%) and maintenance (5%);
- Present Value of 20 Year Injury Collision Cost
  = expected annual collision frequency x ICC $((1 + i)^{20}-1) / i(1+i)^{20}$
- Monte Carlo Analysis may be required. If so, a range for the implementation cost (i.e. 10%, 50%, 90% probability) is required

Conclusions and Recommendation

A roundabout would be the preferred method of traffic control due to the proximity of the intersection of New Dundee Road and Reichert Drive. The analysis in the previous iTRANS reports shows that the 95th percentile queue reach from the eastbound left turn lane on New Dundee Road required at Robert Ferrie Drive would block the intersection of Reichert Drive. With a roundabout in place, the eastbound queues would not be an issue with Reichert Drive.

Appendix E-2

Intersection Control Study, HDR

Monarch Corporation

Intersection Control Study at Robert Ferrie Drive and New Dundee Road

Kitchener, ON

June 2009

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Project # 4311

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EXECUTIVE SUMMARY

A. Introduction

This intersection control study at the intersection of Robert Ferrie Drive and New Dundee Road was undertaken by iTRANS Consulting for Monarch Corporation to satisfy Condition No. 6 of the Regional Municipality of Waterloo's Conditions of Draft Plan Approval for Topper Woods Stage 3A (30T-07202) in the City of Kitchener.

The temporary intersection of Robert Ferrie Drive at New Dundee Road was constructed as a stop-controlled "T" intersection with the stop sign located on Robert Ferrie Drive. In the future, the permanent intersection will be relocated easterly approximately 20 m.

Lands to the south of New Dundee Road are designated for Arterial Commercial uses. While there is no Site Plan under consideration at this time, it is anticipated that the driveway for a future Commercial Block will be established opposite the permanent location of the Robert Ferrie Drive extension, to create a cross intersection.

Robert Ferrie Drive will be constructed to an urban standard cross section, including sidewalks, boulevards and curb and gutter. The posted speed on New Dundee Road is 80km/h adjacent to the intersection. The posted speed on Robert Ferrie Drive will be 50km/h. There is no existing development located on the four quadrants fronting the intersection. In the future, there is expected to be multiple-use residential in the northwest quadrant, a stormwater management facility in the northeast corner and commercial uses are proposed on the south side of New Dundee Road in the respective quadrants. There are currently no sidewalks and bicycle lanes in the vicinity.

This study is being carried out to investigate the feasibility of a roundabout at Robert Ferrie Drive and New Dundee Road as the future forecast traffic volumes will warrant traffic signals at this intersection. The quantitative criteria used as part of this study to compare traffic signals and a roundabout include:

- Safety performance for all users
- Operational performance for motorists
- Estimated capital costs (construction plus property)
- Life cycle costs (including injury crash and operating costs)

B. Conclusion

Based on the analyses of safety performance, operational performance, and the comparison of capital cost, and life cycle costs, the preferred alternative is a roundabout. The life cycle costs of a traffic signal are $321,000 higher than a roundabout at this location.

The recommended roundabout has an inscribed circle diameter (ICD) of 55 metres and double circular lanes. West and east approaches have two entry and exit lanes, whereas, the north and south approaches have two entry lanes and a single exit lane.

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Tables

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1. INTRODUCTION

1.1 Background

This intersection control study at the intersection of Robert Ferrie Drive and New Dundee Road was undertaken by iTRANS Consulting for Monarch Corporation to satisfy Condition No. 6 of the Regional Municipality of Waterloo's Conditions of Draft Plan Approval for Topper Woods Stage 3A (30T-07202) in the City of Kitchener. The site location is shown in **Exhibit 1**.

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- Safety performance for all users
- Operational performance for motorists
- Estimated capital costs (construction plus property)
- Life cycle costs (including injury crash and operating costs)

1.2 Traffic Signal Lane Configurations

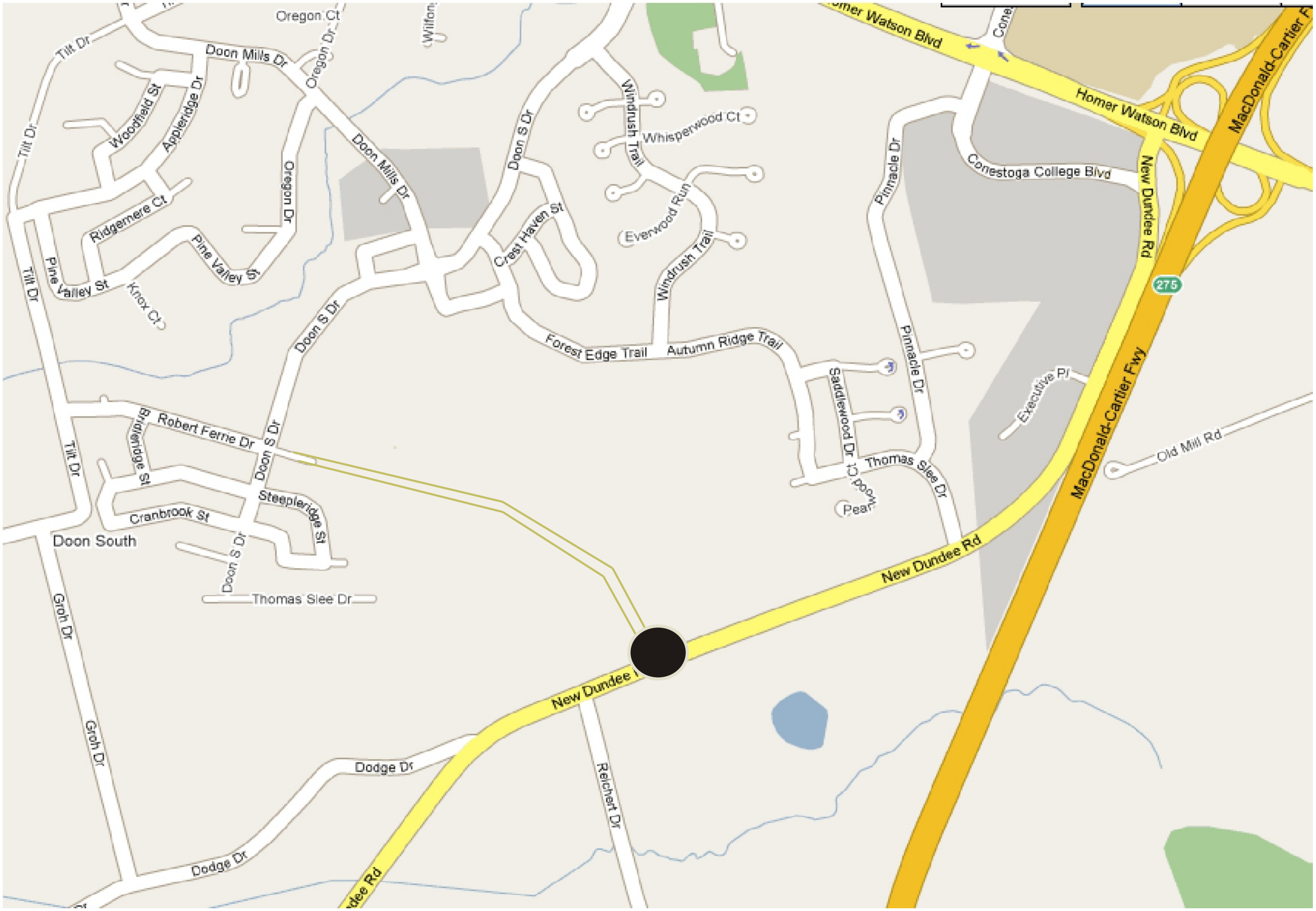
Existing lane configurations at the intersection of Robert Ferrie Drive and New Dundee Road are as follows:

- Eastbound and westbound on New Dundee Road have a single approach lane
- Southbound on Robert Ferrie Drive has a single approach lane

Future lane configurations were obtained by using Synchro 7 software based on the forecast traffic volumes at this intersection for the horizon year 2018. The traffic volumes were developed as part of the ***Doon South Community Road Network Review Report***, completed by iTRANS Consulting Inc., in November 2008.

- Eastbound: 1 left turn storage lane, 1 through and right shared lane
- Westbound: 1 left turn storage lane, 1 through lane, 1 right turn storage lane
- Northbound: 1 left turn storage lane, 1 through and right shared lane
- Southbound: 1 left turn storage lane, 1 through and right shared lane

Refer to **Exhibit 2** for details.



- Study Intersection

Not To Scale

Exhibit 1
Site Location

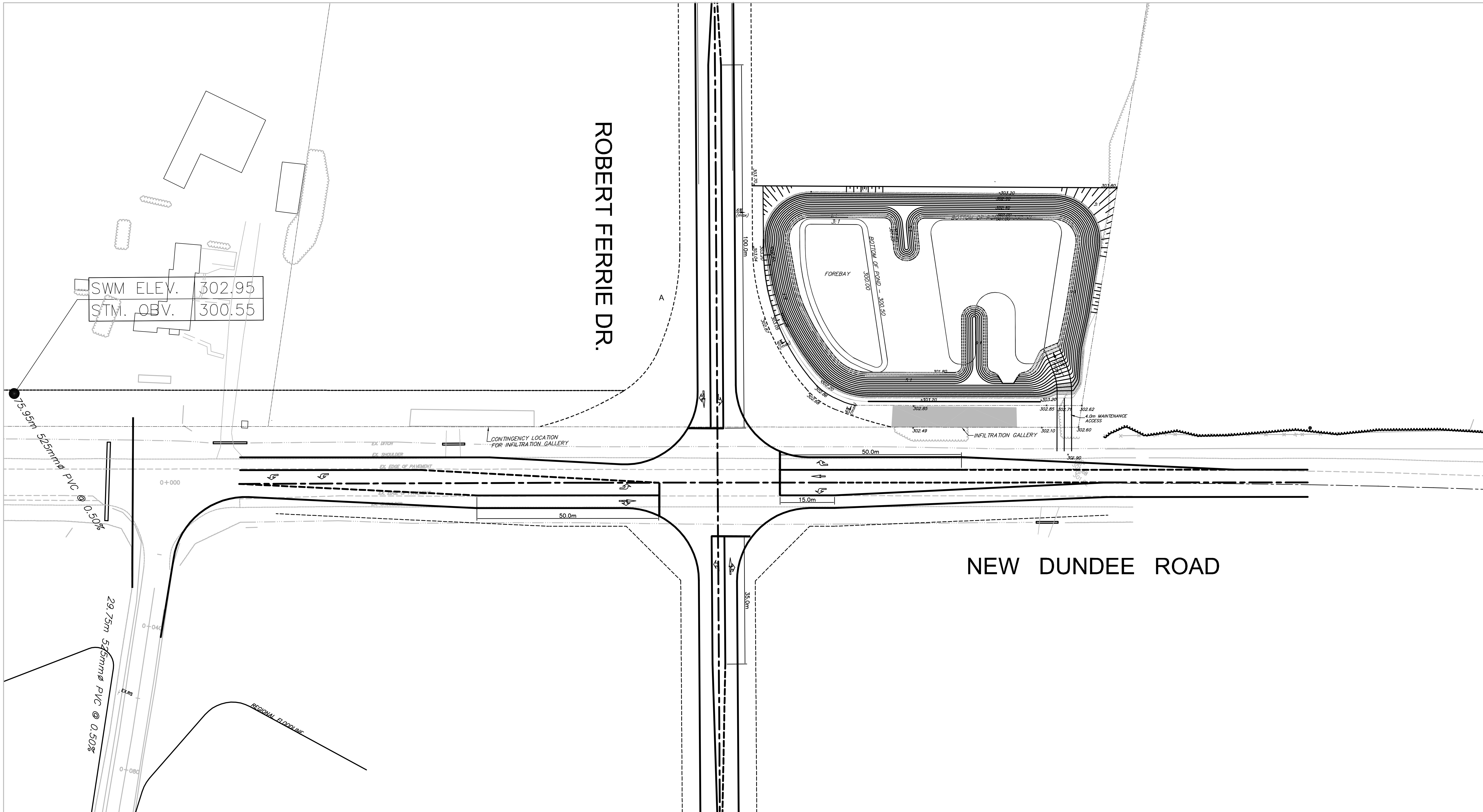


Exhibit 2
Traffic Signal Lane Configurations

Scale: 1:1000

June 2009

iTRANS
Project #4311

1.3 Roundabout Concept Development

The initial roundabout concept for the intersection of Robert Ferrie Drive and New Dundee Road was developed as part of the ***Doon South Community Road Network Review*** that was completed by iTRANS Consulting Inc. in November 2008. RODEL (ROundabout DELay) computer software was used to determine capacity, initial lane requirements, and other geometric aspects.

Through several iterations, an ultimate layout for the roundabout was developed. The proposed roundabout has an inscribed circle diameter (ICD) of 55 metres and double circular lane. West and east approaches have two entry and exit lanes, whereas, north and south approaches have two entry lanes and a single exit lane. The entry deflection is less than 70 metres on all approaches, which means that the fastest-path speed within 50 metres of the yield lines is under 41 km/h.

Using a WB-20 design vehicle turning template, the entries and exits of the proposed roundabout layout were checked to ensure a low probability of path overlap. The intersection is relatively flat, therefore, the sight lines, vertical design, and grading should not pose any significant challenges.

The ultimate layout will provide sufficient capacity for the 2018 horizon year and beyond.

The roundabout layout is shown in **Exhibit 3**.

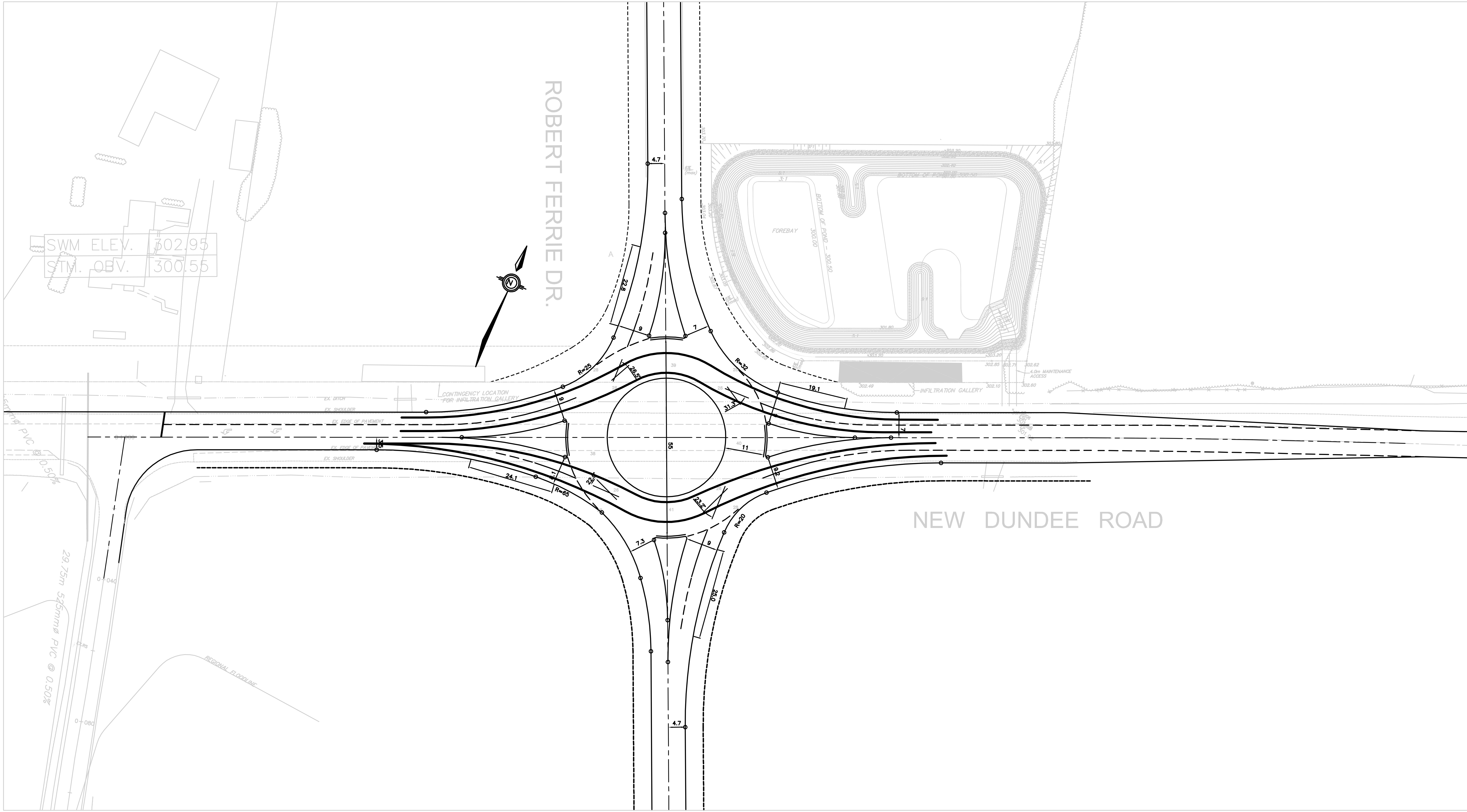


Exhibit 3
Roundabout Layout

Scale: 1:1000

June 2009

iTRANS

Project #4311

2. PERFORMANCE EVALUATION

2.1 Analysis Inputs

The peak hour traffic volumes for the 2018 horizon year were obtained from the ***Doon South Community Road Network Review Report*** completed by iTRANS Consulting Inc. in November 2008.

The existing traffic counts reflect a relatively low truck percentage with an overall 1% for AM peak hour and 2% for PM peak hour. To be conservative, 5 % of trucks on all approaches were assumed.

2.2 Safety Performance

2.2.1 Traffic Signal Injury Collisions

The collision history for this intersection does not exist because the current 'T' intersection was built in 2007 and the proposed cross intersection will be built in future. Therefore, the collision rates for similar intersections will be utilized. In this study, data from the Region on injury crash rates at illuminated, signalized four-leg intersections were utilized. Based on the information provided by staff from the Region, the latest injury rates for a signalized intersection with an entering average annual daily traffic volume (AADT) of 20,000 is 0.17 non-fatal injury crashes/ Million Entering Vehicles (MEV)

Through the Region's permanent count stations, it has been determined that the average ratio of hourly traffic to AADT is 0.068 for the AM peak hour and 0.087 for PM peak hour. Assuming the same ratios in 2018 for this intersection and the average AADT obtained by factoring the two peak hours, the entering AADT would be approximately 28,000 vehicles per day. Accordingly, the predicted 2018 injury collision frequency under traffic signal control is 1.74 collisions per year.

2.2.2 Roundabout Injury Collisions

Under roundabout control, the NCHRP 3-65 method was used to predict injury collision frequency at the intersection of Robert Ferrie Drive and New Dundee Road.

NCHRP 3-65 provides two methods to predict collisions. The first method involves the use of the results of a series of before and after studies of intersections converted from traffic signal or stop control to roundabouts at 55 locations in the US. The outcome from this method is that the average injury crash reduction is 75.8 percent. Therefore, the predicted injury collision in 2018 at the intersection of Robert Ferrie Drive and New Dundee Road would be 0.42 collisions per year under roundabout control.

The second method employed is the use of the intersection level model developed from collision performance at 90 roundabouts:

- For 4-way roundabouts with 1 or 2 circulating lanes, the yearly injury collision frequency would be: $0.0013(AADT)^{0.5923}$.

Using this prediction model, the predicted injury collision in 2018 at the intersection of Robert Ferrie Drive and New Dundee Road would be 0.56 collisions per year under roundabout control.

The injury collision frequency for 2018 that was used for the purpose of this analysis for the intersection of Robert Ferrie Drive and New Dundee Road under roundabout control was determined by averaging the results from the two methods. The outcome is 0.49 injury collisions per year. Therefore, 1.25 injury collisions per year would be reduced by converting the intersection from signal control to roundabout control.

2.3 Safety Performance Comparison

The safety performance has been assessed through societal costs using the predicted collisions and standard cost of $30,000 per injury crash. The annual societal costs associated with injury collisions under the traffic signal control and roundabout control can be calculated as:

$$PC_A = \frac{PC((1+i)^N - 1)}{i(1+i)^N}$$

Where: $PC_A =$ present cost of alternative for injury collisions
PC= Standard cost per injury crash, using $30,000
i= discount rate, 6% (provided by the Region of Waterloo)
N= life-cycle period (assume to be 20 years from 2018)

The results are summarized in **Table 1.**

Table 1: Life Cycle Present Costs of Injury Crashes

Criteria	Traffic Signal	Roundabout	Savings
Annual Injury Collision Frequency	1.74	0.49	1.25
Present life cycle collision costs in 2018	$599,000	$169,000	$430,000

The above safety performance does not include additional saving attributed to property damage collisions given that roundabouts reduce all collisions. Property damage collisions savings are more difficult to quantify. The injury crash savings by roundabout control comparing to signal control are societal savings that are not direct capital savings to the Region.

2.4 Operational Performance Comparison

The traffic signal control was analyzed using Synchro/Sim Traffic 7.0. The lane configurations as discussed in **Section 1.2** as part of the future scenario were used as the basis for this comparison.

The roundabout alternative was modelled at a 50th percentile confidence level using RODEL software.

A comparison in terms of 2018 average approach delay per vehicle and overall level of service (LOS) is summarized in **Table 2**.

Table 2: Comparison of 2018 Average Delay per Vehicle (s) and LOS

Conditions	Traffic Signal	Roundabout
AM Peak Hour		
New Dundee Road EB	33.2	1.8
Commercial Driveway NB	52.7	2.4
New Dundee Road WB	6.4	5.4
Robert Ferrie Drive SB	54.8	3.0
Overall LOS	‘C’	‘A’
PM Peak Hour		
New Dundee Road EB	20.8	3.6
Commercial Driveway NB	41.8	3.0
New Dundee Road WB	19.3	3.0
Robert Ferrie Drive SB	35.5	2.4
Overall LOS	‘C’	‘A’

The proposed roundabout alternative would provide lower average delays under 2018 conditions than the proposed signalized intersection alternative. Even at an 85th percentile confidence level using RODEL, the highest average delay would still be lower than the signalized intersection alternative.

The queue reach review found that all proposed turning storage lengths are sufficient to accommodate the peak hour queues under the proposed signalized intersection alternative.

Under the roundabout scenario, the maximum queue is 2 vehicles and will not impact adjacent intersections, including Reichert Drive.

3. EVALUATION OF ALTERNATIVE COSTS

3.1 Construction and Property Costs

The construction cost of improving the intersection to accommodate the future traffic signal alternative is estimated at $606,000, including a 30% contingency for engineering. The construction cost of the future roundabout alternative is estimated at $760,000, including a 30% contingency for engineering. It is recognized the actual construction costs will depend on the timing of construction, the amount of materials actually required, contractor availability and scheduling, and other factors. To make the cost estimates comparable, the two alternatives used the same assumptions.

Assuming a 5.0 metre offset from the edge of pavement for the future property line to allow for an appropriate boulevard area with enough room for a utility corridor and sidewalk, the signalized intersection will not require additional property beyond the existing ROW. The roundabout alternative will require additional property on both the north and south side of the existing ROW.

The Plan proposed by Monarch Corporation provides sufficient property to accommodate a future roundabout and, as such, there is no cost to the Region to acquire this property. For the purpose of this Study, it is assumed that the Region will require that sufficient property south of New Dundee Road be dedicated as part of any Development approvals for the lands south of New Dundee Road. Accordingly, no cost has been assessed for land acquisition for the roundabout alternative.

In the event that the roundabout is required before the lands to the south of New Dundee are developed, the area of land to be acquired is approximately 0.08 ha (0.20 acres). At an estimated cost of $250,000 per acre, the acquisition cost for the additional lands would be approximately $50,000.

3.2 Overall Costs

A comparison of overall construction, property and life cycle costs is summarized in **Table 3**. A 30% contingency allowance has been made to the construction cost estimates. A 6% discount rate over a 20-year life cycle was used to bring all annual costs to the year 2018. The comparison does not include delay and environmental costs due to differences in emissions and fuel consumption.

Table 3: Comparison of Capital and 20-Year Life Cycle Costs

Cost Item	Traffic Signal	Roundabout
Estimated Construction Cost Including 30 Percent Contingency	$606,000	$760,000
Property Cost	0	0
Injury Crash Cost	$599,000	$169,000
Traffic Signal Annual Maintenance Cost plus Future Replacement(factor to 2018)	$76,000	-
Street Light Installation and Annual Maintenance Cost (bring to 2018)	$5,000	$36,000
Total Cost	**$1,286,000**	**$965,000**

A cost of $3,000 per year for traffic signal maintenance was assumed, and in 15 years it would cost $100,000 to do a complete traffic signal replacement. A cost of $400 per year for street lighting was assumed for the future traffic signal alternative, and a one time capital cost of $20,000 with $1,500 per year for maintenance were used to estimate street lighting for the roundabout alternative.

In terms of total capital, injury and life cycle costs, the preferred alternative is roundabout by a margin of $321,000 over the traffic signal alternative. A roundabout would also result in lower delays to traffic than a traffic signal, and has some advantages in terms of environmental factors and speed control.

4. CONCLUSION

4.1 Summary Evaluation

Table 4 summarizes the findings in terms of the criteria of safety performance, operational performance, construction costs, and 20-year life cycle costs.

Table 4: Summary of Operational, Safety and Cost Evaluation

Evaluation Criteria	Traffic Signal	Roundabout
Annual Injury Crashes by 2018	1.74	0.49
Traffic Operations by 2018	LOS ‘C’	LOS ‘A’
Total Capital Costs	$606,000	$760,000
Capital plus Life Cycle Costs	$1,286,000	$965,000

4.2 Conclusion

Based on the foregoing analyses of safety performance, operational performance, capital cost comparison, and life cycle cost comparison for the Intersection Control Study at Robert Ferrie Drive and New Dundee Road, the preferred alternative is a roundabout.

The recommended roundabout has an inscribed circle diameter (ICD) of 55 metres and double circular lanes. West and east approaches have two entry and exit lanes, whereas, north and south approaches have two entry lanes and a single exit lane.

Appendix E-2A
Capacity Analysis Outputs

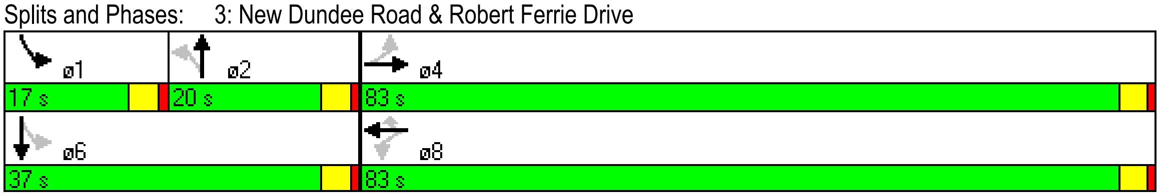
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	934	74	23	278	115	75	15	19	300	15	74
Ideal Flow (vphpl)	1775	1650	1900	1775	1900	1750	1775	1650	1900	1775	1650	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		0.0	30.0		50.0	35.0		0.0	120.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.989				0.850		0.916			0.875	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1672	1618	0	1672	1883	1475	1672	1498	0	1672	1431	0
Flt Permitted	0.567			0.119			0.699			0.517		
Satd. Flow (perm)	998	1618	0	209	1883	1475	1230	1498	0	910	1431	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				115		19			74	
Link Speed (k/h)		80			48			50			50	
Link Distance (m)		1375.9			1399.7			722.1			663.5	
Travel Time (s)		61.9			105.0			52.0			47.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth 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%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	29	934	74	23	278	115	75	15	19	300	15	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	1008	0	23	278	115	75	34	0	300	89	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.08	1.18	0.99	1.08	0.99	1.10	1.08	1.18	0.99	1.08	1.18	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	2	2		2	2	2	2	2		2	2	
Detector Template												
Leading Detector (m)	15.2	15.2		15.2	15.2	15.2	15.2	15.2		15.2	15.2	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	20.0	20.0		20.0	20.0	20.0	20.0	20.0		8.0	20.0	
Total Split (s)	83.0	83.0	0.0	83.0	83.0	83.0	20.0	20.0	0.0	17.0	37.0	0.0
Total Split (%)	69.2%	69.2%	0.0%	69.2%	69.2%	69.2%	16.7%	16.7%	0.0%	14.2%	30.8%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	None	None		None	None	
Act Effct Green (s)	68.4	68.4		68.4	68.4	68.4	11.7	11.7		26.4	26.4	
Actuated g/C Ratio	0.66	0.66		0.66	0.66	0.66	0.11	0.11		0.26	0.26	
v/c Ratio	0.04	0.94		0.17	0.22	0.11	0.54	0.18		0.89	0.21	
Control Delay	7.1	33.9		11.0	7.9	1.6	63.2	29.5		67.4	12.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	7.1	33.9		11.0	7.9	1.6	63.2	29.5		67.4	12.1	
LOS	A	C		B	A	A	E	C		E	B	
Approach Delay		33.2			6.4			52.7			54.8	
Approach LOS		C			A			D			D	
Queue Length 50th (m)	2.0	176.0		1.7	21.6	0.0	16.5	3.2		62.6	2.6	
Queue Length 95th (m)	5.6	#309.5		6.1	35.8	5.9	32.2	12.7		#119.4	15.1	
Internal Link Dist (m)		1351.9			1375.7			698.1			639.5	
Turn Bay Length (m)	50.0			30.0		50.0	35.0			120.0		
Base Capacity (vph)	753	1223		158	1421	1141	205	265		336	540	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.04	0.82		0.15	0.20	0.10	0.37	0.13		0.89	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 103.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 32.8 Intersection LOS: C
Intersection Capacity Utilization 92.9% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: New Dundee Road & Robert Ferrie Drive



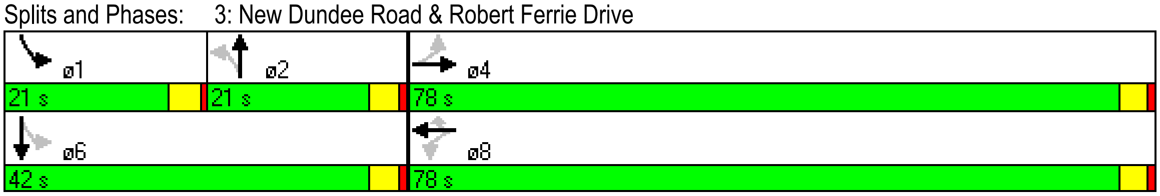
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	94	370	59	26	946	355	62	22	27	273	24	55
Ideal Flow (vphpl)	1775	1650	1900	1775	1900	1750	1775	1650	1900	1775	1650	1900
Storage Length (m)	50.0		0.0	30.0		50.0	35.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979				0.850		0.917			0.896	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1672	1601	0	1672	1883	1475	1672	1500	0	1672	1466	0
Flt Permitted	0.116			0.441			0.706			0.587		
Satd. Flow (perm)	204	1601	0	776	1883	1475	1242	1500	0	1033	1466	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				223		27			55	
Link Speed (k/h)		80			48			50			50	
Link Distance (m)		1375.9			1399.7			722.1			663.5	
Travel Time (s)		61.9			105.0			52.0			47.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	94	370	59	26	946	355	62	22	27	273	24	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	429	0	26	946	355	62	49	0	273	79	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.08	1.18	0.99	1.08	0.99	1.10	1.08	1.18	0.99	1.08	1.18	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0	20.0	20.0	20.0		8.0	20.0	
Total Split (s)	78.0	78.0	0.0	78.0	78.0	78.0	21.0	21.0	0.0	21.0	42.0	0.0
Total Split (%)	65.0%	65.0%	0.0%	65.0%	65.0%	65.0%	17.5%	17.5%	0.0%	17.5%	35.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.5	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		0.5	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Act Effct Green (s)	74.0	74.0		74.0	74.0	74.0	17.0	17.0		38.0	38.0	
Actuated g/C Ratio	0.62	0.62		0.62	0.62	0.62	0.14	0.14		0.32	0.32	
v/c Ratio	0.75	0.43		0.05	0.81	0.36	0.35	0.21		0.65	0.16	
Control Delay	54.8	13.3		9.6	25.0	4.9	52.9	27.6		42.1	12.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	54.8	13.3		9.6	25.0	4.9	52.9	27.6		42.1	12.6	
LOS	D	B		A	C	A	D	C		D	B	
Approach Delay		20.8			19.3			41.8			35.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			B			D			D	
Queue Length 50th (m)	14.8	47.9		2.3	160.7	12.3	13.4	4.6		52.4	3.9	
Queue Length 95th (m)	#49.0	69.8		6.0	224.2	26.9	27.2	16.0		79.0	15.0	
Internal Link Dist (m)		1351.9			1375.7			698.1			639.5	
Turn Bay Length (m)	50.0			30.0		50.0	35.0			100.0		
Base Capacity (vph)	126	992		479	1161	995	176	236		418	502	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.75	0.43		0.05	0.81	0.36	0.35	0.21		0.65	0.16	

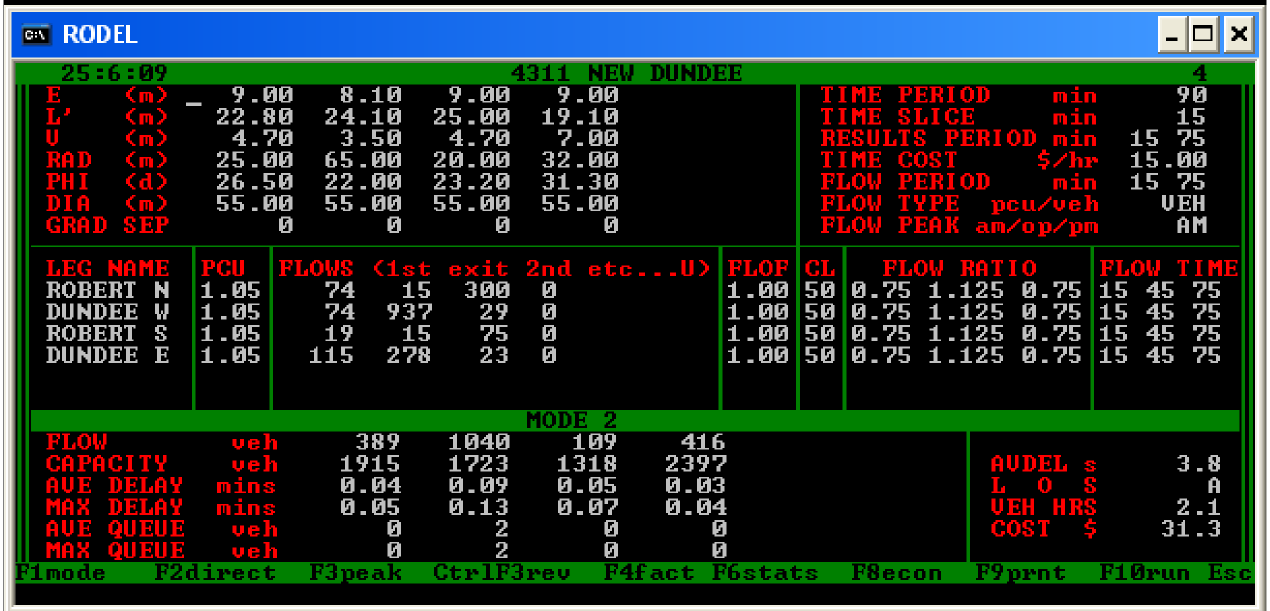
Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 17 (14%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

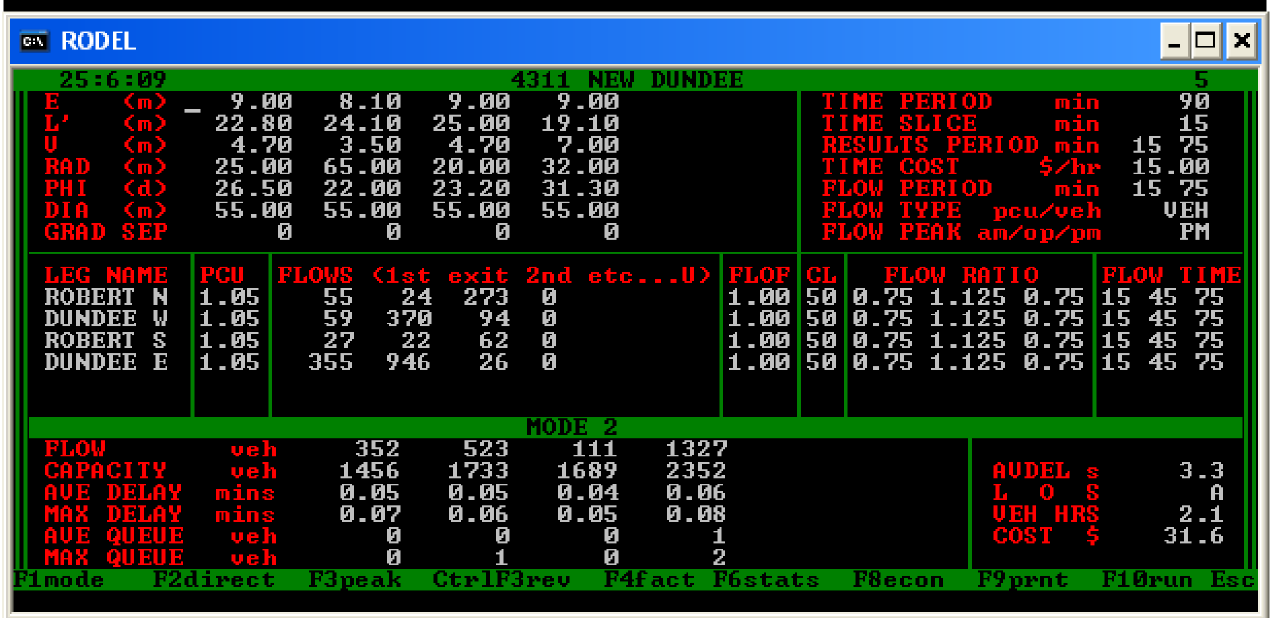
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: New Dundee Road & Robert Ferrie Drive



RODEL SCREEN CAPTURE





Appendix E-2B
Construction Cost Estimates

CONSTUCTION COST ESTIMATE
AT ROBERT FERRIE DRIVE AND NEW DUNDEE ROAD
SIGNALIZED INTERSECTION ALTERNATIVE

ITEM	DESCRIPTION		ESTIMATED AMOUNT
1	SIGNALIZED INTERSECTION		$ 299,606
	LAYOUTS AND BONDS		$ 30,000
	PAVEMENT MARKING		$ 10,000
	TRAFFIC SIGNAL SYSTEM		$ 100,000
		SUB-TOTAL	$ 439,606
		30% Contingency	$ 131,882
		SUB-TOTAL 2	$ 571,488
		6% G.S.T.	$ 34,289
		ESTIMATED TOTAL	$ 605,777

NOTES:
1. THIS ESTIMATE IS BASED ON CONCEPTUAL DESIGN
2. THIS ESTIMATE IS PRELIMINARY AND SHOULD BE USED USED FOR REFERENCE PURPOSES ONLY
3. NO ALLOWANCE HAS BEEN MADE FOR ANY OTHER WORKS THAN THOSE SET OUT HEREIN.

SIGNALIZED INTERSECTION

ITEM	DESTRIPTION	UNIT	ESTIMATED QUANTITY	UNIT RATE	ESTIMATED AMOUNT
1.1	STRIP TOPSOIL FROM THE RIGHT OF WAY AND DISPOSE OFFSITE	m^2	4,900	8.00	39,200
1.2	CUT TO FILL ROADWAY	m^3	2,750	4.00	11,000
1.3	REMOVE DISPOSE OFFSITE EXCESS MATERIAL INCL. EXISTING GRANULAR MATERIAL	m^3	2,750	10.00	27,500
1.4	COMPACT ROAD SUBGRADE	m^2	4,200	0.50	2,100
1.5	SUPPLY, PLACE AND COMPACT GRANULAR 'B', 450 mm DEPTH AT CENTRELINE	m^2	4,200	13.75	57,750
1.6	SUPPLY, PLACE AND COMAPCT GRANULAR 'A' - MINIMUM 150 mm DEPTH	m^2	3,750	8.13	30,469
1.7	SUPPLY AND INSTALL 100 mm DIA PERFORATED SUBDRAINS, EXCLUDING CENTRE MEDIAN	m	450	11.00	4,950
1.8	SUPPLY AND PLACE CONCRETE CURB:				
	a) FULL STAGE CURB AND GUTTER	m	560	45.00	25,200
	b) DEPRESSED FULL STAGE CURB AND REVERSED CURB FOR MEDIAN ISLAND	m	0	45.00	0
1.9	SUPPLY AND INSTALL 150mm DEPTH CONCRETE ISLAND	m^2	0	45.00	0
1.10	SUPPLY AND PLACE HL8 ASPHALT, INCL. ASPHALT CEMENT MINIMUM OF 100mm DEPTH (2 LEFTS OF 50mm)	m^2	3,750	13.50	50,625
1.11	SWEEP, CLEAN AND FLUSH BASE ASPHALT	m^2	3,750	0.25	938
1.12	APPLY TACK COAT TO BASE ASPHALT PRIOR TO PLACEMENT OF SURFACE ASPHALT	m^2	3,750	0.30	1,125
1.13	SUPPLY, PLACE AND COMPACT HL-3 SURFACE ASPHALT - MINIMUM 75mm DEPTH, INCL. ASPHALT CEMENT @ $300 PER TONNE (AS PRICE BASED ON MTO PERFORMANCE GRADE ASPHALT CEMENT PRICE INDEX. UNIT RATE ADJUSTMENT TO BE BASED ON OHMPA / MTO PRICE INDEX AT TIME OF PLACEMENT, ALL HAULAGE CHARGES INCL. IN UNIT RATE PER m^2)	m^2	3,750	13.00	48,750

SUB-TOTAL		
ITEM	SIGNALIZED INTERSECTION	299,606

CONSTUCTION COST ESTIMATE
AT ROBERT FERRIE DRIVE AND NEW DUNDEE ROAD
ROUNDABOUT

ITEM	DESCRIPTION		ESTIMATED AMOUNT
1	ROUNDABOUT		$ 510,363
	LAYOUTS AND BONDS		$ 30,000
	PAVEMENT MARKING AND SIGNS		$ 11,000
		SUB-TOTAL	$ 551,363
		30% Contingency	$ 165,409
		SUB-TOTAL 2	$ 716,771
		6% G.S.T.	$ 43,006
		ESTIMATED TOTAL	$ 759,778

NOTES:
1. THIS ESTIMATE IS BASED ON CONCEPTUAL DESIGN
2. THIS ESTIMATE IS PRELIMINARY AND SHOULD BE USED USED FOR REFERENCE PURPOSES ONL
3. NO ALLOWANCE HAS BEEN MADE FOR ANY OTHER WORKS THAN THOSE SET OUT HEREIN.

ROUNDABOUT

ITEM	DESTRIPTION	UNIT	ESTIMATED QUANTITY	UNIT RATE	ESTIMATED AMOUNT
1.1	STRIP TOPSOIL FROM THE RIGHT OF WAY AND DISPOSE OFFSITE	m^2	6,400	8.00	51,200
1.2	CUT TO FILL ROADWAY	m^3	3,600	4.00	14,400
1.3	REMOVE DISPOSE OFFSITE EXCESS MATERIAL INCL. EXISTING GRANULAR MATERIAL	m^3	3,600	10.00	36,000
1.4	COMPACT ROAD SUBGRADE	m^2	7,100	0.50	3,550
1.5	SUPPLY, PLACE AND COMPACT GRANULAR 'B', 450 mm DEPTH AT CENTRELINE	m^2	7,100	13.75	97,625
1.6	SUPPLY, PLACE AND COMAPCT GRANULAR 'A' - MINIMUM 150 mm DEPTH	m^2	6,500	8.13	52,813
1.7	SUPPLY AND INSTALL 100 mm DIA PERFORATED SUBDRAINS, EXCLUDING CENTRE MEDIAN	m	550	11.00	6,050
1.8	SUPPLY AND PLACE CONCRETE CURB:				
	a) FULL STAGE CURB AND GUTTER	m	400	45.00	18,000
	b) DEPRESSED FULL STAGE CURB AND REVERSED CURB FOR MEDIAN ISLAND	m	520	45.00	23,400
1.9	SUPPLY AND INSTALL 150mm DEPTH CONCRETE ISLAND	m^2	700	45.00	31,500
1.10	SUPPLY AND PLACE HL8 ASPHALT, INCL. ASPHALT CEMENT MINIMUM OF 100mm DEPTH (2 LEFTS OF 50mm)	m^2	6,500	13.50	87,750
1.11	SWEEP, CLEAN AND FLUSH BASE ASPHALT	m^2	6,500	0.25	1,625
1.12	APPLY TACK COAT TO BASE ASPHALT PRIOR TO PLACEMENT OF SURFACE ASPHALT	m^2	6,500	0.30	1,950
1.13	SUPPLY, PLACE AND COMPACT HL-3 SURFACE ASPHALT - MINIMUM 75mm DEPTH, INCL. ASPHALT CEMENT @ $300 PER TONNE (AS PRICE BASED ON MTO PERFORMANCE GRADE ASPHALT CEMENT PRICE INDEX. UNIT RATE ADJUSTMENT TO BE BASED ON OHMPA / MTO PRICE INDEX AT TIME OF PLACEMENT, ALL HAULAGE CHARGES INCL. IN UNIT RATE PER m^2)	m^2	6,500	13.00	84,500

SUB-TOTAL		
ITEM	ROUNDABOUT	510,363

City of Sault Ste. Marie

December 2013

Transportation Master Plan

Road Diet Discussion Paper

Submitted by:
HDR Corporation
255 Adelaide Street West
Toronto, ON M5H 1X9

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HDR

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Exhibits

1. INTRODUCTION

The City of Sault Ste. Marie has initiated a Transportation Master Plan (TMP) Study. The intent of the study is to develop a pragmatic 20 year transportation plan that will assist the City in planning its road and street network in an orderly fashion while ensuring the public funds are spent wisely. The study reflects the City's desire to develop a sustainable transportation system friendly to motorists, pedestrians and cyclists, responsive to the needs of the natural environment and supportive of the City's economy.

The City is currently undertaking an Environmental Assessment study for converting Queen Street east of Pim Street from four (4) to three (3) lanes, providing a centre turning lane and potentially adding cycling lanes and/or on-street parking. This is referred to as a "road diet". The City has requested that during the development of the TMP, corridors be identified and evaluated which could benefit from similar treatments.

The purpose of this paper is to provide Sault Ste. Marie with an introduction to road diets, review lessons learned, provide some examples of where road diets have been successfully implemented, outline a methodology to determine if a particular corridor is suitable for a road diet in Sault Ste. Marie and complete a high level evaluation of potential road diet locations within the City. Each road diet proposed will be the subject of a Class Environmental Assessment (EA). Should the proposed changes significantly change the roadway or impact right-of-way, a Schedule C Class EA is required. If the proposed changes are minor in nature and do not impact right-of-way, a Schedule B Class EA is required.

1.1 Road Diet

A "road diet" reduces the number of lanes and pavement width of a road to improve the road's efficiency, mode share and safety. Typically, this reduction is used to adjust four (4) lane cross-sections to three (3) lane cross-sections (i.e. one (1) lane per direction with a two-way left turn lane) plus cycling lanes as shown in **Exhibit 1-1**. A six (6) lane cross-section may also be reduced to a five (5) lane cross-section which would consist of two (2) lanes per direction with a two-way-left turn lane.

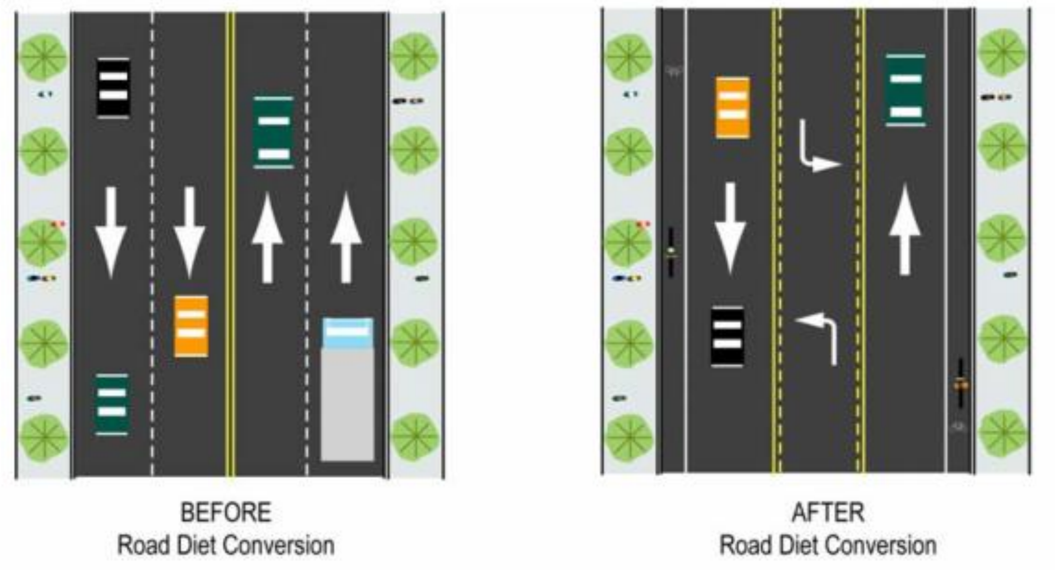

Exhibit 1-1: Before and After Road Diet Conversion (4-lane to 3-lane)

The purpose of reducing the roadway cross-section is to use the right-of-way that has been freed up by the lane reductions for cyclist, pedestrian and transit facilities as well as landscaping. Road diets are a highly-effective infrastructure improvement that can be implemented quickly and at low cost.

Road diets have multiple safety and operational benefits for vehicles as well as cyclists and pedestrians, such as (*References 11, 4*):

- Decreasing vehicle travel lanes for pedestrians to cross, therefore reducing the multiple-threat crash (when one vehicle stops for a pedestrian in a travel lane on a multi-lane road, but the motorist in the next lane does not, resulting in a crash) for pedestrians
- Providing room for a pedestrian crossing island
- Improving safety for cyclists when cycling lanes are added (such lanes also create a buffer space between pedestrians and vehicles)
- Providing the opportunity for on-street parking (also a buffer between pedestrians and vehicles)
- Reducing rear-end and side-swipe crashes
- Improving speed limit compliance and decreasing crash severity when crashes do occur
- Improved livability and quality of life

There are some disadvantages of road diets for traffic operations, such as (*Reference 4, 13*):

- Can reduce roadway capacity if they are not applied at appropriate locations
- In some cases, a road-diet may reduce the amount of on-street parking
- Could cause some route diversion and poor public reception due to unfamiliarity
- Vehicles that require frequent stops such as transit buses will likely impact traffic operations under a road diet option if no bus bays are provided. Through traffic would require stopping for transit vehicles and interfere with flow of vehicular traffic with the single travel lane. This will result in increased travel times and vehicle queuing especially during peak hours

- Decreased travel lanes may impact emergency vehicle response time, as there is limited space for vehicles to yield, and also turning radii can become more constrained especially for large vehicles such as fire trucks with less available road space
- Reduced roadway space may impact access to driveways, particularly where only 2 lanes are provided and large vehicles may encroach onto the oncoming traffic lane. Backing out of driveways may also be a concern. To mitigate such issues, road diets in most cases are recommended with 3-lane cross sections (center-median turning lane) instead of 2-lane sections.

2. LESSONS LEARNED

Road diets have been implemented in many locations throughout the world which have provided some lessons learned. Based on existing road diet implementations, some key factors to consider are:

- **Opportunity:** Road diet projects are a good consideration when there are multiple opportunity factors such as a pavement reconstruction project, presence of an adjacent parallel route, and jurisdictional roadway transfer.
- **Safety Opportunity:** Look for roads with safety issues that may respond to road dieting, such as high correctible crash frequencies / high left turning volumes.
- **Public Request:** If there is a community request to evaluate road safety, road speed, cycling lanes, or a road diet, it is a good opportunity to garner public support for a potential road diet project. These projects are more likely to be successful with both technical and community support.
- **Public Education and Engagement:** Public education is a key element to any road diet project. Emphasis on safety with some small trade-offs for capacity and speed may be required. The use and benefit of two-way left turn lanes should be a large component of this public education, particularly if the jurisdiction has few or no two-way left turn lanes currently existing. Ensure community communication documentation is clear in regard to project goals, performance measures, and expectations. A follow-up evaluation with the community will ensure that the communication strategy has been successful and provides feedback for any future projects.
- **Trial Implementation:** Consider a road diet pilot project which allows the effects on safety to be measured before deciding whether to keep it permanently or whether to add enhanced design features and a more permanent solution. However, a temporary solution may not provide all of the benefits that a permanent solution would provide.
- **Access Management:** With a road diet project, evaluate access management so that driveways may be consolidated or eliminated to improve safety, particularly for pedestrians and cyclists. Median treatments, including grass medians can be installed.
- **Enforcement:** Police enforcement of speeds and proper use of the two-way left turn lane should be increased in the early stages of project implementation.
- **All mode considerations:** Add bus pull out bays when needed. Choose storm water grates that are cyclist friendly. Ensure sidewalks, curb let-downs, ramps and driveways are in good condition. Improve or add landscaping to provide an inviting environment for pedestrians and cyclists. Update signal timings following a road diet.

- **Connectivity:** Check for consistency with adjacent road segments, sidewalk connectivity, and cycling lane connectivity. Pedestrian and cyclist facilities are more likely to be used when part of a larger network.

2.1 Examples of North American Experience

Several successful road diet projects have been implemented throughout the world. A few examples from North America are described in the following sections.

2.1.1 St. George Street – Toronto, Ontario (*References 4, 12*)

St. George Street, located in the City of Toronto, is classified as a minor arterial, which travels through the St. George Campus of the University of Toronto. This street has a high number of pedestrians, but also serves vehicles, delivery trucks, cyclist and skateboarders.

The goals of the St. George Street revitalization project were to calm traffic on this street that flowed through a campus of the University of Toronto, to increase pedestrian and cycling amenities, and in general, to create a more pleasant area. St. George Street was originally a two-lane boulevard which was widened to four lanes in the 1940's. By 1993, the 1.8-kilometre, 14-metre wide stretch of St. George between College and Bloor Streets, was carrying 7,300 cars per day. Because of its proximity to a university campus, pedestrian and bicycle traffic was also relatively high. Prior to the road diet, the street operated with four-lanes during peak hours and as a two-lane road with on-street parking during off-peaks (see **Exhibit 2-1**).

Exhibit 2-1: St. George Street before Road Diet (1994) (*7*)

Although this street was a candidate for rehabilitation, in 1995 the City was not actively pursing a road diet for the street. When a local benefactor challenged the City to beautify the street, the City began a detailed investigation of how to accomplish this. The City realized that the St. George road diet was an opportunity for the City to demonstrate that roads are part of the community and that road and street design can be sensitive to the needs of all users – pedestrians, cyclists and motorists.

The City's objectives were to:

- Increase pedestrian use by enhancing pedestrian space
- Calm traffic
- Enlarge the existing green space

The changes implemented by the road diet were:

- The road operated with two-lanes and on-street parking during all hours
- Bicycle lanes were added
- A narrow painted median was added
- Turn lanes at key intersections were provided
- The pavement width was narrowed (narrowed from 14 m in width to between 9.5 m and 12.2 m depending on the road section) and curbs reconstructed
- The sidewalk area was widened to increase the pedestrian zone
- Mid-block crossing locations were highlighted with alternative pavement materials
- Curb extensions were provided at some locations
- Landscaping was provided

Exhibit 2-2 illustrates the road diet cross-sections for St. George Street, while **Exhibit 2-3** provides an illustration of St. George Street with the completion of the road diet improvements.

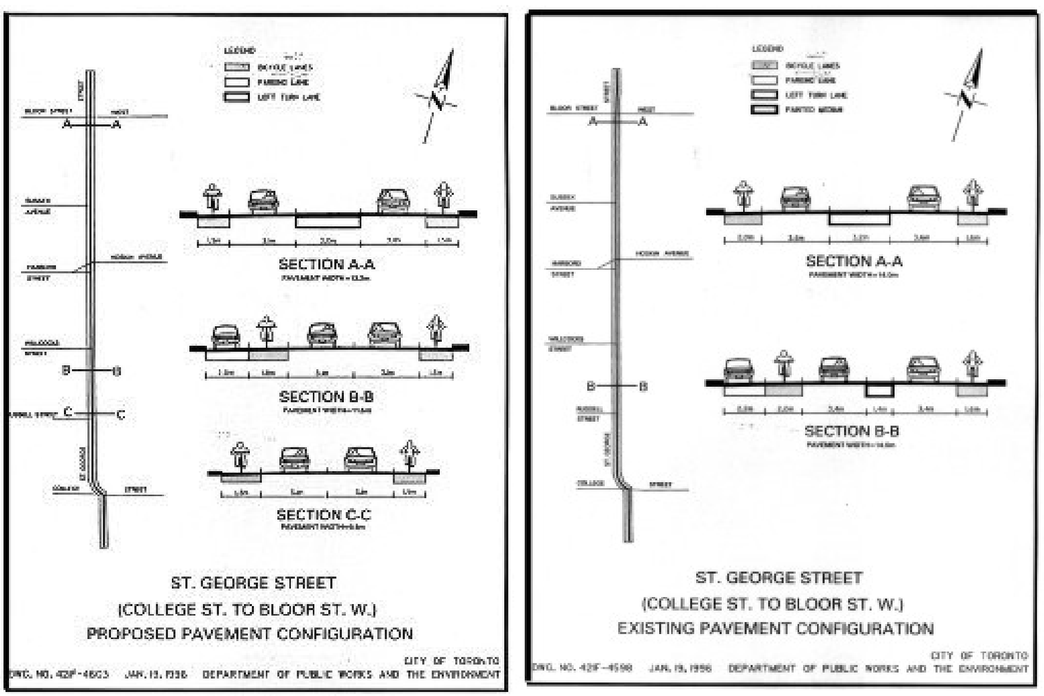

Exhibit 2-2: St. George Street Road Diet Cross Sections (Reference 12)

Exhibit 2-3: St. George Street – After Road Diet (*Reference 4*)

The results of the St. George Street road diet include:

- Reduction in speeding due to the reduction in the roadway width
- Traffic collisions decreased by 40% in the six-year period following the road narrowing
- By revitalizing the street and making it more efficient, St. George was able to carry as much motor traffic as it always had, at lower speeds, while providing more space for pedestrians and cyclists. After the revitalization of St. George, bicycle volumes increased by 7% – from 1,500 cyclists per day to 1,600.
- Improved quality of life in the area
- Narrowing of the pavement and widening of the sidewalk has significantly enhanced pedestrian crossing areas. Pedestrians have been encouraged to cross at specific locations with shorter crossing distances.
- Landscaping has provided a buffer and enhanced the urban environment.
- Domino effect. Based on the success of the St. George road diet, the City narrowed other roads in Toronto including Lansdowne and Oriole Parkway. Dundas Street East was also narrowed from four lanes to two and cycling lanes were added.

A web survey garnered feedback on the livability of the street with the road diet implementation, and the response from respondents included:

- Satisfaction with the number of lanes and street width
- Some desired the removal of all vehicles
- Recognition of increased safety due to slower vehicle speeds
- Desire for further improvements including more crosswalks and more greenery

2.1.2 Davenport Road – Waterloo (*References 6, 5*)

Davenport Road, between Northfield Drive and Lexington Road is a 2 kilometre road classified as a major collector. The original cross-section had four lanes that carried around 10,000 to 12,000 vehicles per day in 2010. There was an existing transit route on this road. There are various potential pedestrian destinations including the Conestoga Mall, and the City's main transit terminal on the west side of this mall.

There were safety concerns on this roadway due to high vehicle speeds and the road curvature which resulted in limited sight distances. A high number of collisions, which were thought to be caused by speed of traffic and the horizontal curvature of the road, few pedestrian crossing opportunities and no cycling facilities led to this road diet project. **Exhibit 2-4** illustrates the cross-section of Davenport Road prior to the implementation of the road diet.

Exhibit 2-4: Davenport Road before the Road Diet (*Reference 6*)

The City's objectives for implementing a road diet on Davenport Road between Lexington Road and Old Abbey included:

- Removing the image of the street as a barrier as it is does not encourage residents to access the green spaces and it is lined with back-lotted homes, providing little landscaping and no shade trees or facilities thereby giving a sense that the vehicle is the dominant mode.
- Improve safety for all road users.
- Optimize the use of the available space.
- Provide facilities to encourage active transportation, transit and decrease single-occupancy vehicle trips
- Improve the overall look and feel of the street

Exhibit 2-5 illustrates the vision for Davenport Road between Lexington Road and Old Abbey based on the road diet approach in order to meet the City's objectives for this corridor.

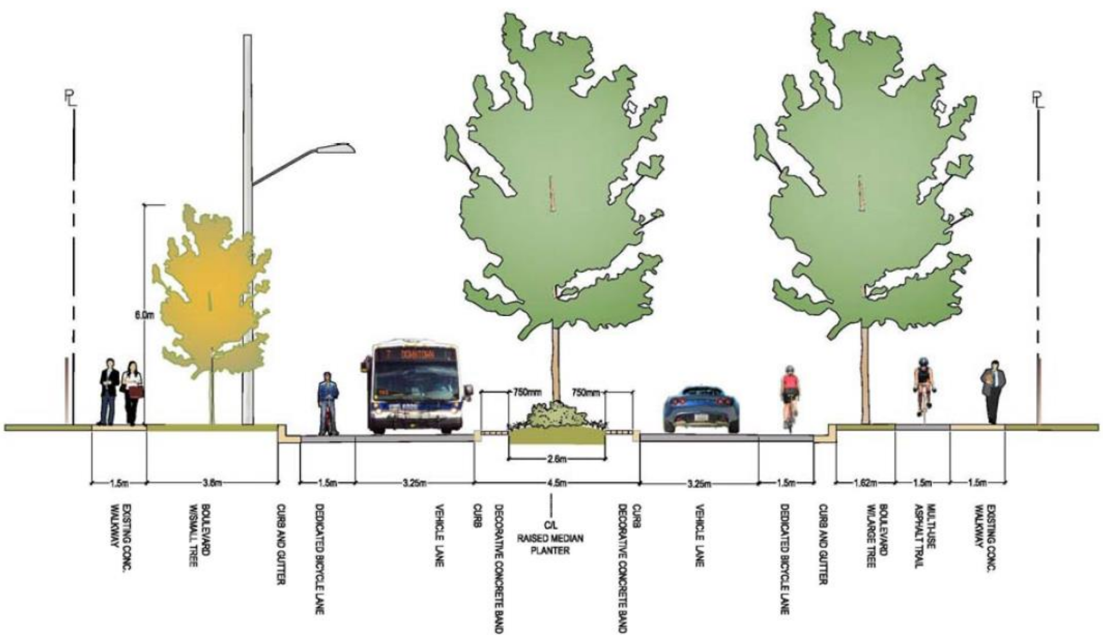

Exhibit 2-5: Road Diet Vision for Davenport Road, Lexington Road to Old Abbey

The changes implemented with this road diet included (see **Exhibit 2-6** to **Exhibit 2-8**):

- Reduced to two-lane cross-section
- On-street bike lanes
- Landscaped medians
- Additional mid-block pedestrian crossing locations
- Zebra marked crosswalks
- Left turn lanes at intersections

Before Road Diet

After Road Diet

Exhibit 2-6: Example of an Intersection Before and After Road Diet Improvements

Before Road Diet

After Road Diet

Exhibit 2-7: Example of Section of Roadway Before and After Road Diet Improvements

Before Road Diet

After Road Diet

Exhibit 2-8: Example of Section of Roadway Before and After Road Diet Improvements

The Davenport Road project, between Lexington Road and Old Abbey, was awarded the 2011 Sustainable Communities Award – Transportation from the Federation of Canadian Municipalities (FCM). The results of this road diet include:

- An 8 km/h reduction in traffic speeds
- Increased pedestrian safety by the installation of eight (8) informal crossings
- Increased cycling safety by the installation of 4 km of cycling lanes
- 14 new transit pads and 6 shelters were added
- Neighbourhood connections were established
- Transportation choice was provided to the community
- 10% reduction in pavement surface
- Reduced snow plow operations
- Reduction in road salt used

2.1.3 Fourth Plain Boulevard – Vancouver, Washington (*Reference 4*)

Fourth Plain Boulevard, located in Vancouver, Washington, is designated as a principal arterial which connects Interstate 5 to West Vancouver. There are a variety of user types on this road including truck traffic as this road was a designated truck route. When the road diet was implemented, a parallel route (Mill Plain Boulevard) was designated as the truck route instead of Fourth Plain Boulevard. The original cross-section had four lanes.

The purpose of the road diet was to:

- Cost-effectively enhance the environment for all uses while minimizing operational or spillover effects
- Develop a safe and efficient transportation system
- Reduce crash frequency and number
- Improve pedestrian and cycling mobility
- Establish a balance between vehicle operations, port freight and neighbourhood livability

The changes implemented with the road diet included:

- No longer designated as a truck route
- Change to three lane cross-section with centre lane as two-way left turn lane

A web survey garnered feedback on the livability of the street with the road diet implementation. The respondents noticed improvements to traffic, safety, and livability. Retail sales analysis found that the commercial area on Fourth Plain Boulevard performed better than comparable areas in the City. This occurred after the road diet and during a recession. Other noted changes included:

- Safety improvements with significant reduction in crashes
- Traffic operations continued adequately without queuing issues
- Respondents noted that the road diet improved traffic issues
- Implementation of a road diet creates a street environment that is calmer and safer


Before Road Diet


After Road Diet

Exhibit 2-9: Fourth Plain Boulevard Lane Configuration – Before and After (*4*)

3. ROAD DIETS IN SAULT STE. MARIE

3.1 Policy Framework

Sault St. Marie has some existing policies that support the principles or elements of road diets. The Official Plan includes policies that support road diets, which include:

- Alternative transportation modes will be considered part of the development approval process for large scale residential, commercial, institutional and industrial projects, and should include provisions for public transit, pedestrian and cycling travel.
- Transit use is to be encouraged and the City may acquire right-of-way for transit purposes.
- Pedestrian travel shall be encouraged. Sidewalks are required on all streets and the City will emphasize the creation of pedestrian friendly environments where feasible.
- On and off road bicycle routes and facilities shall be encouraged and developed. These will be identified in the Cycling Master Plan.

The last Transportation Master Plan (TMP) also has some recommendations that support road diets, in particular, recommendations regarding two-way left turn lanes (referred to as centre turning lanes in the TMP) and cycling traffic. Two way left turn lanes remove left turning vehicles from the flow of traffic which eliminates a potentially major source of delay and reduces the potential for collisions. Bicycle routes should be considered within the context of the Cycling Master Plan and any road construction or reconstruction should take this into account.

The following are recommendations for policies to be used by Sault Ste. Marie for road diet projects. Road diet policies from several cities were reviewed. The City of Calgary policies are very relevant to the Sault Ste. Marie situation. The policies below have been adapted from the City of Calgary Transportation Plan (2009):

- **Planning, Design and Maintenance of Streets with Road Diets**

    1. Any street being considered for a road diet must meet the requirements outlined in **Section 3.2** of this document. Once these requirements have been met, a detailed study that examines the impact to future transportation operations must be completed in order to ensure location appropriateness. Each candidate street for a road diet must be evaluated on a case by case basis and will require a class Environmental Assessment.
    2. In order to be a successful road diet candidate, consideration for the surrounding land uses must be taken, and should incorporate universal access principles.
    3. Depending on the function of the street to which a road diet will be applied, the cross-sectional elements that will be incorporated into the road diet street should be sensitive to traffic composition and adjacent land use context.
    4. Design speed for a road diet street should be no more than 70 km/h with the resulting operating speed being no more than 60 km/h. Operating speed should be communicated to drivers with more than posted speed signs. Cues to drivers to indicate an appropriate operating speed include lane widths, and other cross-sectional elements such as bike lanes and landscaping.
    5. The design of intersections should accommodate the needs of all users safely. This might include provision of bicycle signals heads, loop detectors and designated left turn lanes for cyclists.
    6. Planning studies for road diet street locations should ensure that diverted trips to adjacent routes will not occur as a result of the road diet.
    7. Snow clearing shall be provided for travel lanes and sidewalks, but may not be feasible for any bike lanes.

- **Access**

    1. Driveway accesses on road diet streets should be consolidated or relocated as redevelopment occurs over time, in order to minimize impacts on pedestrian and cycling facilities, while respecting access needs.
    2. Any streets to have a road diet applied should provide adequate access for emergency vehicles, waste and recycling, street maintenance and other city services to meet policy requirements.

- **Green Infrastructure**

    1. With additional right-of-way made available by road diets, green infrastructure should be strongly considered as part of the design to contribute to the environmental health, aesthetics and comfort of all road users.

2. With green infrastructure incorporated into road diet design, consideration should be given to native vegetation and a layered tree canopy. These reduce the urban heat island effect and improve air quality.

- **Collaboration and Public Engagement**

1. When a street has been selected as appropriate for a road diet, residents, businesses and other stakeholders should be engaged and encouraged to participate in the street design development. With this engagement, the public should be educated as to the benefits and drawbacks of road diets so that the future impact to traffic operations will be fully understood before the project is implemented. This is accomplished though the class Environmental Assessment process.

3.2 Guidelines for Selection

Selecting a street for a road diet is about more than considering the street itself. The candidate street is part of a greater network and serves a purpose within that network. Therefore, consideration of that role is important when considering road diet candidates. For example, some streets may have more of a traffic-carrying function. Other streets may provide an important connection within the pedestrian and/or cycling network and have dedicated facilities and a comfortable experience to encourage the use of that facility. Other streets may have an urban design function where more room is required to improve the pedestrian realm and provide streetscaping and tree canopy. It is important to evaluate each candidate road section on a case by case basis. All factors of a particular street must be evaluated in concert with one another to determine the future success or failure of a road diet project prior to its implementation.

3.2.1 Selection Methodology

To aid in determining whether a street is a good road diet candidate, a decision tree was developed as shown in **Exhibit 3-1**. This decision tree illustrates the characteristics that indicate a good road diet candidate. For the average annual daily traffic (AADT) range of 20,000 and 24,000, the decision tree indicates that a review of the road diet on traffic operations should be completed. This review should include specific peak hour turning volume analysis of all of the intersections and driveways along the corridor using Synchro or other comparable modeling software.

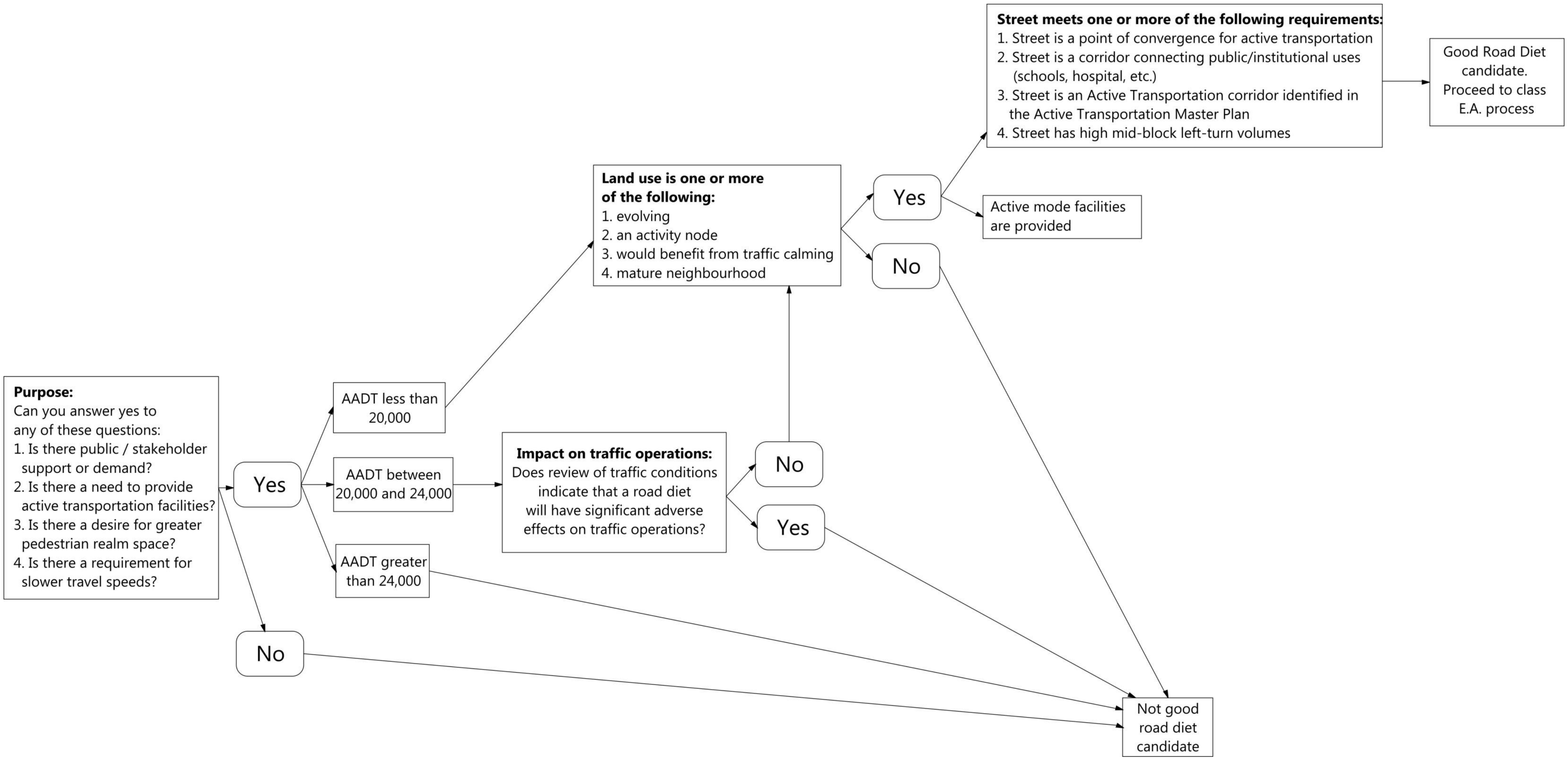

Exhibit 3-1: Road Diet Decision Tree

3.3 Implementation Methods

3.3.1 Design Solutions

There are many different options for road diet cross sections as illustrated in **Exhibit 3-2**.

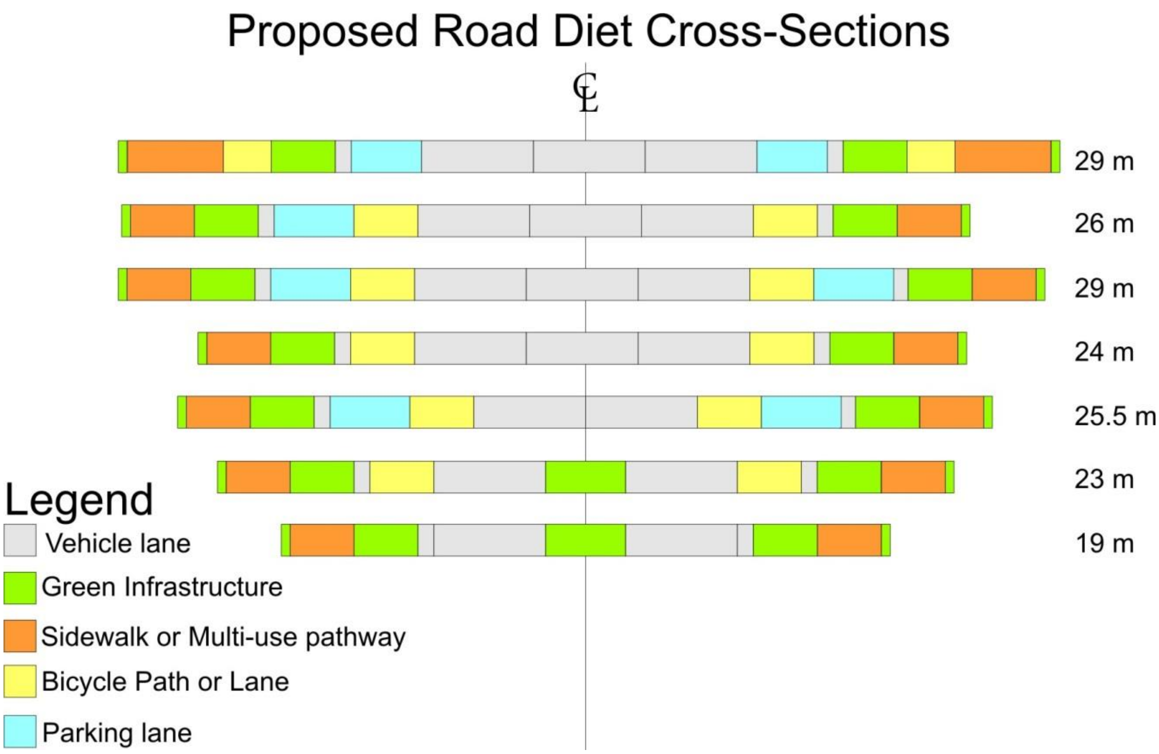

Exhibit 3-2: Proposed Road Diet Cross-Sections

Apart from choosing the appropriate cross-section, implementing the road diet should include three stages that can be completed strategically to ensure a greater chance of success (*Reference 2*):

1. Community education and acceptance for the project:

- Gain an understanding of the needs of a community by generating a list of transportation, economic and safety objectives
- Clearly identify the objectives of implementing the road diet
- Show several alternatives (including road diets) to show and contrast the benefits and limitations of each in regard to the needs of the community
- Demonstrate how a road diet will affect all modes of transportation
- Show both the advantages and disadvantages of road diets. An overstatement of benefits can create falsely high expectations.

2. **Construction:**
   - Ensure as short a construction timeline as possible
   - Maintain access and mobility through the area with proper detours
   - Consider public transportation options through the corridor
   - If possible, select a design that uses the existing curb line
   - Implement the road diet concurrently with other improvements (pavement rehabilitation, utility installation, etc.)
   - Keep users up to date of all the construction changes through a project website (Twitter, Facebook, etc.)
3. **Demonstrate how the road diet fulfilled community objectives while highlighting the benefits of the new corridor:**
   - Measure the success of the desired goals of the road diet and communicate its effectiveness to the public
   - Assess perception of success from the surrounding community through a survey

3.3.2 Other Design Considerations

Providing a friendlier pedestrian environment is one of the positives of road diets. Two-way left turn lanes can be intimidating for pedestrians who wish to cross midblock, even if a marked crosswalk is provided. These situations can also be confusing for drivers. Provision of a pedestrian island refuge can mitigate these challenges if there is a two-way left turn lane continuously down the corridor

More significant intersections should be monitored for turning traffic volumes to determine if dedicated turn lanes, as opposed to two-way left turn lanes, should be provided to reduce driver confusion.

Two-way turn lanes do not need to be provided for the entire length of a corridor. A centre median boulevard may be installed with breaks at required access points.

3.4 Costs and Benefits

There are several benefits to road diet projects. Some benefits are more qualitative than quantitative. This section deals with quantitative benefits.

3.4.1 Impact to Average Speeds

A study was completed using simulation to determine the effect of road diets on average speeds of each vehicle movement. An hourly vehicle volume of 1,000 vehicles was used and an average spot speed of about 50 km/h. Main street movements were found to be reduced by 2%, left-turn movements would be reduced 5%-11%. Access point through movement speeds would be reduced by 6%-9% and access point left-turn movements would be reduced by 15%-21%.

3.4.2 Improved Safety through Crash Reductions

Both crash frequency and severity have been documented to increase with vehicle speed. Therefore, a reduction in speed reduces crash frequency. Several studies have shown that there is a relationship between road diets and crash reduction. The **Table 3-1** shows the crash reduction results from several road diet projects as presented at the Institute of Transportation Engineers (ITE) annual meeting in 2005 (*Reference 4*).

Table 3-1: Crash Frequencies of Select Street Conversions

Location	Street	Road Diet Project Elements	Initial Traffic Volume	Crash Reduction (%)
Vancouver, Washington	Fourth Plain Boulevard	Conversion to two lanes, two way centre left turn lane, bike lanes, ADA ramps, underground utility work	Arterial ~ 17,000 ADT	52
Athens, Georgia	Baxter Street	Conversion to two lanes, two way centre left turn lane, bike lanes, signal modifications	Arterial ~ 20,000 ADT	53
Clear Lake, Iowa	US State Highway 18	Interim project - re-striping to two lanes, two-way centre turn lane, shoulders, temporary signal	State Highway ~ 12,000 ADT	65
Toronto, Ontario	St. George Street	1993 - lanes reduced to two lanes and bike lanes added with median, 1996 - lanes narrowed, new curbs, added landscaping, widened sidewalks	Minor Arterial ~ 7,500 ADT	40
Dunedin, New Zealand	Kaikorai Valley Road	Conversion to two lanes with on-street parking, added cycle lanes and improved median landscaping, turn lanes, pedestrian crossings	Arterial ~ 10,000 ADT	30

3.4.3 Economic Benefits:

There have been noted examples where a road diet has increased the economic vitality of a commercial street. Lake Avenue in Lake Worth, Florida is an example. In the early 1990's, Lake Avenue was a six lane road in decline with many businesses moving out. Traffic accidents and vehicular-pedestrian collisions were growing. Despite initial hesitation about narrowing Lake Avenue to four lanes along some areas and down to two in others, business community is now reaping the economic benefits of the redevelopment effort.

The taxable value of non-exempt properties has increased by 6.5% since the road diet on Lake Avenue to $6.3 million (*10*). Another successful example was described earlier in this paper – Fourth Plain Boulevard (Vancouver, Washington). This showed remarkable economic improvement with a 3.1% increase in the area compared to negative declines of -9.8% to -25% in two other comparable commercial zones in the City.

3.5 Community Impacts and Benefits

As previously noted, there are severable measurable impacts of road diets to communities such as speed reduction, crash reduction and increased economic vitality. In addition to these, there are several qualitative benefits to communities such as increased active mode use due to a more inviting and safer street environment for pedestrians and cyclists, a stronger sense of community due to a friendlier street environment that more easily facilitates access to destinations that front the street, and improved access to all modes through more equitable division of road right-of-way. If community engagement is a process of implementing a road diet project, the community will feel ownership of both the issues and the solutions.

Although road capacity for vehicles is reduced through a road diet, acceptable traffic operations can be maintained with proper and innovative planning.

4. HIGH-LEVEL SCREENING OF POTENTIAL LOCATIONS

The City of Sault Ste. Marie requested that several street locations be examined as potential road diet locations. Existing conditions were reviewed and summarized:

- Average Daily Traffic (ADT)
- Speed Limit
- Function
- Fronting Land Use
- Surrounding Land Use
- Street Role within the greater network

Future changes to the road were also summarized:

- Function: commentary on potential for a road diet
- Fronting land use
- Surrounding land use
- Role: how the street could fit into the greater transportation network as a road diet street

In total, 6 candidate locations were reviewed, and each is currently 4 lanes. However it is noted that there are several very wide 2 lanes roads situated across the city that could be looked at as well. For any road that is a potential road diet candidate, a class Environmental Assessment should be completed prior to implementation.

The road diet candidates reviewed are summarized in the following sections, and include:

1. Wellington Street East (Trunk Rd to Texas Ave)
2. Bennett Boulevard (Texas Ave to Boundary Rd)
3. Northern Avenue East (North St to Pine St)
4. Wallace Terrace (Korah Rd to Brookfield Ave)
5. Goulais Avenue (Second Line W to Korah Rd)
6. Bay Street (Andrew St to Pim St)

The location of these candidates is illustrated in **Exhibit 4-1**.

Potential Road Diet Locations

SAULT STE. MARIE TRANSPORTATION PLANNING STUDY

Legend

Potential Road Diet Location

1. Wellington Street East (Trunk Rd to Texas Ave)
2. Bennett Boulevard (Texas Ave to Boundary Rd)
3. Northern Avenue East (North St to Pine St)
4. Wallace Terrace (Korah Rd to Brookfield Ave)
5. Goulais Avenue (Second Line W to Korah Rd)
6. Bay Street (Andrew St to Pim St)

Exhibit 4-1: Road Diet Candidate Locations

4.1 Wellington Street East

Wellington Street East from Trunk Road to Texas Avenue is a four lane road east of the city centre.

Exhibit 4-2: Wellington Street East

Source: Google Earth Pro

Existing Conditions:

ADT	16,000 vehicles per day
Speed limit	None posted – assume 50 km/h
Function	Arterial Street – connection from residential to 'downtown'
Fronting Land Use	Residential (some backing the road), Churchill plaza commercial, green space, church
Surrounding Land Use	Residential, Sir James Dunn, Algoma University, Recreational Centre
Role	Provides connection through the lower east part of town to the downtown. To the east is an on road cycling/sidewalk route. Multiple activity centres in the vicinity.

Proposed Future Changes:

Function	**Potential road diet project to provide cycle lanes and pedestrian access to fronting and surrounding land uses**
Fronting Land Use	Same as existing conditions
Surrounding Land Use	Additional enrolment at Algoma University
Role	Potential to fill a gap in the future cycling network

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

4.2 Bennett Boulevard

Bennett Boulevard from Texas Avenue to Boundary Road is a four lane road east of the city centre north of the Sault Ste. Marie Golf Club.

Exhibit 4-3: Bennett Boulevard

Source: Google Earth Pro

Existing Conditions:

ADT	11,900 vehicles per day
Speed limit	50 km/h, 40 km/h for school zone when lights flashing
Function	Arterial Street – connection from residential to 'downtown'
Fronting Land Use	Residential (mostly backing the road), Holy Cross Catholic School, Fire Station, Emmanuel United Church
Surrounding Land Use	Sir James Dunn, Algoma University, Grandview Public School, Golf Course
Role	Provides connection through the lower part of town to the downtown. To the east is an on road cycling/sidewalk route. Multiple activity centres in the vicinity.

Proposed Future Changes:

Function	Potential road diet project to provide cycle lanes and pedestrian access to fronting and surrounding land uses.
Fronting Land Use	Same as existing conditions
Surrounding Land Use	Additional enrolment at Algoma University
Role	Potential to fill a gap in the future cycling network

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

4.3 Northern Avenue East

Northern Avenue east from North Street to Pine Street is a four lane road north of the city centre.

Exhibit 4-4: Northern Avenue

Source: Google Earth Pro

Existing Conditions:

ADT	16,000 to 23,000 vehicles per day
Speed limit	50 km/h
Function	Collector street – 4 lane cross-section with sidewalk on north side only for a portion of the length of the street
Fronting Land Use	Residential and Commercial from Wilson Street eastward
Surrounding Land Use	Residential, commercial, hotel
Role	East-west commercial access road

Proposed Future Changes:

Function	Potential road diet project to provide cycle lanes and pedestrian access to fronting and surrounding land uses.
Fronting Land Use	Additional commercial and residential
Surrounding Land Use	Additional commercial and residential
Role	Cycling Master Plan indicates that Third Line to the north will be part of the hub trail and spoke route. Considering the close vicinity of Northern Avenue, this may not be an optimum location for bike lanes as part of a road diet. However, the commercial accesses may warrant left turn lanes (either dedicated or two-way).

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

4.4 Wallace Terrace

Wallace Terrace from Korah Road to Brookfield Avenue is a four lane road west of the city centre.

Exhibit 4-5: Wallace Terrace

Source: Google Earth Pro

Existing Conditions:

ADT	12,900 vehicles per day
Speed limit	Assumed 50 km/h
Function	4 lane arterial street with sidewalk on the south side
Fronting Land Use	North side is mostly residential, south side is fenced rail yard adjacent to the Tenaris Algoma Tubes property, green space or residential
Surrounding Land Use	Residential, Green space, hotel, church
Role	East-west residential access road

Future Changes:

Function	Potential road diet project to provide cycle lanes and pedestrian access to fronting and surrounding land uses.
Fronting Land Use	Additional residential
Surrounding Land Use	Additional residential
Role	Cycling Master Plan indicates that Douglas Street and Asquith Street to the north will be part of the spoke route. Considering the vicinity of these streets to Wallace Terrace, this may not be an optimum location for cycle lanes as part of a road diet. However, if traffic volumes warrant it, the cross-section could be narrowed to 3 lanes.

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

4.5 Goulais Avenue

Goulais Avenue from Second Line West to Korah Road is a north-south four lane road northwest of the city centre.

Exhibit 4-6: Goulais Avenue

Source: Google Earth Pro

Existing Conditions:

ADT	7,500 vehicles per day
Speed limit	Assume is 50 km/h
Function	4-lane Collector Street with sidewalk on east side
Fronting Land Use	Residential backs onto street, green space, Korah College HS, West End Community Centre
Surrounding Land Use	Residential, green space, churches
Role	North-south residential and school access road

Proposed Future Changes:

Function	Potential road diet project to provide cycle lanes and pedestrian access to fronting and surrounding land uses.
Fronting Land Use	Additional residential
Surrounding Land Use	Additional residential
Role	From the Cycling Master Plan, Goulais Avenue planned to be part of spoke route. This makes it an ideal candidate for a road diet.

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

4.6 Bay Street

Bay Street between Andrew Street and Pim Street is a one-way four lane road in the city centre.

Exhibit 4-7: Bay Street

Source: Google Earth Pro

Existing Conditions:

ADT	11,000 vehicles per day
Speed limit	Assumed 50 km/h
Function	4-lane one-way arterial street with sidewalk generally on both sides
Fronting Land Use	Commercial
Surrounding Land Use	Commercial; in vicinity of the waterfront, the marina and major shopping centre
Role	Commercial access road

Proposed Future Changes:

Function	Potential road diet location to promote more economic activity for businesses fronting the street.
Fronting Land Use	Additional residential, additional mixed use
Surrounding Land Use	Additional residential, additional mixed use
Role	From the Cycling Master Plan, Bay Street will be in between the Spoke Route running along Queen Street east and the Hub Trail south of Bay Street. Therefore, this may not be an ideal location for cycling lanes. However, with the commercial land use fronting this street, it may beneficial to the businesses to implement a road diet to encourage more commercial activity.

Recommendations:

This road is a suitable road-diet candidate. Improvement scope to be confirmed through an Environmental Assessment study.

5. REFERENCES

Number	Paper Title	Authors	Date
1	Shedding Excess Width: Establishing Criteria for the Suitability of Candidate Road Diet Projects	Sarah Rocchi, Opus International Consultants and Jennifer Craik, Opus International Consultants	September 2011
2	Safety and Operational Analysis of 4-lane to 3-lane Conversions (Road Diets) in Michigan	Michigan Department of Transportation, Michigan State University, Richard Lyles, PhD, PE, M. Abrar Siddiqui, PhD, William C. Taylor, PhD, PE, Bilal Z. Malik, Gregory Siviy, Tyler Haan	January 10, 2012
3	Capacity Models and Level of Service Analysis in Road Diet	Haiyan Li, Zong Tian, and Yue Zhao	
4	Road Diet Handbook - Overview	Jennifer A. Rosales, PE	September 2006
5	Davenport Road Multi-use Corridor Improvement	Councillor Diane Freeman P. Eng., FEC, City of Waterloo	?
6	City 'Fat' Street Gets Makeover with First Road Diet	Christopher Hodgson P.Eng., City of Waterloo	2010 TAC conference
7	Urban Transportation Showcase Program, Case Studies in Sustainable Transportation - St. George Street Revitalization: "Road Diets" in Toronto	John Niedra, Daniel Egan	May 2005
8	City of Calgary 2011 Interim Complete Streets Guide	The City of Calgary	2011
9	City of Calgary Transportation Plan	The City of Calgary	2009
10	Lake Worth: Reclaiming a Small Downtown. Florida Sustainable Communities Network.	Pollock Shea, C.	1998
11	http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_013.htm		
12	http://www.tc.gc.ca/eng/programs/environment-utsp-st-1171.georgestreetrevitalization.htm		
13	James Street Road Diet Final Report http://www.smtcmpo.org/docs/reports/jsrd_finalreport_2011-10-13_lr.pdf	Wendel Duchscherer Architects & Engineers and GTS Consulting	2011

City of Sault Ste. Marie

November 2013

Transportation Master Plan

Traffic Calming Policy Review

Submitted by:
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TABLE OF CONTENTS

Appendices

Tables

1. INTRODUCTION

The recently approved City of Sault Ste. Marie's Traffic Calming Policy (included in **Appendix G-1**) was developed with the goal of reducing speed and increasing safety on local roads. As part of the Transportation Master Plan, HDR has conducted a review of the policy to firstly ensure its effectiveness and secondly to ascertain its role in the future transportation network.

2. POLICY REVIEW

The policy in general appears to meet the goals for which it was developed and provides an effective means to ensure reduced speeds in certain areas and improve the safety of local roads. To further increase the effectiveness of the policy, HDR has identified some potential revisions, and these are summarized in **Table 2-1**.

In addition, there is no mention of engineering judgement, which should always be a component of the evaluation process. There are many softer criteria that an experienced individual should review beyond just the facts as noted in the policy. Some examples are shown under "Other" as additional criteria that should be reviewed. The City shall consider traffic calming solutions as part of its road upgrade projects at the design stage either through the Design Consultant or through the City's Traffic Consultant.

Finally, it is noted that this review does not consider the history of the policy, its development, issues with implementation, public and staff feedback, which were not available.

Table 2-1: Traffic Calming Policy Suggested Revisions

Section	Comment
1. General	The policy should refer specifically to ITE / TAC's ***Canadian Guide to Neighbourhood Traffic Calming*** as a guiding document. The edition or date of the document should not be noted as an update will be forthcoming within the next year or two.
2. Request for a study	No suggested revisions.
3. Timing of study	No suggested revisions.
4. Consultation	It is stated in this section of the policy that traffic calming would not be recommended on a primary emergency response route. It is suggested that the statement in Section 4 be removed as it partially contradicts item 5.f). Many traffic calming measures do not affect response times.
5. Information to be obtained for Traffic calming/traffic management study (Phase 1)	
a) and b)	No suggested revisions.
c)	Agree that vertical deflection measures should not be placed on roadways exceeding 5% grade. However, non-vertical deflection measures could be used such as pavement markings and horizontal narrowing's.
d)	No suggested revisions.
e)	Although ideal, this requirement would prevent many streets with rural cross-sections from qualifying. It is often these types of streets that need traffic calming to encourage a more pedestrian friendly environment. This requirement should be removed and left to engineering judgement.
f) and g)	No suggested revisions.
Other	Other items that should be reviewed: 1. Roadway geometrics 2. Rural or urban cross-section 3. Rural or urban environment 4. Lighting 5. Cycling routes or lanes 6. Building setbacks 7. Review of parallel streets and other neighbourhood streets 8. Transit routes 9. On-street parking 10. History of complaints
5. Information to be obtained for Traffic calming/traffic management study (Phase 2)	
a)	No suggested revisions.
b)	The phrase "default speed" should be replaced with a discussion of statutory speed limits as mandated by the HTA.
c)	No suggested revisions.
6. Expected timeframe for study completion	No suggested revisions.

7.	The warrant criteria discuss two very different types of issues, but are not clear on their differences. Traffic calming is used to influence speed, whereas traffic management is used to control volume and “cut-thru” traffic. Rarely do both issues exist on the same street. The warrant criteria should address these two separately. Warrant criteria specific to traffic management policies and infrastructure are recommended to be developed in a separate study.
8. Basic consideration for the decision making process	No suggested revisions.
9. Alternatives	No suggested revisions.
10. Reporting to council and implementation of decision	No suggested revisions.
Appendices	No suggested revisions.

Appendix G-1

City of Sault Ste. Marie Traffic Calming Policy

PROCEDURE FOR TRAFFIC CALMING/ TRAFFIC MANAGEMENT STUDIES

1. GENERAL

The purpose of this policy is to set out a specific procedure to analyze and recommend traffic calming and traffic management alternatives based upon engineering principles established by the Transportation Association of Canada (‘TAC’), the Institute of Transportation Engineers (‘ITE’), the Ontario Traffic Manual (‘OTM’), the Highway Traffic Act (‘HTA’) and the Manual of Uniform Traffic Control Devices for Canada (‘MUTCD’).

By applying this procedure to each request the true need for the implementation of traffic calming and traffic management alternatives shall be determined in accordance with these guiding documents.

2. REQUEST FOR A STUDY

In order to request a study of a potential location requiring a traffic calming solution and/or traffic management application one of the following must be done:

a) A request in writing from a Councillor/Resident(s) to Public Works and Transportation Department (‘PWT’) – Traffic Division; or via

b) The submission of an on-line “Traffic Calming Request Form”. This form can be found at the following location on the City’s web-site: www.cityssm.on.ca/open_page.aspx?ID=1071&deptid=1

c) A copy of this form is found in Appendix 1. This on-line form goes directly to the PWT – Traffic Division.

Please note it is preferred that the request be submitted electronically in order to efficiently track the study and communicate results with those involved.

3. TIMING OF STUDY

A traffic calming/traffic management study can be conducted at any time of year, although, it is preferred that the Phase 2 data collection take place between May and October. As discussed further in Section 6, the majority of the study is conducted by PWT - Traffic Division and (data collection is best without potential damage from snow removal equipment.)

4. CONSULTATION

PWT – Traffic Division staff will ensure consultation with the following areas:

a) Affected Councillors/Resident(s)
b) Police Services and Emergency Services; and
c) Engineering and Planning Department.

Once a request is made, a Phase 1 evaluation will be conducted by PWT - Traffic Division.

Consultation with the individual(s) making the request will take place during and after the Phase 1 is complete. If the Ward Councillors are not involved in the request they will be advised of the study.

The results of the evaluation will be shared with the person(s) making the request (Appendix 2) and if it is determined to be a potential candidate location for traffic calming/management – the person(s) making the request, either Councillors/Resident(s) will be advised that a petition should be organized. The petition ***must be successful*** in order for staff to proceed with a Phase 2 evaluation.

The petition shall be evaluated by the Engineering Department. Names of at least 70% of all directly affected property owners must be included in addition to at least 50% of indirectly affected property owners. The extent of the property owners required to be petitioned will be determined by PWT – Traffic Division staff in consultation with the Ward Councillors.

City Police Services and Emergency Management Services ('EMS') shall be consulted during the Phase 1 evaluation for their opinion regarding any interference or issues to the provision of their services. If it is a primary emergency response route this shall be considered a serious negative impact and <u>not</u> recommended for traffic calming/management.

The Engineering and Planning Department shall be consulted to ensure there are no geometric changes that can mitigate traffic concerns as well as discuss whether or not the subject roadway is scheduled for reconstruction within a five (5) year period.

5. INFORMATION TO BE OBTAINED FOR TRAFFIC CALMING/TRAFFIC MANAGEMENT STUDY

PHASE 1 – Confirmation of Prerequisite Requirements

A Phase 1 study will begin once the request is submitted.

a) <u>Road Classification</u> - The subject roadway must be classified as a ***local road***.
Traffic calming is not appropriate or recommended on collector and arterial streets (as defined in the City of Sault Ste. Marie Truck Route Class Environmental Assessment and Transportation Planning Study) as these are designed to serve larger volumes of traffic at higher speeds. Introducing traffic calming measures may result in reduced safety or other negative effects such as short-cutting down local streets not designed to carry higher volumes.

b) <u>Speed Limit</u> - The speed limit on the subject roadway ***must be at least 50 km/hr***.
If the speed limit on the subject road is less than 50 km/hr the enforcement of the speed limit is the traffic calming tool. This will be explained to the Councillor/Resident(s) involved in the request.

c) <u>Roadway Gradient</u> – The gradient of the roadway ***must not exceed 5%***. Weather conditions affect vertical traffic calming devices (ie. speed humps) and it is recommended that they not be implemented on roadways with grades exceeding 5%.

d) <u>Length of Block</u> – The minimum block length ***must be at least 200m*** between controlled intersections or block segments. Sections of streets less than 200m generally do not experience speeding issues as there is insufficient distance to attain excessive speed.

e) Presence of Sidewalk – The subject roadway should have a continuous sidewalk on one side of the street (minimum). This shall ensure pedestrian safety.

f) Emergency Response Route – Indication by Police Services and EMS that the subject roadway is a ***primary EMS response route*** will strongly affect the recommendation of the study.

g) Adjacent Land Use – Consideration will be given to abutting land uses (ie. school, church, playground, recreation center, etc.). These types of facilities typically generate more pedestrian traffic. Also, if the subject roadway is a signed bicycle route consideration will be given in the warrant system.

As a result of a Phase 1 study, the form found in Appendix 2 shall be completed by PWT – Traffic Division staff and the results discussed with person making the request and the Ward Councillors.

PHASE 2 – Collection of Traffic Data

If the Phase 1 study indicated the subject roadway met all the pre-requisite criteria, the Councillor/Resident(s) shall be advised to organize a petition as explained in Section 5. If a successful petition is received, a Phase 2 evaluation will then begin by PWT – Traffic Division staff.

a) Volume – The minimum 24 hour volume on the subject street ***must be at least 750 vehicles per day (vpd)***. In cases where the “cut-through” traffic volume is greater than 30%, no minimum threshold is required. Once traffic volumes exceed 5000 vpd, the road is functioning as a major collector or arterial roadway and traffic calming measures should not be implemented due to the probability of diverting significant traffic volumes to adjacent local roadways.

b) Traffic Speed – The 85^{th} percentile ***must be at least 10 km/hr*** above the posted (or default) speed limit. In cases where the 85^{th} percentile speed is at least 15 km/hr above the posted speed, no minimum volume threshold is required. A traffic speed study must confirm a speeding problem does exist.

c) Collision Study – Collision data will be collected for the subject roadway and consideration will be given for every reported preventable collision in the past three (3) years.

6. EXPECTED TIMEFRAME FOR STUDY COMPLETION

The request for the study is made, in writing or electronically (preferred), to the Public Works and Transportation Department – Traffic Division. The request is the ‘trigger’ for a Phase 1 evaluation.

Phase 1 – Confirmation of Prerequisite Requirements – To complete a Phase 1 evaluation will require between two (2) – four (4) weeks time. Following the Phase 1 evaluation, the summary form will be prepared and provided to the Councillor/Resident making the request which will either confirm that the request is valid for further study or the prerequisite conditions do not exist. If each pre-requisite does not exist it is not a candidate for traffic calming/management.

Phase 2 – Collection of Traffic Data – If all the pre-requisites are present, the Councillor/Resident will be advised that a petition should be organized to confirm public support of a traffic calming/management solution in their neighbourhood. Once a successful petition is received, the collection and interpretation of traffic data will require an additional two (2) to four (4) weeks time.

7. WARRANT FOR TRAFFIC CALMING/TRAFFIC MANAGEMENT ALTERNATIVES

In order to prioritize or rank candidate traffic calming/traffic management locations a warrant system has been established. (It must be understood in order to have a Phase 2 study conducted and then to be scored **all** the pre-requisite conditions **and** a successful petition must be met.)

Every location will be scored out of 100 maximum points as indicated on the form in Appendix 3. The following will guide the recommendations of the study:

- Score 0- 45 – No traffic calming/traffic management alternative required
- Score 46- 75 – A traffic management alternative will be recommended
- Score 75 – 100 – A traffic calming alternative will be recommended

The evaluation shall be completed by PWT – Traffic Division staff and shall include the following:

Traffic Speed Warrant – A maximum of 40 points will be awarded through the examination of the traffic speed data. Three (3) points will be awarded for every km/hr the 85^{th} percentile speed is above 50 km/hr. to a maximum of 40 points.

Traffic Volume Warrant – A maximum of 30 points will be awarded through the examination of the traffic volumes on the subject roadway. Two (2) points will be awarded for every 100 vehicles of daily traffic for local roads to a maximum of 30 points.

Collision Warrant – A maximum of 25 points will be awarded for every reported preventable collision in the past three (3) years on the subject roadway (or subject block).

Pedestrian/Cycling Warrant – A maximum of 5 points will be awarded if the abutting land use generates a high volume of pedestrian traffic.

8. BASIC CONSIDERATION FOR THE DECISION MAKING PROCESS

As noted in Section 7 – Traffic speed, traffic volume, number of collisions and abutting land use designations generating a high pedestrian volume forms the basis for consideration of a traffic calming or traffic management alternative. (Note: all the pre-requisites must be met to be at this point in the decision making process.)

Based on the score obtained through the warrant process (total of 100), prioritization and ranking can occur. It is recommended that this score be used to plan for the implementation of the traffic calming or traffic management alternative. It should be noted, that the implementation will be dependant on the identification of adequate funds.

If the subject roadway is within the five year approved capital construction plan, the traffic data assessment will be provided to the Engineering and Planning Department for their consideration in the design phase of the roadway as there may be cost savings achieved through implementation at the reconstruction stage.

9. ALTERNATIVES

Traffic calming and traffic management alternatives are used in many North American communities. Although the trigger for this procedure was the number of speed hump requests, it should be recognized that there are other alternatives for traffic calming and traffic management – some suitable and others not likely candidates for Sault Ste. Marie.

Appendix 4 of this policy defines many of the terms and alternatives used in this area of traffic engineering, however, the following is a list of potential traffic calming/traffic management alternatives:

- Chicanes;
- Curb extensions;
- Directional closure;
- Full closure;
- On-street parking;
- Raised crosswalks;
- Raised intersections;
- Raised median island;
- Right-in/Right-out island;
- Sidewalk extensions;
- Speed humps;
- Textured crosswalks;
- Diverters/barriers; and
- Roundabouts.

Traffic calming and traffic management should be considered from the planning stage of residential developments and in the design of capital construction and reconstruction projects. Often implementation at these times is most cost effective.

10. REPORTING TO COUNCIL AND IMPLEMENTATION OF DECISION

Once Phase 1 evaluation has been completed for a subject roadway, Ward Councillors/Resident(s) will be informed – if they are not involved in the original request. The results of the Phase 1 study (Appendix 2) will be copied to the Ward Councillors and any resident(s) involved.

The completion of the petition shall be the responsibility of the Ward Councillors and/or the resident(s) making the request. Once the petition is evaluated, the results will be shared with those organizing it.

A Council Report shall be prepared following the Phase 2 evaluation. This shall include the total score (Appendix 3). A report shall be submitted for each subject roadway that undergoes a Phase 2 evaluation.

An annual Council Report shall be prepared which presents to Council all those subject roadways which are recommended for Traffic Calming or Traffic Management alternatives. The recommended alternative shall be identified for each subject roadway(s) studied that year and the report shall include any projects previously recommended and not yet implemented. An associated cost estimate will also be presented for Council's approval to fund and implement.

Appendix 2 – Confirmation of Pre-requisites for Traffic Calming/ Traffic Management Alternatives

Subject Roadway:	
From:	**To:**
Date of Request:	
Date of Last Study:	
Resident/Councillor Making Request:	
Form of Request (Attach):	
Pre-requisite Requirement	**Subject Roadway (Please Check if Pre-requisite Applies)**
Road Classification (Local)	
Speed Limit (min. 50 km/hr)	
Roadway Gradient (Less than 5%)	
Length of Block (Greater than 200 m)	
Presence of Sidewalk (At least one side)	
Recommend Petition be Organized (ie. Roadway meets all Pre-requisite criteria)	
Other Factors to be considered:	
EMS Route **(Not Primary Route)**	
Adjacent Land Use (High Volume Pedestrian Traffic Ie. School, church, etc)	
W.O. No.	

Appendix 4 – Traffic Calming/Traffic Management Definitions

Traffic Calming – As defined by ITE as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users".

Traffic Management – As defined by ITE "attempts to control the volume of traffic movements through the use of regulatory devices and signs such as turn prohibitions or one-way streets or other physical devices such as diverters or full road closures.

Chicane - A series of curb extensions on alternating sides of the roadway, which require the driver to slow down and "zig-zag" from one side of the road to the other to travel along the street. Typically, a series of at least three curb extensions are required.

Curb Extension – Also known as "bump-outs", are horizontal extensions of a curb into the roadway. These may be used to provide higher visibility of pedestrians, shorter walking distances to cross the roadway and to create chicanes, etc.

Directional Closure – A curb extension or vertical barrier extending to appropriately the centerline of a roadway, effectively obstructing (prohibiting) one direction of traffic.

Full Closure – A barrier extending across the entire width of a roadway, which obstructs all motor vehicle traffic movements from continuing along the roadway.

On-Street Parking – The reduction of the roadway width available for vehicle movement by allowing motor vehicles to park adjacent and parallel to the curb.

Raised Crosswalk – A marked pedestrian crosswalk at an intersection or mid-block location constructed at a higher elevation than the subject roadway.

Raised Intersection – An intersection – including sidewalk – constructed at a higher elevation than the adjacent roadway.

Raised Median Island – An elevated median constructed on the centerline of a two-way roadway to reduce the overall width of the adjacent travel lanes.

Right-In/Right-Out Island – A triangular island at an intersection approach which obstructs left turns and through movements to and from the intersecting street or driveway.

Sidewalk Extension – A sidewalk is continued across a local intersection. For a "raised" sidewalk extension, it is continued at its original elevation, with the local roadway raised to the level of the sidewalk at the intersection. For an "unraised" sidewalk extension, the sidewalk is lowered to the level of the roadway.

Speed Hump – A raised area of a roadway, which deflects both the wheels and frame from a traversing vehicle.

Textured Crosswalk – A crosswalk incorporating a textured and/or patterned surface which contrasts with the adjacent roadway.

Diverters/Barriers – These are devices that physically block some or all traffic movements, thereby limiting access or turns to and from side streets and/or driveways or forcing turns at intersections. These can be effectively used to discourage cut-through traffic.

Roundabouts – varying in size, at the neighbourhood level, these may be referred to as "mini-roundabouts", or "intersection buttons", and are raised islands placed at the center of an intersection. The best designs are scaled-down versions of the modern roundabout designs now in use as an alternative to traffic signals on arterials. Roundabouts in neighbourhoods are generally used in place of all-way stop control. The benefits of roundabouts are that they slow traffic and reduce the number of right-angle and turning collisions, while providing a more efficient and environmentally-friendly operations, compared to stop signs. They reduce the number of potential conflict points at an intersection from 32 down to only eight, increasing safety.

85th Percentile Speed – is the speed at which 85 percent of the motorists travel at/or below on a given road.

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File: 2.0
Project # 6976

Memorandum

To: Don Elliott - City of Sault Ste. Marie
Cc:
From: Elizabeth Szymanski - HDR
Date: November 15, 2013
Re: **Road Classification Review and Best Practices**

1. INTRODUCTION

The purpose of this report is to present a summary of the City's current road classification system as well as road classifications from other municipalities to offer as a comparison.

2. CURRENT CLASSIFICATION

The City of Sault Ste Marie current road classifications for urban and rural roads are as follows (as stated in their 1996 Official Plan):

- Arterial Streets – are designed to facilitate the safe movement of large volumes of traffic at moderate rate of speed over extended distances. A design width of up to 36 m shall be protected for arterial streets. Access shall be restricted to other arterial streets, collector streets, and streets serving major commercial / industrial uses. Access from abutting uses shall be controlled and permitted only where approved by the Commissioner of Public Works and Transportation.
- Collector Streets – are designed to facilitate the safe movement of traffic from residential, commercial, and industrial areas to or from the arterial street network. A design width of up to 26 m shall be protected for collector streets. Limited access is permitted from abutting uses subject to the approval of the Commissioner of Public Works and Transportation.
- Local Streets – are designed to facilitate the safe movement of traffic within a residential area. A design width of up to 20 m shall be protected for local streets. Individual access from abutting land uses is permitted. Local streets shall be designed to discourage through traffic, thus, preserving their usage as access to the abutting land uses and enhancing safety.

3. OTHER JURISDICTIONS

3.1 Thunder Bay (Official Plan, May 2005)

- Provincial Highways – under the jurisdiction of the Ministry of Transportation. They are planned, designed, and constructed to carry large volumes of long distance and intra-municipal traffic at relatively high speeds. In addition to all applicable municipal requirements, all development adjacent to provincial highways is subject to the requirements and permits of the MTO.
- Expressways – are planned, designed, and constructed to carry large volumes of long distance and intra-municipal traffic at relatively high speeds. The minimum right-of-way width of an expressway is 36 m, although 50 m is considered desirable.
- Major Arterials – are planned, designed, and constructed to carry large volumes of through traffic at moderate speeds throughout the City. The minimum right-of-way width of a major arterial road is 24 m, although 36 m is considered desirable.
- Minor Arterials – are planned, designed, and constructed to carry moderate volumes of through traffic at moderate speeds throughout the City. The secondary function of a minor arterial road is to provide access to abutting lands. The minimum right-of-way width of a minor arterial road is 20 m, although 30 m is considered desirable.
- Collectors – are planned, designed, and constructed to carry moderate volumes of medium distance traffic travelling at moderate speeds between local and arterial roads. The functions of accommodating traffic movements and providing for land access are of equal importance. Collector roads provide access to secondary traffic generators, such as community, business, and recreation centres, or small industrial areas. The minimum right-of-way width of a collector road is 20 m, although 24 m is considered desirable.
- Local Roads – are planned, designed, and constructed to provide land access and carry low volumes of traffic between points of origin and collector roads. Local roads may be residential, commercial, or industrial in function depending on the predominant land use served. The right-of-way width of a local road is generally 20 m

3.2 City of Greater Sudbury (Official Plan Background Report September 2005)

- Primary Arterial (Major Highway) – Connecting the City with other major centers outside the City and/or inter-connecting settlements. Long distance person or goods movement travel through the City between major activity areas within the City. Traffic movement primary consideration. Intersections with other arterial roads and with collector roads. Access from adjacent property strictly regulated and kept to a minimum (rigid access control). Daily traffic volume between 10,000 and 30,000. Design speed between 60 – 100 km/h. Minimum intersection spacing of 400 m. No on-street parking. Buffers between the roadway and adjacent urban and rural areas.

- Secondary Arterial – Connecting two or more settlements or major activity centers within the City. Connecting between two primary arterial roads or connecting a settlement or activity center with a primary arterial road. Trip origin and/or destination along it, an intersecting tertiary arterial, intersecting collector or a local street intersecting with the collector. Traffic movement major consideration. Intersections with other roads. Access from adjacent property strictly regulated and kept to a minimum. Daily traffic volume between 5,000 and 20,000. Design speed between 50-70 km/h. Minimum intersection spacing of 200 m. No on-street parking. Buffers between roadway and adjacent uses.
- Tertiary Arterial – Connecting small settlements or connecting settlement to primary or secondary arterial leading to a recreational area. Trip origin and/or destination along it, along an intersecting collector or along a local street intersecting with the collector. Traffic movement major consideration. Intersections with other roads. Access from adjacent property strictly regulated and kept to a minimum. Daily traffic volume between 5,000 and 20,000. Design speed between 50-70 km/h. Minimum intersection spacing of 200 m. No on-street parking. Buffers between roadway and adjacent uses.
- Collector – Connecting neighbourhoods or connecting a neighbourhood with an arterial road. Trip origin and /or destination along it or an intersecting local street. Traffic movement and land access of equal importance. Intersection with other roads. Regulated access from adjacent property. Daily traffic volume between 1,000 and 12, 000. Design speed between 50-80 km/h. Minimum intersection spacing of 60 m. On-street parking may be permitted. Greater setbacks from roadway of adjacent uses.
- Local – Connecting properties within a neighbourhood. Trip origin and/or destination along its right-of-way. Traffic movement secondary consideration, land access primary function. Intersections with collectors or other local roads. Access from adjacent property permitted. Daily traffic volumes less than 1,000. Design speed between 30-50 km/h. Minimum intersection spacing of 60 m. On-street parking generally permitted except in un-usual circumstances. Goods movement restricted except for that having origin or destination along road.

3.3 City of North Bay (Official Plan, August 2009)

- Provincial Highways – In addition to all of the applicable municipal requirements, all developments adjacent to, or in proximity to, a provincial highway is also subject to the safety and geometric requirements of the Ministry of Transportation, and permits of the Ministry of Transportation.
- Arterial Roads – in an urban setting are designed to facilitate the movement of significant traffic volumes of all types at medium and higher speeds. Arterials are intended to connect developments in urban areas and generally are intended to provide a higher service level of mobility through measures such as limited access and greater spacing of intersections. All new and re-developed arterial roads shall be equipped with a sidewalk on each side of the road.
- Collector Roads – provide land access as well as mobility within residential, commercial, and industrial areas and distribute traffic between other collector, local,

and arterial roads. These roads can be further grouped into the representative zones they serve and design features will vary mainly based on heavy vehicle usage. All new and re-developed Collector Road shall be equipped with a sidewalk on one side of the road.

- Local Roads – provide access to adjacent properties. As the general function of local roadways is not to provide enhanced mobility, local roadways can be characterized by circuitous routing intended to facilitate privacy, low volumes of traffic, and greater pedestrian activity.

3.4 City of Timmins (Official Plan, April 2009)

- Provincial Highways (101 & 144 – Class III, Special Controlled Access) – Carry high volumes of through traffic at high speeds. Direct access restricted. Provincial geometric and safety standards apply. Access, signage, and adjacent lands uses subject to MTO approvals/permits. Transportation studies may be required for highway entrances, intersections, or new development. Screening may apply to adjacent storage, parking, or loading areas. Noise, vibration, and drainage studies may be required.
- Provincial Highways (655 – Class IV) – Carry moderate volumes on through traffic at moderate to high speeds. Some direct access permitted. Provincial geometric and safety standards apply. Access, signage, and adjacent lands uses subject to MTO approvals/permits. Transportation studies may be required for highway entrances, intersections, or new development. Screening may apply to adjacent storage, parking, or loading areas. Noise, vibration, and drainage studies may be required.
- Arterial Roads – Carry high volumes of intra-urban traffic. Direct access discouraged. 2 to 4 lanes undivided. 20 to 30 m right-of-way. 30 to 35 m width at intersections. 50 to 80 km/h posted speed. Sidewalks on both sides in urban areas.
- Collector Roads – Carry moderate volumes of traffic between arterials and local streets. Direct access discouraged. 2 lanes undivided. 20 to 26 m right-of-way. 26 to 30 m width at intersections. 50 to 60 km/h posted speed. One sidewalk in urban areas.
- Local Access Streets – Carry low volumes of traffic at low speeds. Direct access to properties is the primary purpose. 2 lanes undivided. 20 m right-of-way. 40 to 50 km/h posted speed. Sidewalks may be provided.
- Private Roads – carry low volumes of traffic at low speeds. Direct access to two or more properties. 2 lanes undivided. Construction standards to be determined by municipality and apply to roads created by Condominium Act or which are assumed by Council.
- Resource Access Roads – Temporary roads which provide access to resources. Not intended for access to non-resource related development. Construction standard determined by Crown or agency having jurisdiction.
- Shoreline Road Allowance – Not functional for transportation. May provide public access to water body. 20m width along shoreline of a lake or river.

3.5 Region of Waterloo (Context Sensitive Regional Corridor Design Guidelines, June 2010)

- Community Connector – connect to 400 series highways, Conestoga Parkway (expressway), other Community Connectors, Neighbourhood Connectors, and Rural Connectors. They connect communities within the Region and incorporate a high degree of access control. Community Connectors focus on moving vehicles and can be considered for higher order transit corridors.
- Neighbourhood Connector – are typically continuous across several communities / neighbourhoods within the Region. Neighbourhood Connectors balance active transportation (bicycles and pedestrians), transit and vehicle movement, providing a higher level of priority (design and comfort) for pedestrians, cyclists, and transit users.
    - Avenue – are located in existing built up areas with adjacent development facing the street but set back to incorporate large front yards and front yard parking, typical of medium to large format commercial, shopping malls, community facilities, and low rise neighbourhoods. Avenues have larger right-of-ways's than main streets and include many opportunities for re-urbanization.
    - Main Street – are located in existing built up areas characterized by buildings that address the street with small or no setbacks. Buildings, lot sizes, and right-of-way widths are typically smaller than those found within Avenues.
- Residential Connector – are short segments of roadway typically located in built up residential areas linking Neighbourhood Connectors and Rural Connectors. They are flanked primarily with residential uses of varying sizes and densities together with supporting neighbourhood uses such as schools, parks, and places of worship. The Residential Connector is a somewhat uniquely Region of Waterloo road type, which typically has a strong presence of single family residential directly facing the street.
- Rural Connector – are comprised of 'country roads' located along historical concession right-of-ways in the Region's rural areas or country side. They are generally continuous across the Region and are flanked by farms and other rural land uses including rural residences on severed lots.
- Rural Village – Main Street – are short segments of roadway that are generally contained within a village or hamlet, characterized by buildings that address the street. Buildings, lot sizes, and right-of-way widths are typically smaller that those found on the outskirts of villages and hamlets in rural areas.

4. ROAD CLASSIFICATION REVIEW AND RECOMMENDATIONS

Many municipalities across the province and the region are taking steps to make the move towards Complete Streets, which are defined as streets designed for all ages, abilities, and modes of travel with safe and comfortable access for pedestrians, bicycles, transit users and the mobility-impaired as integral features of the planning and design process and not merely as an afterthought. The City's Official Plan encourages a modal shift to public transit and active transportation with emphasis on the provision of safe, direct and attractive pedestrian access between public sidewalks, transit and building entrances. The Plan states that sidewalks shall be required (where appropriate) on both sides of arterial and collector streets and on at least one side of local streets in new residential developments. The Plan also encourages the development of bicycle routes and facilities and the incorporation of the system additions identified in the Cycling Master Plan into the overall transportation system.

Currently, the majority of Sault Ste. Marie's streets are equipped with sidewalks with a total of approximately 351 km of sidewalk, providing fairly good pedestrian coverage across the City. A few of the City's streets also have on-road cycling allowances; however, they do not have designated cycling lanes. The City has designed an extensive hub trail which the Cycling Master Plan (updated in 2007) combines with a system of cycling routes extending within and outside of the perimeter loop to create a comprehensive network of on and off-road trails, creating linkages between neighborhoods, destination points, and facilities that reflect the culture and community of the City; approximately 24 km of the hub trail have been built to date. Although many gaps still currently exist in the City's active transportation network, these gaps are expected to be filled upon the full implementation of the Cycling Master Plan.

As previously mentioned, the City's Official Plan classifies roads as arterials, collectors or local roads, with each class further sub-categorized into an urban or rural designation depending on what area of the City the road is located. In consideration of the City's truck route network which runs mainly along arterial roads, and the Cycling Master Plan's hub trail and spoke route network which also runs mainly along arterial roads (but also along some collectors), the City should consider further dividing its current arterial road class into subclasses with distinct design standards for arterials with differing characters. This can be done in a manner similar to the Thunder Bay or Sudbury official plans in which arterials are divided into major and minor arterials or primary, secondary and tertiary arterials. Alternatively, the arterial designation can be divided in accordance with the truck route and cycling networks with possible designations such as "Industrial Arterial" or "Complete Arterial", respectively. A review of the City's land use map also reveals a similar need; Sault Ste. Marie has distinct industrial and commercial areas and a downtown core through which arterials run and serve differing purposes and thus these roads should not be lumped into the same category with the same design requirements. Many other possibilities exist for the sub-classification of arterial roads, but the main purpose remains to establish specific design standards for certain types of arterial roads serving different purposes within the City's transportation network.

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Project # 6976

Memorandum

To: Don Elliott - City of Sault Ste. Marie
Cc:
From: Stephen Keen, P.Eng.
Maurice Masliah, Ph.D
Date: November 20, 2012
Re: **Sault Ste Marie Transportation Master Plan**
Software for Managing Traffic Data

Currently the City of Sault Ste. Marie uses a variety of products for managing traffic data, as listed in **Table 1**. The problem currently facing the City is that their version of Ontrac, used for maintaining collision data, is out of date and not compatible with the latest suite of Microsoft software. This has resulted in a stoppage of the updating of collision information into the database.

Table 1: The City of Sault Ste. Marie Software

Data	Software
Traffic Volume Traffic Speed	JAMAR TRAXPro for automatic traffic recorders JAMAR PETRAPro for hand-held data collection
Collision	TRIMAP Ontrac
Roadway Inventory Sign Inventory	GIS layers maintained by the Innovation Centre

The latest version of Ontrac is web-based, which means that the company which makes Ontrac, TRIMAP, hosts the data on their servers. For the City, this option to have an outside party host their collision data is unacceptable. The City requires a solution which allows the City to maintain control of its own data. Therefore, upgrading to the latest version of Ontrac for maintaining a collision database is not an option. The City needs to find a solution to their software problems because without properly maintained transportation databases, the City is not able to allocate resources appropriately.

One potential solution would be to develop customized software, either in-house or through the City's relationship with the Sault Ste. Marie Innovation Centre, to replace the existing software in use. This approach is the equivalent to reinventing the wheel. The cost of developing the software internally can be expected to cost many times the cost of purchasing a ready-to-use commercial software package. The Region of Durham has recently developed their own custom-designed software package. HDR has inquired to Mr. Jeff Pammett with the Region of Durham about the costs they incurred to develop their custom built software. The

Region of Durham has spent a six figure sum over one-year for the acquisition, installation, training, and support of their integrated traffic data management system.

An alternative solution to developing custom software is to purchase an existing software suite from the leading developer of such software in Ontario[1], Traffic Engineering Software (TES). TES is currently being used by numerous cities and regions including the Region of York, Region of Peel, Niagara Region, City of Markham, and the City of Richmond Hill. TES has quoted the City of Sault Ste. Marie a price of $35,000 (Traffic Count & Study Module, Collision Module, Infrastructure Module) for software and data transfer from the current systems. In other words, developing an in-house solution would costs about eight times more than purchasing an existing software suite. Durham Region is much larger than the City of Sault Ste Marie. For example, Durham Region maintains approximately 550 signalized intersections while the City has 84 signalized intersections.

Cost is only one of the reasons why developing custom software is not justified for the City. In general, HDR does not recommend a relatively small city such as Sault Ste. Marie develop their own custom software because the risks are too high. Software development is inherently a risky business area since it is difficult to properly estimate the level of effort needed to write the necessary code. Even more important is the long term risk to the City. For a small city there are usually only one or two people who use a specialized piece of software. Over time these people are expected to transfer and change jobs and their knowledge leaves with them. For custom software this loss of expertise usually means that there is no one left who knows how to use the software and there is no technical support available. This can leave a jurisdiction at risk of being unable to fully utilize its own systems.

HDR also spoke with Mr. Calvin Mollett of the Region of York to ask about their experience as a TES software user and what they would recommend for the City. In his opinion, Mr. Mollett felt that for a small jurisdiction it would be "irresponsible to develop their own system", citing reason of being vulnerable to having no one who knows how to use the system when there is staff turnover. Mr. Mollett had only positive things to say about his experience and knowledge of the TES software and felt that the TES option is an excellent choice for the City. Mr. Mollett also felt that TES would be able to do everything a small municipality might need and is a good choice for managing data in-house.

In HDR's opinion, the option to transfer the City's transportation data to the TES software suite is the best solution available. To the best of our knowledge, there is no better competing product on the market that has the same level of support, technical functionality, and understanding of Ontario systems, than TES.

[1] While there are also options available in the US, they are known to be much more expensive.

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File: 2.0
Project # 6976

Memorandum

To: Don Elliott – City of Sault Ste. Marie
Cc:
From: Elizabeth Szymanski
Jonathan Chai
Brian Lui
Date: July 25, 2014
Re: **Sault Ste. Marie Transportation Master Plan**
Travel Demand Forecasts

Future travel demand in the City of Sault Ste. Marie considers three horizon years – 10 years, 20 years, and 20+ years in the future. Traffic growth is assumed to be stagnant except for proposed developments projected for the appropriate time horizon. Travel generated by these proposed developments was added to existing traffic to develop the horizon year travel forecasts.

1. MODEL METHODOLOGY

A four-stage transportation model was developed which split the City into 15 traffic zones. Trip Generation from each new development and for each horizon year was determined using the ITE Trip Generation Manual (9th edition). Trip distribution was applied manually and based upon engineering judgment. Trip distribution methodology primarily factored in traffic zone proximity and also the type of land use in the zone (i.e. larger attraction between residential zones and work or institutional zones). A network representing the City was then developed in EMME including the 15 zones, in order to assign the traffic to the network using the shortest path methodology. Additional details on the demand forecasting work are provided in the following sections.

Additional assumptions surrounding the methodology include the following:

- A horizon period of 30 years was assumed for the 20+ year horizon period
- Growth in enrolment in institutions was assumed to be compounded for the development of land use forecasts
- It is assumed all trips taking place in the study area are round trips, and therefore the trip distribution matrix constrained to origins is the transpose of the trip distribution matrix constrained to destinations
- It is assumed that additional demand incurred on local roads is negligible – the forecasts are applied only to arterial roads.

- Shortest travel time assumption – all trips were assigned to the route with least travel time, regardless of any congestion that may be occurring

2. PROPOSED DEVELOPMENTS

Proposed developments projected for the City consist of a combination of residential low density single detached housing, higher density residential, warehouse and business park uses, and institutional uses.

A list of developments considered for the future demand forecasts is provided in **Table 2-1**.

Table 2-1: Proposed Developments in the City of Sault Ste. Marie

ID	Development Type	Land Use	Description of Location	Development Size and Timing	Notes
1	Low density single detached	Residential	S-E of Second Line and Allen's Side Rd	140 units within 10 years, another 140 units in 10 - 20 years, another 140 units in 20+ years	
2	Low density single detached	Residential	S-E of Korah Rd and Goulais Ave	15 units within 10 years	
3	Low density single detached	Residential	N-E of Rossmore Rd and Goulais Ave	24 units within 10 years	
4	Low density single detached	Residential	N-W of Rossmore Rd and Korah Rd	35 units within 10 years	
5	Low density single detached	Residential	N-E of Fourth Line and Goulais Ave	50 units within 10 years	
6	Low density single detached	Residential	S-E of Third Line and Peoples Rd	38 units within 10 years	
7	Low density single detached	Residential	S-E of Third Line and Peoples Rd	84 units within 10 years	
8	Low density single detached	Residential	N-W of Third Line and Old Goulais Bay Rd	62 units within 10 years	
9	Low density single detached	Residential	N-E of Third Line and Old Goulais Bay Rd	111 units 10 - 20 years, 111 units 20+ years	
10	Low density single detached	Residential	S-E of Third Line and Old Goulais Bay Rd, N of Sackville Rd at Fort Creek	60 units within 10 years (see notes)	Timing dependent on the extension of Sackville Road to Third Line

ID	Development Type	Land Use	Description of Location	Development Size and Timing	Notes
11	Warehousing/ business park??	Commercial	S-E of Third Line and Great Northern Rd	80,000 GFA within 10 years, 85,000 GFA within 10-20 years	Most likely larger format retail
12	Warehousing/ business park??	Commercial	N-W of Second Line and Great Northern Rd	50,000 GFA within 10 years, 50,000 GFA 10 - 20 years	Most likely larger format retail or office space associated with hospital
13	Low density single detached (see notes)	Residential	S-W of Third Line and Old Garden River Rd	188 units within 10 years, 100 units within 10 - 20 years, 400 units 20+ years	Mixture of single detached, semi-detached and townhouses
14	Low density single detached	Residential	N-E of Second Line and Old Garden River Rd	60 units within 10 years	
15	Educational/ high school	Institutional	N-E of Second Line and Old Garden River Rd	1,100 Student Population, complete September 2015	New HSDCSB High School
16	Apartment buildings	Residential	N-W of Northern Ave and Pine St	136 units, less than 10 years	Two 78 unit apartment buildings are proposed
17	Educational/ college	Institutional	S-W of Northern Ave and Pine St	projected +5% Annual Enrolment for 5 years - no growth following that	Current enrolment level 2,000 students
18	Nursing home	Institutional	N-E of Northern Ave and Pine St	256 units completed April 2013	Tendercare
19	Warehousing/ business park??	Industrial	N-E of McNabb St and Black Rd	Approx. 155 acres	Possible future multi-modal reload centre
20	Available land	Mixed Use	In downtown bounded by West St, Cathcart St and Gore St	Approx. 67 acres	
21	International Bridge Plaza	Institutional	S-W of Cathcart St and Huron St	Complete by October 2017	
22	Townhouse apartment	Residential	S of Bay St and Foster Dr & Spring St	100 units between 10 - 20 years	
23	Apartment building	Residential	S-E of Queen St E and Church St	150 units within 10 years, 150 units between 10 - 20 years	
24	University/ educational	Institutional	N-W of Queen St E and Shannon Rd	projected +8% Annual Enrolment for 5 years - no growth following that	Current enrolment (full & part time) is 1,300 students

ID	Development Type	Land Use	Description of Location	Development Size and Timing	Notes
25	Low density single detached	Residential	S of Simon Ave and Millwood St	47 units within 10 years	
26	Low density single detached	Residential	S of Queen St E and Dacey Rd	20 units within 10 - 20 years	
27	Low density single detached	Residential	S-E of Trunk Rd and Queensgate Blvd	47 units within 10 years, 47 units within 10-20 years	
28	Low density single detached	Rural Residential	S-E of Trunk Rd and Fournier Rd	39 units within 10 years	
29	Water-truck - rail intermodal facility	Transportation	S-W of the City at the shoreline just above the Canada/US border	New Harbour Facility possible 500 jobs.	

3. TRAVEL GENERATED BY NEW DEVELOPMENT

Auto travel demand generated by the new development for each of the three horizon periods of interest (10 year, 20 year, and 20+ year period) was forecasted through a high-level analysis under the Urban Transportation Modelling System (UTMS) framework, which typically includes a 4-stage approach to demand forecasting, including trip generation, trip distribution, modal split, and traffic assignment. For this exercise, only future auto trips were assessed.

3.1 Trip Generation

The first step in travel demand forecasting under the UTMS framework is trip generation – trips originating from and trips destined to each new development are estimated. The land use growth assumptions for each horizon year, as described in **Section 1**, were used as inputs in the Institute of Transportation Engineers (ITE) Trip Generation Manual (9th ed.) to determine the number of trip ends for each new development. Trip ends were then proportioned according to the ITE Trip Generation Manual standards to obtain trip origin and destination rates (trips per weekday).

The resultant trip generation rates are summarized in **Table 3-1**, for the 10 year horizon period (2022), 20 year horizon (2032) and 20+ year horizon period (2042).

While the trip generation was calculated per development, a traffic zone system was also developed to facilitate the next step in the UTMS framework, trip distribution. The zone system divides the City into 15 zones, and each new development was assigned entirely to a single zone. See **Exhibit 3-1** for the zoning system applied to the study area.

Table 3-1: 2022, 2032 and 2042 Trip Generation

ID	Development Type	Description of Location	Development Size and Timing	Traffic Zone #	2022 Trip Generation	2032 Trip Generation	2042 Trip Generation	ITE CODE
1	Low density single detached	S-E of Second Line and Allen's Side Rd	140 units within 10 years, another 140 units in 10 - 20 years, another 140 units in 20+ years	3	1431	2708	3933	210
2	Low density single detached	S-E of Korah Rd and Goulais Ave	15 units within 10 years	4	183	183	183	210
3	Low density single detached	N-E of Rossmore Rd and Goulais Ave	24 units within 10 years	4	283	283	283	210
4	Low density single detached	N-W of Rossmore Rd and Korah Rd	35 units within 10 years	4	400	400	400	210
5	Low density single detached	N-E of Fourth Line and Goulais Ave	50 units within 10 years	1	555	555	555	210
6	Low density single detached	S-E of Third Line and Peoples Rd	38 units within 10 years	5	431	431	431	210
7	Low density single detached	S-E of Third Line and Peoples Rd	84 units within 10 years	5	895	895	895	210
8	Low density single detached	N-W of Third Line and Old Goulais Bay Rd	62 units within 10 years	1	677	677	677	210
9	Low density single detached	N-E of Third Line and Old Goulais Bay Rd	111 units 10 - 20 years, 111 units 20+ years	1	0	1156	2187	210
10	Low density single detached	S-E of Third Line and Old Goulais Bay Rd, N of Sackville Rd at Fort Creek	60 units within 10 years (see notes)	5	656	656	656	210

ID	Development Type	Description of Location	Development Size and Timing	Traffic Zone #	2022 Trip Generation	2032 Trip Generation	2042 Trip Generation	ITE CODE
11	Warehousing/ business park??	S-E of Third Line and Great Northern Rd	80,000 GFA within 10 years, 85,000 GFA within 10-20 years	6	1565	2468	2468	770
12	Warehousing/ business park??	N-W of Second Line and Great Northern Rd	50,000 GFA within 10 years, 50,000 GFA 10 - 20 years	6	1247	1778	1778	770
13	Low density single detached	S-W of Third Line and Old Garden River Rd	188 units within 10 years, 100 units within 10 - 20 years, 400 units 20+ years	7	1877	2779	6192	210
14	Low density single detached	N-E of Second Line and Old Garden River Rd	60 units within 10 years	7	656	656	656	210
15	Educational/ high school	N-E of Second Line and Old Garden River Rd	1,100 Student Population, complete September 2015	7	1868	1868	1868	530
16	Apartment buildings	N-W of Northern Ave and Pine St	136 units, less than 10 years	7	948	948	948	220
17	Educational/ college	S-W of Northern Ave and Pine St	Projected +5% Annual Enrolment for 5 years - no growth following that	12	5864	5864	5864	550
18	Nursing home	N-E of Northern Ave and Pine St	256 units completed April 2013	7	804	804	804	620
19	Warehousing/ business park??	N-E of McNabb St and Black Rd	Approx. 155 acres	8	8239	8239	8239	150
20	Available land	In downtown bounded by West St, Cathcart St and Gore St	Approx. 67 acres	10	n/a	n/a	n/a	n/a
21	International Bridge Plaza	S-W of Cathcart St and Huron St	Complete by October 2017	10	no new trips assumed	no new trips assumed	no new trips assumed	n/a
22	Townhouse apartment	S of Bay St and Foster Dr & Spring St	100 units between 10 - 20 years	10	0	643	643	230
23	Apartment building	S-E of Queen St E and Church St	150 units within 10 years, 150 units between 10 - 20 years	13	1033	1942	1942	220

ID	Development Type	Description of Location	Development Size and Timing	Traffic Zone #	2022 Trip Generation	2032 Trip Generation	2042 Trip Generation	ITE CODE
24	University/ educational	N-W of Queen St E and Shannon Rd	Projected +8% Annual Enrolment for 5 years - no growth following that	14	4570	4570	4570	550
25	Low density single detached	S of Simon Ave and Millwood St	47 units within 10 years	15	524	524	524	210
26	Low density single detached	S of Queen St E and Dacey Rd	20 units within 10 - 20 years	15	0	239	239	210
27	Low density single detached	S-E of Trunk Rd and Queensgate Blvd	47 units within 10 years, 47 units within 10-20 years	15	524	992	992	210
28	Low density single detached	S-E of Trunk Rd and Fournier Rd	39 units within 10 years	15	442	442	442	210
29	Water-truck - rail intermodal facility	S-W of the City at the shoreline just above the Canada/US border	New Harbour Facility possible 500 jobs.	10	no new trips assumed	no new trips assumed	no new trips assumed	n/a

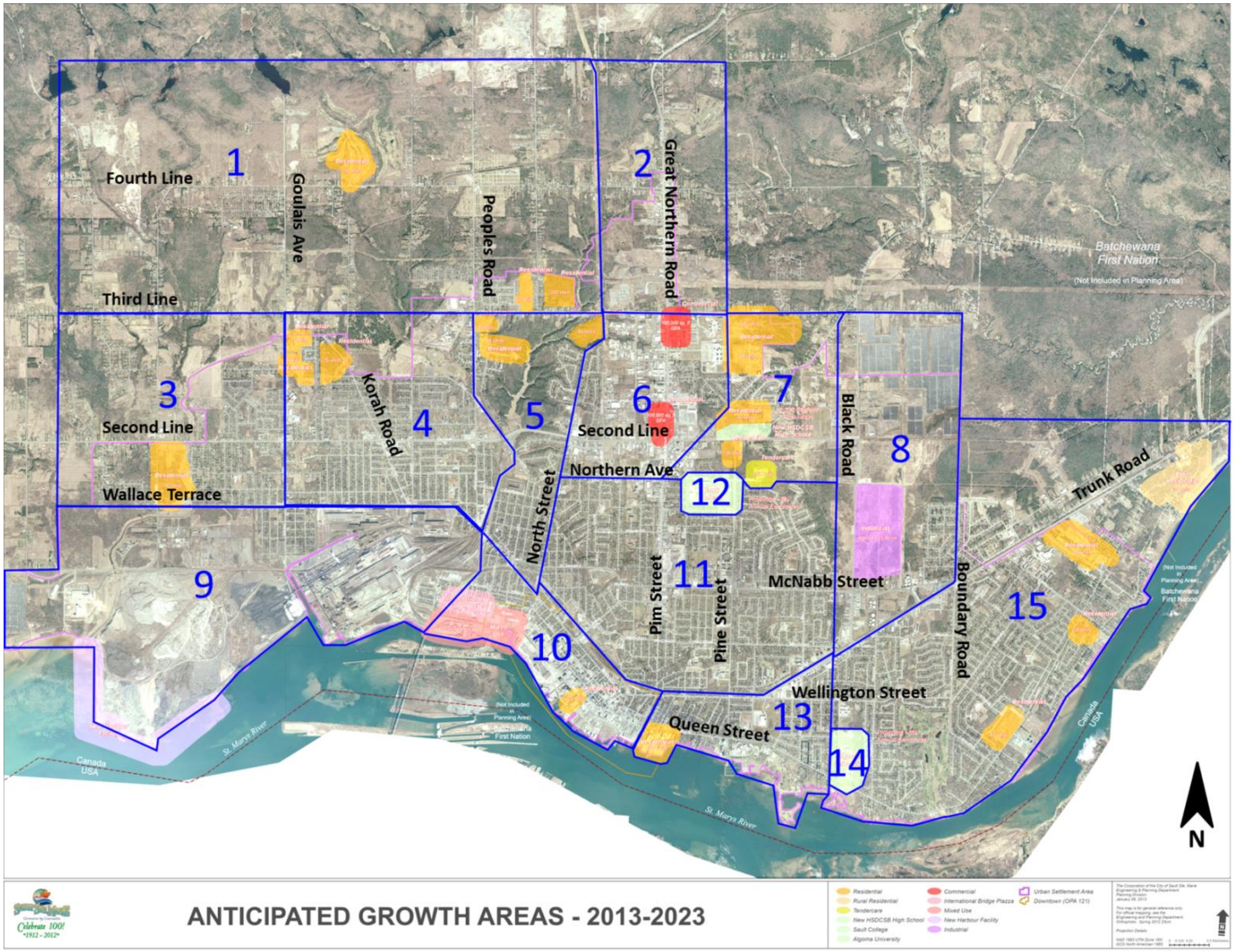


Exhibit 3-1: City Wide Traffic Zone System

3.2 Trip Distribution

The second step in forecasting travel demand under the UTMS framework is trip distribution. A trip is in part defined by its beginning (origin) and its end (destination). As a consequence, each trip origin and destination resulting from trip generation for a new development must be matched with a trip destination or origin, respectively, of either the same or another new development.

As an essential part of trip distribution, matrices were created to model a percentage distribution of trips between and within each zone. Given existing and future land use for each zone, a trip distribution matrix based on trip origins was created (see **Table 3-2**). Note that each percentage dictates an estimate of the percentage of total trips originating from a specified zone destined to another specified zone. Trips within the zone are also accounted for, as shown in the grayed out cells.

Table 3-2: Trip Distributions Rates Based on Origins

Origin Zone / Destination Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	5%	3%	1%	1%	1%	10%	11%	12%	12%	12%	1%	15%	1%	15%	1%
2	5%	2%	2%	2%	2%	11%	11%	15%	6%	6%	2%	17%	2%	15%	2%
3	1%	3%	4%	1%	1%	8%	10%	10%	15%	14%	1%	15%	1%	15%	1%
4	1%	2%	1%	4%	1%	8%	12%	10%	14%	14%	1%	15%	1%	15%	1%
5	1%	2%	1%	1%	4%	10%	13%	14%	8%	8%	1%	19%	1%	17%	1%
6	1%	3%	1%	1%	2%	15%	15%	12%	8%	8%	3%	14%	2%	14%	2%
7	1%	2%	1%	1%	1%	17%	10%	18%	7%	7%	3%	15%	1%	15%	1%
8	3%	5%	3%	3%	3%	10%	10%	2%	10%	10%	6%	10%	5%	10%	10%
9	3%	3%	10%	10%	4%	9%	11%	7%	2%	10%	8%	9%	3%	9%	2%
10	2%	2%	2%	2%	2%	8%	12%	7%	13%	14%	3%	15%	2%	15%	1%
11	1%	1%	1%	1%	2%	11%	15%	10%	6%	12%	5%	17%	1%	16%	1%
12	5%	3%	4%	8%	8%	8%	15%	1%	1%	8%	15%	0%	8%	8%	8%
13	1%	1%	1%	1%	1%	8%	12%	12%	7%	15%	1%	16%	5%	18%	1%
14	4%	2%	3%	7%	8%	8%	10%	1%	1%	8%	10%	8%	15%	0%	15%
15	1%	1%	1%	1%	1%	8%	11%	15%	8%	8%	1%	19%	1%	20%	5%

To ensure consistency between percentage proportions of trips, percentages were summed across each origin zone to ensure that 100% of trips were accounted for.

Subsequently, a trip distribution matrix based on trip destinations was created, which was simply the transpose of the trip distribution matrix based on trip origins, a reasonable conclusion assuming most of the day trips are round-trips (see **Table 3-3**). Like for trip origins, to ensure consistency between percentage proportions of trips, percentages were summed across each destination zone to ensure that 100% of trips were accounted for.

Table 3-3: Trip Distribution Rates Based on Destinations

Origin Zone / Destination Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	5%	5%	1%	1%	1%	1%	1%	3%	3%	2%	1%	5%	1%	4%	1%
2	3%	2%	3%	2%	2%	3%	2%	5%	3%	2%	1%	3%	1%	2%	1%
3	1%	2%	4%	1%	1%	1%	1%	3%	10%	2%	1%	4%	1%	3%	1%
4	1%	2%	1%	4%	1%	1%	1%	3%	10%	2%	1%	8%	1%	7%	1%
5	1%	2%	1%	1%	4%	2%	1%	3%	4%	2%	2%	8%	1%	8%	1%
6	10%	11%	8%	8%	10%	15%	17%	10%	9%	8%	11%	8%	8%	8%	8%
7	11%	11%	10%	12%	13%	15%	10%	10%	11%	12%	15%	15%	12%	10%	11%
8	12%	15%	10%	10%	14%	12%	18%	2%	7%	7%	10%	1%	12%	1%	15%
9	12%	6%	15%	14%	8%	8%	7%	10%	2%	13%	6%	1%	7%	1%	8%
10	12%	6%	14%	14%	8%	8%	7%	10%	10%	14%	12%	8%	15%	8%	8%
11	1%	2%	1%	1%	1%	3%	3%	6%	8%	3%	5%	15%	1%	10%	1%
12	15%	17%	15%	15%	19%	14%	15%	10%	9%	15%	17%	0%	16%	8%	19%
13	1%	2%	1%	1%	1%	2%	1%	5%	3%	2%	1%	8%	5%	15%	1%
14	15%	15%	15%	15%	17%	14%	15%	10%	9%	15%	16%	8%	18%	0%	20%
15	1%	2%	1%	1%	1%	2%	1%	10%	2%	1%	1%	8%	1%	15%	5%

The trip distribution matrices were then applied to the trip generation rates and summed to obtain an estimate of the number of weekday trips occurring from one zone to another. **Table 3-4**, **Table 3-5**, and **Table 3-6** illustrate the forecasted trip matrices for 10, 20, and 20+ year horizons, respectively.

Table 3-4: Trip Matrix – 10 Year Horizon by 2022

Origin Zone / Destination Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	0	7	4	10	14	31	124	0	0	0	147	9	91	0
2	0	0	21	9	20	42	62	206	0	0	0	88	9	46	0
3	7	21	57	11	17	71	102	195	107	100	7	225	17	176	7
4	4	9	11	35	14	49	83	167	61	61	4	299	14	225	4
5	10	20	17	14	79	127	160	262	74	74	10	423	19	351	10
6	14	42	71	49	127	422	734	581	105	105	42	431	103	380	28
7	31	62	102	83	160	734	615	966	215	215	92	901	143	690	31
8	124	206	195	167	262	581	966	165	412	412	247	441	319	435	412
9	0	0	107	61	74	105	215	412	0	0	0	29	66	23	0
10	0	0	100	61	74	105	215	412	0	0	0	235	141	183	0
11	0	0	7	4	10	42	92	247	0	0	0	440	9	228	0
12	147	88	225	299	423	431	901	441	29	235	440	0	385	417	235
13	5	5	12	9	15	69	93	268	36	77	5	317	73	436	5
14	91	46	176	225	351	380	690	435	23	183	228	417	512	0	343
15	0	0	7	4	10	28	31	412	0	0	0	235	9	343	0

Table 3-5: Trip Matrix – 20 Year Horizon by 2032

Origin Zone / Destination Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	119	36	25	16	22	141	167	267	137	144	12	326	26	270	23
2	36	0	41	9	20	64	71	206	0	6	0	88	14	46	11
3	25	41	108	18	23	130	171	259	203	196	14	320	27	272	25
4	16	9	18	35	14	56	87	167	61	67	4	299	18	225	15
5	22	20	23	14	79	142	164	262	74	81	10	423	24	351	21
6	141	64	130	56	142	637	918	667	159	185	64	532	154	480	130
7	167	71	171	87	164	918	706	1,047	247	286	106	969	202	758	156
8	267	206	259	167	262	667	1,047	165	412	434	247	441	373	435	577
9	137	0	203	61	74	159	247	412	0	42	0	29	97	23	82
10	144	6	196	67	81	185	286	434	42	90	10	283	215	231	86
11	12	0	14	4	10	64	106	247	0	10	0	440	14	228	11
12	326	88	320	299	423	532	969	441	29	283	440	0	457	417	443
13	22	10	23	14	20	120	152	322	68	152	10	390	118	517	21
14	270	46	272	225	351	480	758	435	23	231	228	417	593	0	562
15	23	11	25	15	21	130	156	577	82	86	11	443	25	562	110

Table 3-6: Trip Matrix – 20+ Year Horizon by 2042

Origin Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	171	51	37	21	27	192	240	329	197	203	17	403	48	348	28
2	51	0	59	9	20	64	105	206	0	6	0	88	31	46	11
3	37	59	157	24	30	179	249	320	295	282	20	412	51	363	31
4	21	9	24	35	14	56	104	167	61	67	4	299	35	225	15
5	27	20	30	14	79	142	181	262	74	81	10	423	41	351	21
6	192	64	179	56	142	637	1,208	667	159	185	64	532	290	480	130
7	240	105	249	104	181	1,208	1,047	1,354	366	405	157	1,225	424	1,014	173
8	329	206	320	167	262	667	1,354	165	412	434	247	441	578	435	577
9	197	0	295	61	74	159	366	412	0	42	0	29	217	23	82
10	203	6	282	67	81	185	405	434	42	90	10	283	471	231	86
11	17	0	20	4	10	64	157	247	0	10	0	440	31	228	11
12	403	88	412	299	423	532	1,225	441	29	283	440	0	730	417	443
13	17	0	20	4	10	42	52	206	0	6	0	235	155	343	11
14	348	46	363	225	351	480	1,014	435	23	231	228	417	900	0	562
15	28	11	31	15	21	130	173	577	82	86	11	443	42	562	110

3.3 Traffic Assignment

Once trip distribution is complete, trips (assumed to be all auto trips) occurring between two zones must be assigned a path in the network, in order to accurately model traffic volumes in the horizon years. This next step in UTMS framework, trip assignment, can be achieved with the help of EMME software.

First, a road network, containing road attributes such as posted speed limits and road lengths, was created in EMME/4 modelling package, by importing GIS shape files for the road network, as provided by the City. The road network was then simplified to include only arterial and collector roads, since the additional demand incurred on local roads is negligible with respect to the road capacity, and thus is of little interest.

Centroids and centroid connectors were also coded into the network to facilitate the trip assignment process. Each zone was assigned a single centroid – a single point in space which serves as a simplification of travel demand. For the purposes of trip assignment, it is assumed all travel demand originates from or is destined to a zonal centroid (no trips originate or are destined to any other space in a zone), corresponding to the OD patterns resulting from trip distribution. Conversely, centroid connectors serve as virtual pathways which connect the centroids of each zone to the arterial/collector road network, and are placed in such a way to distribute newly generated traffic demand over the road network as equally as possible.

Simple static trip assignments were performed for each of the three horizon periods of interest based on a shortest travel time assumption – all trips were assigned to the route with least travel time as compared to other alternatives, neglecting congestion effects on travel time and roadway capacity. As a result, only one iteration of auto assignment per horizon period was required.

The result of trip assignment outputs the final results of the UTMS framework applied to new site traffic development. **Exhibit 3-2** shows an example of the resultant distribution and assignment of additional travel demand, due to new developments, on the arterial/collector road network (for the 20+ year horizon period). The thickness of each link is in proportion to the amount of additional travel demand associated with that link. It is noted that this exhibit is not intended to comprehensively summarize the forecast traffic but to simply document the EMME model assignment and road network.

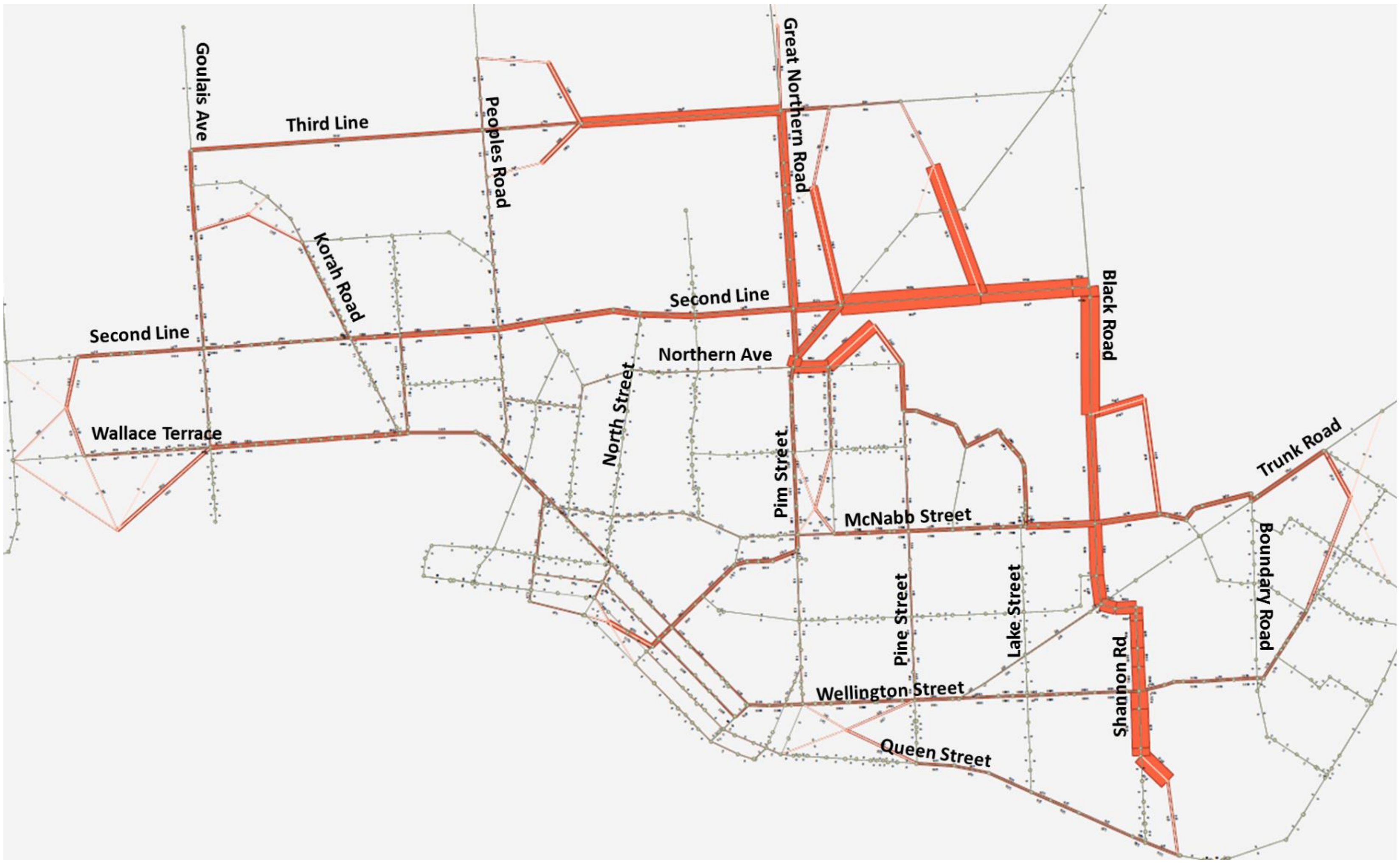


Exhibit 3-2: Additional Daily Travel Demand on the Road Network in the EMME Model

4. FUTURE TRAVEL DEMAND FORECASTS

Additional daily traffic volumes predicted by the EMME model were added to the existing daily traffic volumes on the City's road network to yield total Annual Average Daily Traffic (AADT) volumes. AADT future demand maps were generated for each of the three horizon periods of interest – 10 years, 20 years, and 20+ years, and are provided in **Exhibit 4-1**, **Exhibit 4-2**, and **Exhibit 4-3**, respectively. A summary exhibit illustrating the growth in traffic is provided in **Exhibit 4-4**.

From the forecast traffic volume exhibits, a number of conclusions can be drawn as follows:

- Minor traffic growth is anticipated
- Traffic volumes on Second Line and Great Northern will continue to be heavy in the future
- Majority of industrial growth occurs in the north-east part of the City, along Second Line and Black Road in particular. These roads are also forecast to see the highest traffic increases over the next 30 years.

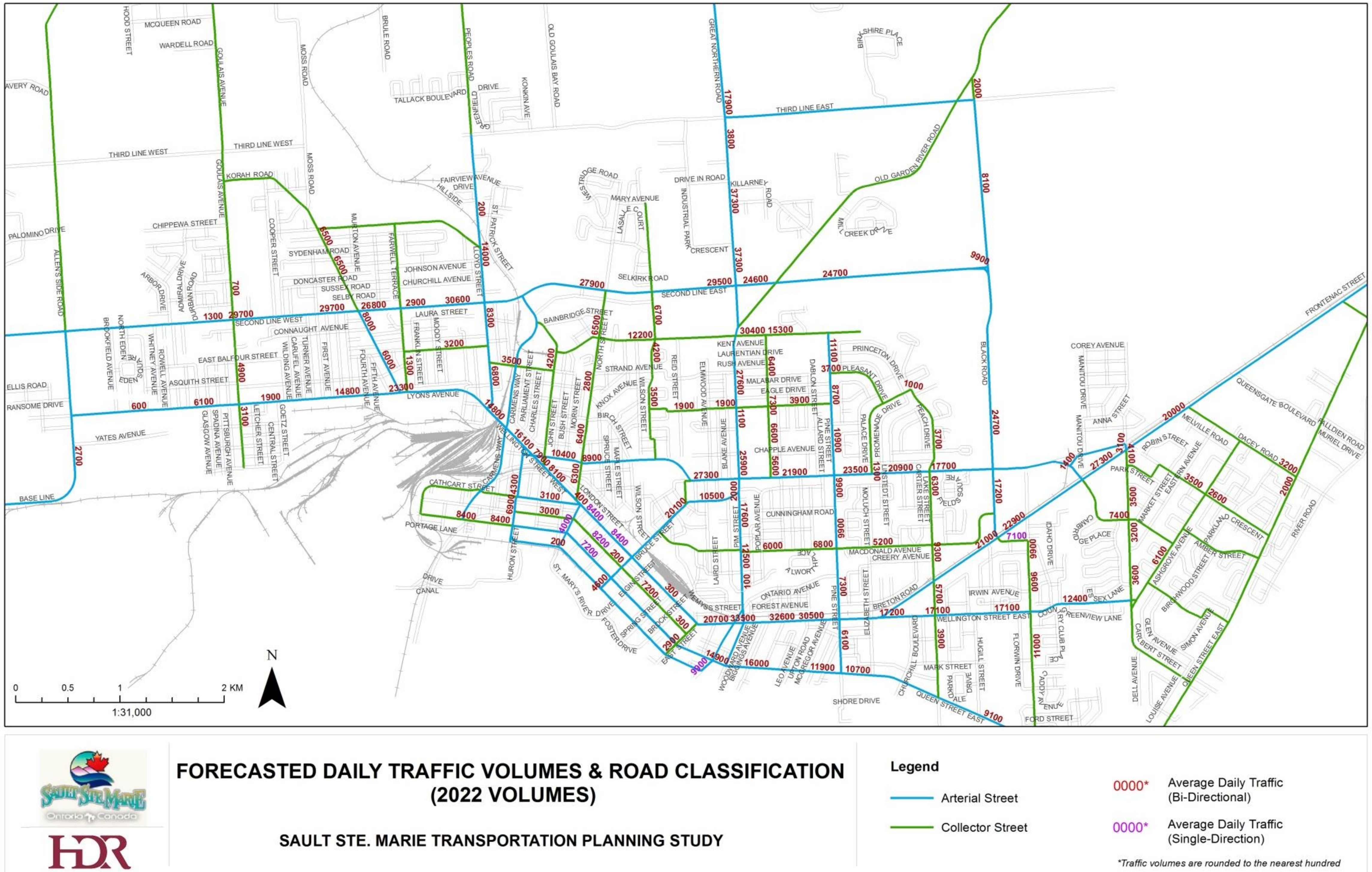


Exhibit 4-1: Estimated 10 year AADT Volumes by 2022

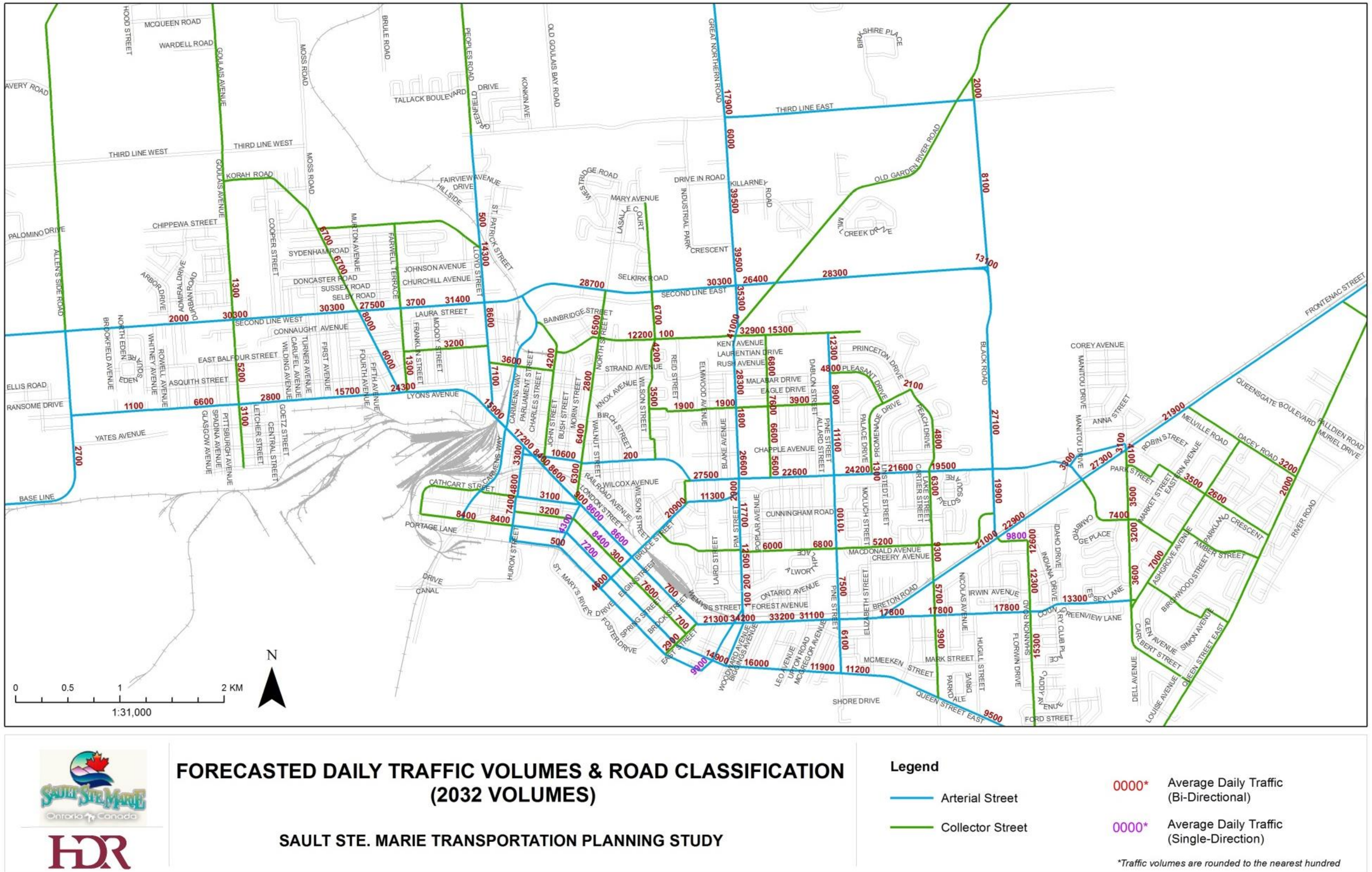


Exhibit 4-2: Estimated 20-Year AADT Volumes by 2032

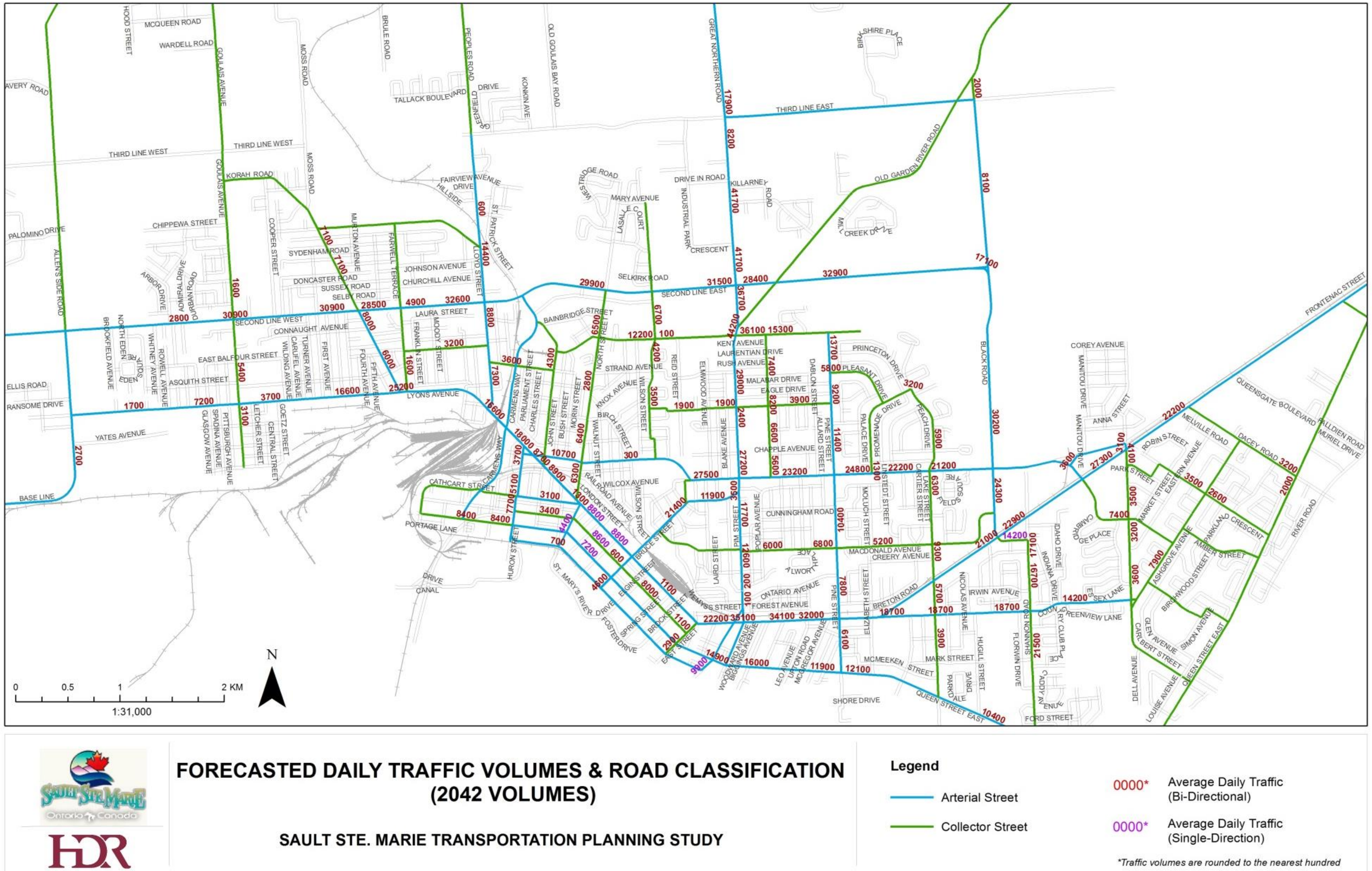


Exhibit 4-3: Estimated Beyond 20-Year AADT Volumes by 2042

Exhibit 4-4: Forecast Traffic Growth Summary

HDR Corporation
100 York Blvd. Suite 300
Richmond Hill, ON L4B 1J8
Tel: (905) 882-4100
Fax: (905) 882-1557
www.hdrinc.com

File: 2.0
Project # 6976

Memorandum

To: Don Elliott – Sault Ste. Marie
Cc:
From: Elizabeth Szymanski – HDR
Jonathan Chai - HDR
Date: March 28, 2014
Re: **Sault Ste. Marie Transportation Master Plan**
Highway 17 Bypass

Highway 17 / Trans-Canada Highway currently follows a circuitous route through the City of Sault Ste. Marie. Westbound traffic passing through the City must travel south along Trunk Road then north along Black Road to reach Second Line and vice versa for eastbound traffic. The existing route from Second Line and Black Road to the eastward curve in Highway 17 is approximately 9 km in length. A direct connection between the same points would be about half that distance at 4.5 km. The proposed bypass is illustrated in **Exhibit 1-1**.

Exhibit 1-1: Potential Highway 17 Bypass Location

The City of Sault Ste. Marie believes that there are a number of benefits to the potential Highway 17 bypass, including:

1. Improve travel times for Highway 17 through traffic as well as international traffic to and from the east
2. Reduce traffic growth impacts
3. Reduce truck traffic impacts on local Sault Ste. Marie traffic and residents
4. Support growth and development / improve network connectivity

Based on the above stated benefits which are further detailed below, the City of Sault Ste. Marie recommends to the Ministry of Transportation to renew the Class EA Truck Route Study conducted in the early 2000's which studied the Highway 17 connection to Black Road and Second Line in detail.

1. IMPROVE TRAVEL TIME ON HIGHWAY 17

As noted previously, the travel distance would be cut in half with the implementation of a Highway 17 Bypass. Not accounting for intersection delays, it can be assumed that travel times would also be cut in half and benefit Highway 17 and international traffic passing through the City.

2. REDUCE TRAFFIC GROWTH IMPACTS

Traffic counts were obtained at two key locations which would be impacted by a potential Highway 17 Bypass – Black Road at Second Line and Black Road at Trunk Road. The existing traffic count including truck percentages as well as the projected traffic for a forecast of over 20 years out are summarized respectively in **Exhibit 2-1** and **Exhibit 2-2**.

The major traffic flow observed in these PM peak hour counts appears to be eastbound, with approximately 500 vehicles making an eastbound right-turn at Second Line to Black Road and another 500 vehicles making a southbound left-turn onto Trunk Road.

In the future, based on projected new developments along this corridor as well as for provincial traffic, traffic is expected to grow to about 670 vehicles making these movements over a project of about 30 years into the future. A compound annual growth rate of 1% is assumed to project traffic by 2042, and this rate is based upon long-term development proposals at various locations throughout the City and ITE Trip Generation Manual trip rates.

These 670 vehicles can be easily accommodated at a through movement at an intersection, but requiring this traffic to turn left at an intersection would result in unacceptable traffic operations. A Synchro analysis of the intersection reveals a volume to capacity (v/c) ratio of 1.00 for the southbound left-turn at Black Road and Truck Road (compared to existing v/c of 0.85). To maintain acceptable traffic operations, the Highway 17 Bypass is recommended.

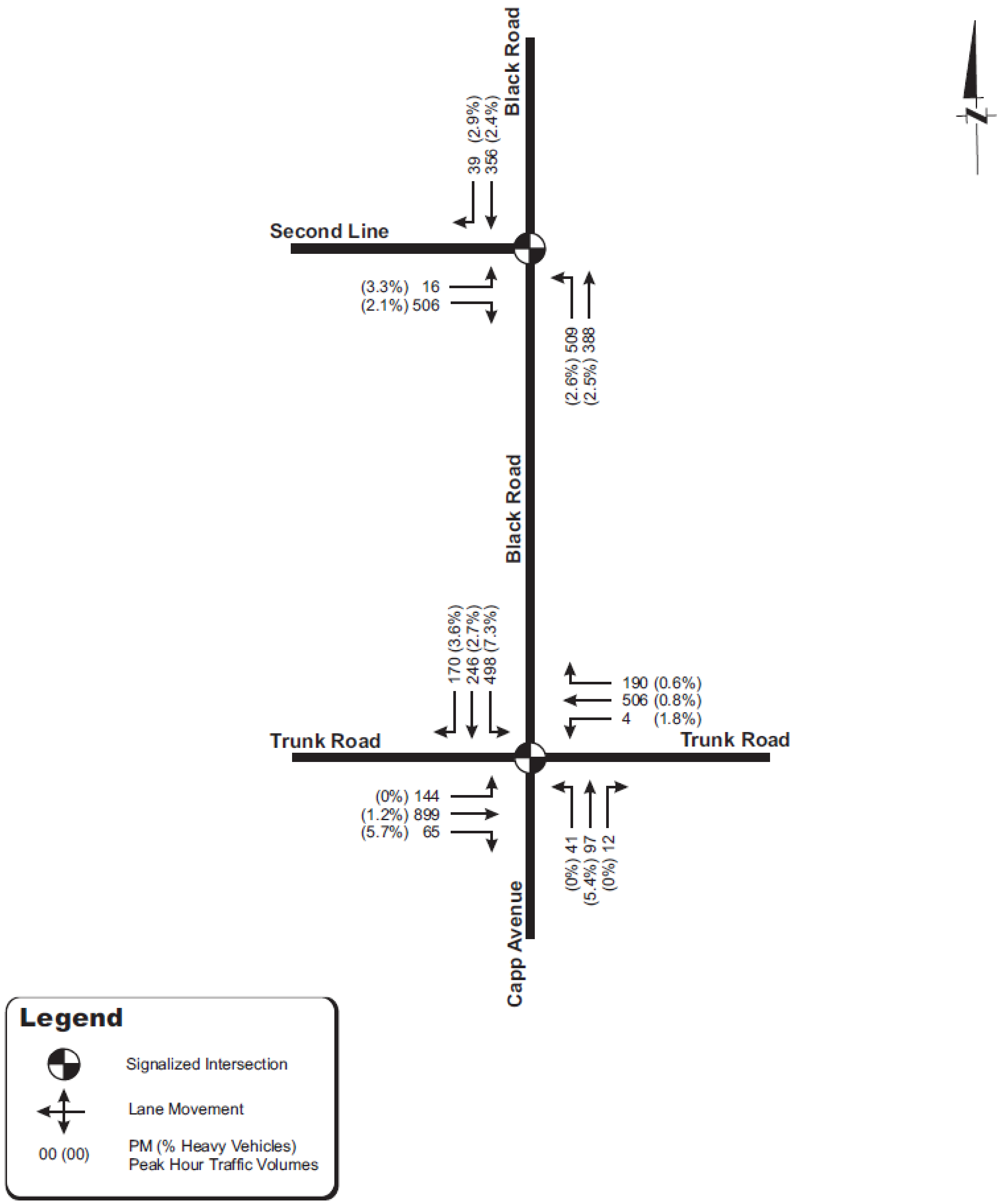


Exhibit 2-1: Existing PM Peak Hour Traffic

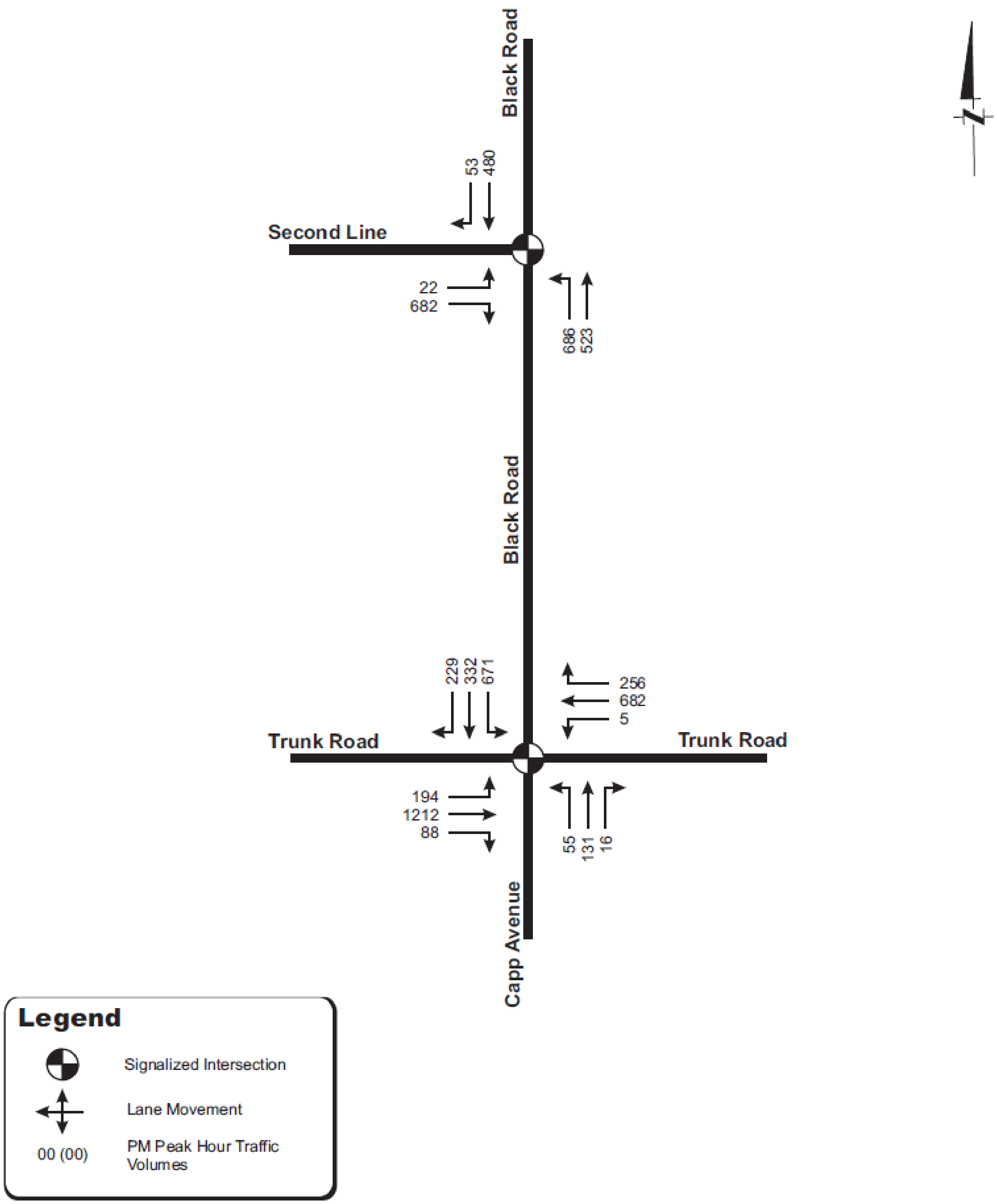


Exhibit 2-2: Projected PM Peak Hour Traffic (Over20 Years Forecast)

3. REDUCE TRUCK TRAFFIC IMPACTS

In addition to the traffic impacts, truck traffic using Highway 17 along Trunk Road, Black Road, and Second Line is composed of about 2-7% and is assumed to be similar in the future. Considering that Black Road is proposed as a spoke route in the City's Cycling Master Plan, it is not desirable for the proposed bike route to be located next to a major truck route on Highway 17. Providing an alternative to Black Road would thus benefit the City greatly in promoting and creating a continuous cycling network throughout. Furthermore, residential development is located on the south side of Trunk Road between Black Rd and Highway 17. Truck traffic has noise impacts on these existing communities, and it would benefit these residents greatly to provide a new route which bypasses this corridor.

4. SUPPORT GROWTH AND DEVELOPMENT

The construction of a Highway 17 Bypass would support any potential growth and development adjacent to the proposed corridor including Batchewana First Nations lands on the north side of Trunk Road and east of Black Road.

Attachments:
Highway 17 Bypass Synchro Existing.pdf
Highway 17 Bypass Synchro Forecast.pdf

Highway 17 Bypass Synchro (Existing)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	899	65	4	506	190	41	97	12	498	246	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	55.0		0.0	65.0		75.0	0.0		0.0	110.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	2.5		2.5	2.5		2.5	2.5		2.5	2.5		2.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00	1.00		1.00		0.99
Frt		0.990				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	3534	0	1825	3544	1328	1825	1760	0	1587	1865	1541
Flt Permitted	0.379			0.133			0.595			0.593		
Satd. Flow (perm)	699	3534	0	255	3544	1311	1140	1760	0	990	1865	1520
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				207		7				185
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		381.6			388.8			645.5			900.1	
Travel Time (s)		22.9			23.3			38.7			54.0	
Confl. Peds. (#/hr)	2		15	15		2	4		1	1		4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	1%	0%	3%	23%	0%	8%	0%	15%	3%	6%
Adj. Flow (vph)	157	977	71	4	550	207	45	105	13	541	267	185
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	1048	0	4	550	207	45	118	0	541	267	185
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm			Perm		Free	Perm			pm+pt		Free
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		Free	2			6		Free
Minimum Split (s)	34.0	34.0		34.0	34.0		34.0	34.0		8.0	34.0	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	0.0	34.0	34.0	0.0	19.0	53.0	0.0
Total Split (%)	41.1%	41.1%	0.0%	41.1%	41.1%	0.0%	37.8%	37.8%	0.0%	21.1%	58.9%	0.0%
Maximum Green (s)	30.0	30.0		30.0	30.0		27.0	27.0		15.0	46.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	4.0
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		20.0	20.0			20.0	
Pedestrian Calls (#/hr)	15	15		15	15		15	15			15	
Act Effct Green (s)	30.0	30.0		30.0	30.0	90.0	27.0	27.0		49.0	46.0	90.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.33	0.33		0.33	0.33	1.00	0.30	0.30		0.54	0.51	1.00
v/c Ratio	0.67	0.89		0.05	0.47	0.16	0.13	0.22		0.85	0.28	0.12
Control Delay	42.7	38.7		22.2	25.3	0.3	24.3	23.6		25.3	12.6	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	42.7	38.7		22.2	25.3	0.3	24.3	23.6		25.3	12.6	0.1
LOS	D	D		C	C	A	C	C		C	B	A
Approach Delay		39.3			18.5			23.8			17.2	
Approach LOS		D			B			C			B	
Queue Length 50th (m)	23.1	88.5		0.5	39.1	0.0	5.7	14.3		49.2	21.5	0.0
Queue Length 95th (m)	#51.4	#124.9		2.9	53.7	0.0	13.8	27.3		m#62.2	m24.9	m0.0
Internal Link Dist (m)		357.6			364.8			621.5			876.1	
Turn Bay Length (m)	55.0			65.0		75.0				110.0		
Base Capacity (vph)	233	1184		85	1181	1311	342	533		639	953	1520
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.67	0.89		0.05	0.47	0.16	0.13	0.22		0.85	0.28	0.12

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 26.4	Intersection LOS: C
Intersection Capacity Utilization 82.2%	ICU Level of Service E
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Trunk Road & Black Road

Highway 17 Bypass Synchro (Forecast)

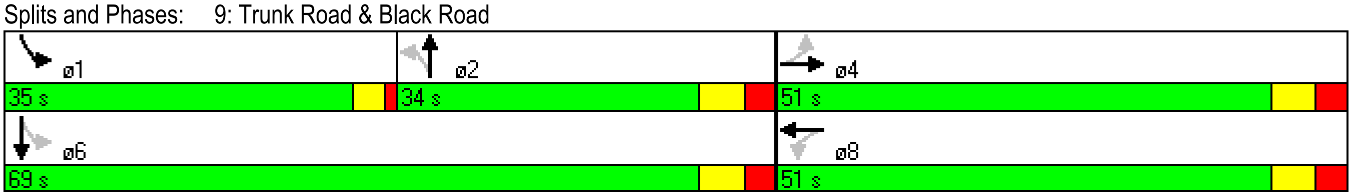
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	194	1212	88	5	682	256	55	131	16	671	332	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	55.0		0.0	65.0		75.0	0.0		0.0	110.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	2.5		2.5	2.5		2.5	2.5		2.5	2.5		2.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00				0.99	1.00	1.00		1.00		0.99
Frt		0.990				0.850		0.984				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1755	3532	0	1825	3544	1328	1825	1762	0	1587	1865	1541
Flt Permitted	0.286			0.091			0.560			0.551		
Satd. Flow (perm)	528	3532	0	175	3544	1311	1072	1762	0	920	1865	1520
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				233		5				228
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		381.6			388.8			645.5			900.1	
Travel Time (s)		22.9			23.3			38.7			54.0	
Confl. Peds. (#/hr)	2		15	15		2	4		1	1		4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	2%	1%	0%	3%	23%	0%	8%	0%	15%	3%	6%
Adj. Flow (vph)	194	1212	88	5	682	256	55	131	16	671	332	229
Shared Lane Traffic (%)												
Lane Group Flow (vph)	194	1300	0	5	682	256	55	147	0	671	332	229
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm			Perm		Free	Perm			pm+pt		Free
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		Free	2			6		Free
Minimum Split (s)	34.0	34.0		34.0	34.0		34.0	34.0		8.0	34.0	
Total Split (s)	51.0	51.0	0.0	51.0	51.0	0.0	34.0	34.0	0.0	35.0	69.0	0.0
Total Split (%)	42.5%	42.5%	0.0%	42.5%	42.5%	0.0%	28.3%	28.3%	0.0%	29.2%	57.5%	0.0%
Maximum Green (s)	44.0	44.0		44.0	44.0		27.0	27.0		31.0	62.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		1.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	4.0
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		20.0	20.0			20.0	
Pedestrian Calls (#/hr)	15	15		15	15		15	15			15	
Act Effct Green (s)	44.0	44.0		44.0	44.0	120.0	27.0	27.0		65.0	62.0	120.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.37	0.37		0.37	0.37	1.00	0.22	0.22		0.54	0.52	1.00
v/c Ratio	1.00	1.00		0.08	0.53	0.20	0.23	0.37		1.00	0.34	0.15
Control Delay	104.3	63.0		28.8	31.6	0.3	41.1	41.1		50.1	13.6	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	104.3	63.0		28.8	31.6	0.3	41.1	41.1		50.1	13.6	0.1
LOS	F	E		C	C	A	D	D		D	B	A
Approach Delay		68.4			23.1			41.1			31.0	
Approach LOS		E			C			D			C	
Queue Length 50th (m)	~45.5	~159.3		0.8	65.7	0.0	10.7	28.4		153.0	46.8	0.0
Queue Length 95th (m)	#93.2	#209.8		3.9	83.6	0.0	22.5	47.5		m#208.6	m63.6	m0.0
Internal Link Dist (m)		357.6			364.8			621.5			876.1	
Turn Bay Length (m)	55.0			65.0		75.0				110.0		
Base Capacity (vph)	194	1300		64	1299	1311	241	400		671	964	1520
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	1.00	1.00		0.08	0.53	0.20	0.23	0.37		1.00	0.34	0.15

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 44.0 Intersection LOS: D
Intersection Capacity Utilization 120.2% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Trunk Road & Black Road



April 4, 2014

Project # 188030

Mr. Don Elliott
Director, Engineering Services
The Corporation of the City of Sault Ste. Marie
99 Foster Drive, 5th Floor
Sault Ste Marie, ON P6A 5N1

Dear Mr. Elliott:

Re: Korah Road Truck Route Class Review

The City of Sault Ste. Marie has retained HDR to provide traffic advice on a potential change in truck route classification on Korah Road from Second Line to Lyons Avenue.

The purpose of this letter is to provide our engineering judgment as to the impact on traffic conditions with the proposed change in truck route classification from Class A (Operates 24 hours, 7 days a week) to Class B (Operations 7AM to 8PM, Monday to Saturday).

The subject Class A truck route along Korah Road extends 850m between Second Line W and Lyons Avenue as illustrated in the context of the City's Truck Route Map (By-Law 77-200 Schedule N-1) in **Exhibit 1**, and in the local street and neighbourhood context in **Exhibit 2**.

As the change only impacts truck traffic during specific hours of the day, the City of Sault Ste. Marie provided traffic counts by vehicle classification to determine how many vehicles may potentially be impacted by the change. The count provided was undertaken on Monday May 30, 2011 to Tuesday May 31, 2011 on Korah Road north of Douglas Street. The data provided is summarized in **Table 1** (on page 3). As seen in this table, heavy truck usage is minimal during restricted hours (for this sample day) with a total of 5 heavy trucks recorded between the 8PM and midnight, and no truck movement recorded between midnight and 7AM.

The change in classification along Korah Road, illustrated in **Exhibit 1,** would impact trucks wishing to access any commercial land uses along Korah Road or travelling between Second Line W and Wallace Terrace / Lyons Avenue outside of the Class B truck route hours. The closest access between these two streets is Carmen's Way, which is about 1.5km away from Korah Road on Second Line and 1.1km away from Koran Road on Lyons Avenue. Given that a relatively small number of trucks today have been observed to use Korah Road during Class B restricted hours, the change in Truck Route class would have nominal impact that can be mitigated by using an alternative route via Carmen's Way. Carmen's Way provides

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unlimited Class A access between Second Line and Wallace Terrace / Lyons Avenue, and is only a maximum 1.1 to 1.5km detour for trucks approaching from west of Korah Road.

As seen in **Exhibit 2**, from a local street or neighbourhood context, we do not anticipate any high demand for heavy truck usage beyond the observed usage noted in **Table 1**. Korah Road between Connaught Avenue and Douglas Street is largely fronted by residential houses and would not require heavy truck access during Class B restricted hours. Commercial uses close to both Second Line and Lyons Avenue may require overnight deliveries which would be impacted by the change; however, our opinion is that this impact is likely minimal. Finally, the Tenaris Algoma Tubes facility on the south side of Wallace Terrace west of Korah Road may be impacted by the restriction where heavy vehicles may wish to access Second Line; however as noted previously, these vehicles may detour to Carmen's Way.

The City has also observed a noticeable reduction in the number of trucks using Korah Road following the construction of Carmen's Way. The majority of trucks that use Korah Road do so during the hours compliant to a Class B standard and this is verified in the traffic data documented in this letter. Furthermore, Essar Steel has a more direct connection from its Truck Gate-2 off Patrick to Lyons via Carmen's Way leading north to Second Line and Highway 17N and E or south to the International Bridge to USA. Finally, Tenaris Algoma Tubes uses Wallace Terrace following a similar route.

Therefore, based on the findings of the above traffic analysis, the proposal to downgrade Korah Road from a Class A truck route to a Class B truck route would not have any significant traffic impacts and from this perspective may proceed with a Schedule A+ EA

It is noted that a Schedule A+ EA is limited in scope with minor environmental effect and considered pre-approved and may be implemented without the need for a full Municipal Class EA process. Prior to implementation however, the public must be notified.

Yours truly,

HDR Corporation

Carl Wong, P.Eng.
Associate Vice President
Traffic Lead - Canada

Encl.
Table 1: Korah Road Traffic Count by Vehicle Class
Exhibit 1: Korah Road Truck Route – City Truck Route Context
Exhibit 2: Korah Road Truck Route – Neighbourhood Context Map

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Carl Rumiel, City of Sault Ste. Marie
Elizabeth Szymanski, HDR
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Table 1: Korah Road Traffic Count by Vehicle Class

Start Time (2011-5-30 to 2011-5-31)	Light Vehicles & Single Axle Trucks	Heavy Trucks (> 1 Axle)	Total Vehicles
10:00	294	2	296
11:00	351	4	355
12:00	401	2	403
13:00	408	8	416
14:00	431	4	435
15:00	461	5	466
16:00	486	1	487
17:00	425	0	425
18:00	302	3	305
19:00	251	1	252
20:00	207	2	209
21:00	187	0	187
22:00	104	2	106
23:00	76	1	77
0:00	40	0	40
1:00	27	0	27
2:00	15	0	15
3:00	5	0	5
4:00	16	0	16
5:00	49	0	49
6:00	108	0	108
7:00	188	5	193
8:00	328	15	343
9:00	337	11	348
10:00	386	11	397
11:00	396	6	402
12:00	433	4	437
Legend			
	Class B Truck Route Allowed Hours (7AM-8PM Monday to Saturday)		
(shaded)	Class B Truck Route Restricted Hours (8PM-7AM Monday to Saturday)		

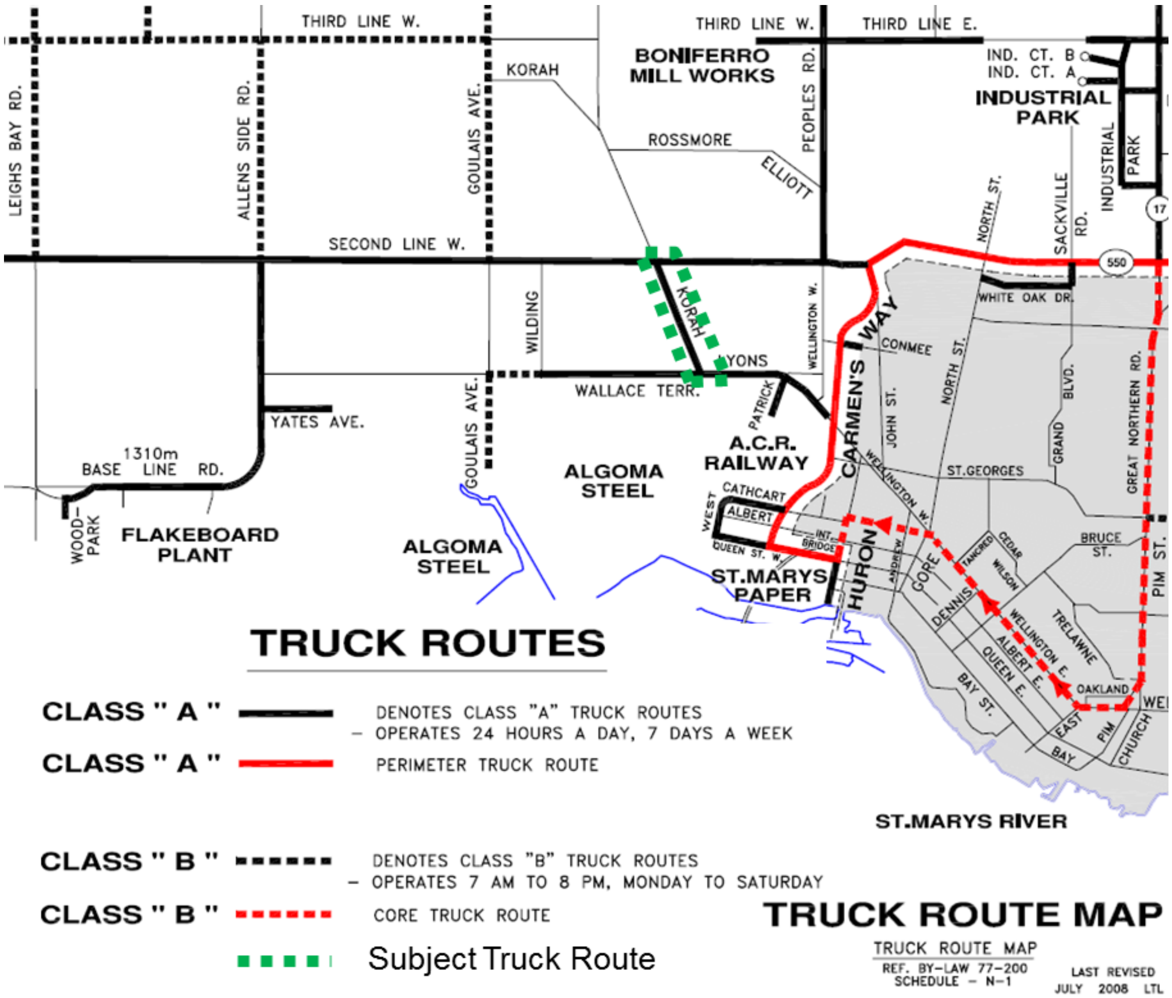

Exhibit 1: Korah Road Truck Route – City Truck Route Context

Exhibit 2: Korah Road Truck Route – Neighbourhood Context Map