Sarnia Transportation Master Plan and Transit Master Plan

VOLUME 1: TRANSPORTATION MASTER PLAN

IBI GROUP

Prepared for the City of Sarnia
by IBI Group

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1. STUDY PURPOSE

1.1 Preface

Request for Proposal No. 12-105 issued by the City of Sarnia in March 2012 called for the preparation of a 'Transportation Master Plan and Public Transit Master Plan'. In the development of these two related plans, involved City staff confirmed that it would be best to separate the two plans so that Sarnia Transit would have a planning document dedicated specifically to their transit needs and services, and City and County of Lambton engineering and planning staff would have a related document addressing the transportation systems under their jurisdiction, namely roads, traffic signals, downtown parking and active transportation (cycling and walking). This resulted in the preparation of two related planning documents:

Volume 1: Transportation Master Plan

Volume 2: Public Transit Master Plan

1.2 Report Organization

Section 1 outlines the study purpose, scope, Environmental Assessment status and study direction;

Section 2 summarizes the planning context in which the Transportation Master Plan (TMP) has been prepared;

Section 3 describes the local transportation profile of the City of Sarnia, including existing roadway network Level-of-Service, existing travel patterns, how the City is expected to grow to 2031 and how to mitigated forecasted growth-related roadway network deficiencies;

Section 4 summarizes the public transit system;

Section 5 summarizes public and stakeholder input provided to the study through public consultation activities;

Section 6 describes recommended transportation policies for the City;

Section 7 provides recommendations on how to improve the City's traffic signal system;

Section 8 is a brief road safety review of issues identified in the study Terms of Reference;

Section 9 makes recommendations regarding the supply and management of public parking;

Section 10 introduces new guidelines for the preparation of Traffic Impact Studies as part of the City's development approval process;

Section 11 provides basic recommendations for management of rural roads within the City;

Section 12 provides a new Active Transportation Plan for the provision and management of bikeways and trails in the City; and

Section 13 ptovides basic recommendations for the implementation of the Transportation Master Plan.

1.3 Master Plan Purpose

According to the City's Terms of Reference for this study, the purpose of the Transportation Master Plan (TMP) is to apply an integrated planning approach for the strategic planning of the City's transportation system using an integrating planning approach that encompasses:

- Transportation;
- Land Use Planning;
- Natural Resource Protection;
- Social Cohesion; and
- Economic/Operational Sustainability.

1.4 Master Planning Scope

According to the province's Municipal Class Environmental Assessment (EA) process, master plans are:

"long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles ".

To do this, the scope of the TMP is:

- strategic system-wide planning, and not focused on specific projects that will undergo further analysis through the Municipal Class EA process;
- providing the need and justification for specific transportation infrastructure projects by satisfying the first two phases of the Municipal Class EA process by addressing 1) Problems and Opportunities, and 2) Alternative Planning Solutions;

- future - oriented over a 20 year planning timeframe with the Sarnia Official Plan to 2031;
- multi-modal to address all modes of transportation under the jurisdiction and responsibility of the City. In the case of Sarnia this includes sidewalks, trails, bikeways, transit and city roads;
- refers to transportation planning experienced in other cities of similar size and context, but ultimately is a plan custom-made for Sarnia;
- integrates transportation and city planning by recommending how to comply with provincial and city growth management strategies;
- provides a set of actions on how the city can meet its transportation needs and vision over the next 20 years. It is not based on any one specific transportation project;
- achievable within the context of the municipality it plans for socially, practically, financially and politically;
- consultative by providing opportunities for agencies, stakeholder groups and the general public to contribute to the plan development; and
- flexible to change over its 20 year planning timeframe through regular reviews and updates to respond to changing conditions and needs.

1.5 Best Practices Review of Other Municipalities

The City of Sarnia recognizes the role that transportation has in achieving its sustainable community future. According to the City's Integrated Community Sustainability Plan (ICSP), the City administration is responsible for reaching the identified targets, goals and objectives of the ACSP, including the optimization of its transportation facilities and services for the long term social, cultural, environmental and financial benefits of the local and regional communities.

This sustainable community future is supported by Healthy Community approach of the Official Plan which includes the principle of "*An accessible and connected city that is designed to accommodate all ages, abilities and income levels".* Furthermore, the City's Strategic Plan wants the City to be "*economically and environmentally sustainable"*.

Regarding planning for transportation sustainability, a peer review of best practices in small city transportation planning was conducted early in the preparation of the Sarnia TMP.as a summary review of master planning approaches used in a number of comparable municipalities.

Information in this peer review was taken from Transport Canada's *STRATEGIES FOR SUSTAINABLE TRANSPORTATION PLANNING: PRACTICES & OPTIONS,* September, 2005, IBI Group. The excerpts taken from that report focus on small Canadian cities comparable to Sarnia. Some medium sized city references are also used to compare with a city of Sarnia's size. Additional information on this peer review is available from the Transport Canada report at www.tc.gc.ca.

The peer review found that despite positive changes in the overall understanding of sustainable transportation in Canada, there remains a wide variance in municipal approaches to incorporating sustainable transportation principles into municipal transportation and land use plans. For example, there is no widely accepted definition of sustainable transportation from a municipal planning perspective, nor are there any accepted measures for determining whether a transportation master plan will actually lead to a more sustainable transportation system. It seems that each municipality essentially starts from scratch when developing these plans.

Another major concern is that in those Canadian municipalities with master plans that promote more sustainable transportation, actual observed trends have been moving in the opposite direction. Perhaps most telling is the finding of TAC's Urban Indicators Survey that gasoline fuel use per capita (a surrogate measure for many sustainability indicators) grew by more than 11% between 1991 and 2001 in major Canadian cities.

The 2005 Transport Canada report concludes that there is a significant need for improved resources to help municipalities efficiently and effectively prepare transportation plans that promote and help create more sustainable transportation systems. TAC's Sustainable Transportation Standing Committee, with the assistance of Transport Canada, developed a set of guidelines for the benefit of municipalities of various sizes across Canada. These guidelines must be based on a sound understanding of current practices, opportunities and challenges, and they must also be sensitive to the jurisdictional, technical and cultural differences that exist among Canadian urban communities.

Exhibit 1.1 provides a high level overview of each plan review and where they were considered to be notable with respect to any of the twelve sustainable transportation principles. This provides a guide to those plans that have addressed a principle comprehensively, and with a view to promoting more sustainable transportation.

Exhibit 1.1 – Summary of Transportation Master Plan Peer Review

Transportation Planning Principles	Victoria	Kamloops	London	Peterborough	Kingston	Ottawa	Gatineau	Halifax
1. Integration with land use planning	●	●			●	★		★
2. Environmental health						★		★
3. Economic development and social objectives						★		★
4. Modal sustainability	●			★	★	★	★	
5. Transportation demand management	●	●	★	★		★	★	
6. Transportation supply management	★		★			★		
7. Strategic approach	●	★	●	●		★	★	●
8. Implementation guidance			●	★		★	●	
9. Financial guidance			★		★	★		
10. Performance measurement	★		★			★		●
11. Public involvement			★			★		
12. Plan maintenance			★			★		

* Notable consideration – discussed in text

• Notable consideration – not discussed in text

1.6 Master Plan Status in the Environmental Assessment Process

The *Municipal Engineers Association Municipal Class Environmental Assessment Process (2007, updated 2011)* (Class EA) recognizes that it is sometimes advisable to plan municipal infrastructure as part of an overall system, rather than as specific projects such as a roadway improvement project. The planning provisions of the Class EA describe the scope of a master plan as being broad and comprehensive, usually including analysis of an entire system

such as a municipal transportation system, in order to develop a framework for future works and developments. The master plan is not typically prepared to address site-specific problems such as traffic operations at individual intersections or in specific neighbourhoods.

The Sarnia TMP was prepared in conformance to the master planning process of the Class EA. To help expedite these types of transportation projects, the Class EA provides alternative approaches for the preparation of master plans, each designed to address at least Phases 1 and 2 of the Municipal Class EA process.

The Sarnia TMP conforms to the Class EA description of a master plan using Approach #1 from the Class EA document. Following this approach, Phases 1 and 2 of the Municipal Class EA process were concluded by broadly establishing the problems and opportunities associated with the City's transportation system over the next 20 years, and selecting a preferred transportation planning solution to address these needs and opportunities.

An approved TMP provides the context for the implementation of specific minor Schedule B road and traffic management projects such as intersection improvements recommended in this TMP (see Exhibit 3.9), and major Schedule C transportation infrastructure projects such as any changes to the capacity and operation of roads recommended in this TMP (see Section 6.2 and 6.3). The TMP either reflects or confirms Schedule C road extensions recommended in related project-specific Schedule C Class EAs or Secondary Plans. As such, the TMP satisfies Phases 1 and 2 of the Class EA process, once again by establishing the problem or opportunity that such projects address, and selecting the preferred transportation planning solution.

More detailed investigations will be required for specific Schedule C projects recommended in this TMP. Schedule B projects will require the filing of the project file for public review, while Schedule C projects will have to complete Phases 3 and 4 of the Class EA process prior to filing an Environmental Study Report (ESR) for public review.

In both cases, the public review period includes a Part II Order appeal mechanism, where an individual can make a written request to the Minister of the Environment to extend the project to a higher level of EA investigation.

Note: A Part II Order request can only be made on a project-specific Schedule B or C EA, and not on a Transportation Master Plan on which such a project is based.

1.7 Study Direction

Preparation of this TMP was directed by a Project Team that included the following members:

Mike Berkvens	City of Sarnia, Development Manager (Chair September 2013 - completion)
Muhammad Ali Khan, P. Eng.	City of Sarnia, Transportation Engineer (Chair until September 2013)
Jim Stevens	City of Sarnia, Director of Transit
Kevin Edwards	City of Sarnia, Manager of Planning
Ivan Peters	City of Sarnia, Sarnia Transit
Jason Cole	County of Lambton Engineer
Don Drackley, MCP	IBI Group, Project Manager
Chris Prentice	IBI Group, Transit Planner
Scott Johnston, P. Eng.	IBI Group, Transportation Engineer
Marian Saavedra, P. Eng.	IBI Group, Active Transportation Planner

2. PLANNING CONTEXT

2.1 City of Sarnia Strategic Planning

Strategic planning background and direction provided to the development of this TMP has come from the following City of Sarnia strategic plans:

2.1.1 City of Sarnia Integrated Community Sustainability Plan (ICSP), March 2013

Transportation is one of the five (5) sectors that are integrated into this recent sustainability plan. It focuses on the role of roadway, transit, active transportation, rail service, water and air service, all of which have an important role in achieving Sarnia's sustainable community future. The City administration is responsible for meeting the identified targets, goals and objectives of the ICSP by optimizing the use of these transportation facilities and services for the long term social, cultural, environmental and financial benefit of the local and regional communities.

According to the ICSP, planning for future transportation projects in the city will consider matters such as:

- Increased highway traffic volumes;
- Capacity of city streets including complete streets, thoroughfares, accessibility and impacts on neighbourhood streets;
- Improved connectivity between modes of active transportation infrastructure (cycling routes and walking trails);
- Improved public transit services; and
- Increased airport, freight rail and harbour facilities.

Each of these matters is addressed in the TMP in terms of recommended actions and projects. One weakness identified with the Sarnia transportation system according to the ICSP is the integration of alternative modes of transportation. This TMP specifically addresses the functional integration of road and active transportation facilities.

2.1.2 City of Sarnia Future Focus

In 2008, Sarnia City Council prepared this future focus for the city for the period 2008-2010 as the fundamentals of a sustainable Sarnia. While this document has been replaced with the more recent ICSP summarized above, it also indicates some transportation-related strategic expectations of City Council. Strategic Priority #3 involves transforming City service delivery via continuous improvement, and this includes to "*drive transit ridership increases via Information Technology innovation program to enable "just in time" route scheduling performance for users".*

2.1.3 City of Sarnia Corporate Strategic Plan

Although this Strategic Plan has been replaced with the preceding strategic planning updates, it did include two important transportation-related recommendations that are reflected in this TMP:

- Strategy: Create Programs to Identify and Protect Environmental Resources and Ecosystems
    1. Explore and promote environmentally friendly modes of transportation
    2. Maintain and expand the trail system and develop a supporting educational component

- Strategy: Provide Facilities and Programs that Promote a Healthy Lifestyle
    1. Expand pathway, walking and bikeway opportunities
    2. Ensure official documents and plans support a healthy lifestyle.

2.2 City of Sarnia Official Plan

In 2013 the Sarnia Official Plan began the mandatory five-year review and update. While the updates have not been approved as of March 2014, they do show some of the new policy direction being taken by the City of Sarnia in its long term transportation and related planning. This includes:

- Principles for a Vibrant City that includes improving accessibility and connectivity;

- The Map 1 City Structure Plan shown on Exhibit 2.1 establishes the city structure and local travel patterns that the transportation system is intended to service. This includes:
    - Growth Areas (Downtown, Centres (i.e. London Road/Lambton Mall), Corridors, Commercial Hubs and Employment Areas;
    - Urban Growth Boundaries and Settlement Areas; and
    - Intensification targets (strive to achieve 40% of new residential growth through intensification, infill and redevelopment); and

- The Map 4 Transportation and Road Widening Plan shown on Exhibit 2.2 that provides the city's road classification system (Provincial Highway, Arterial City and Arterial County, Collector Roads, Local Roads and Railways), as well as the transportation objectives, new Complete Street policy and policies on parking, transit active transportation and railways.

Exhibit 2.1 - Draft Official Plan Map 1: City Structure Plan

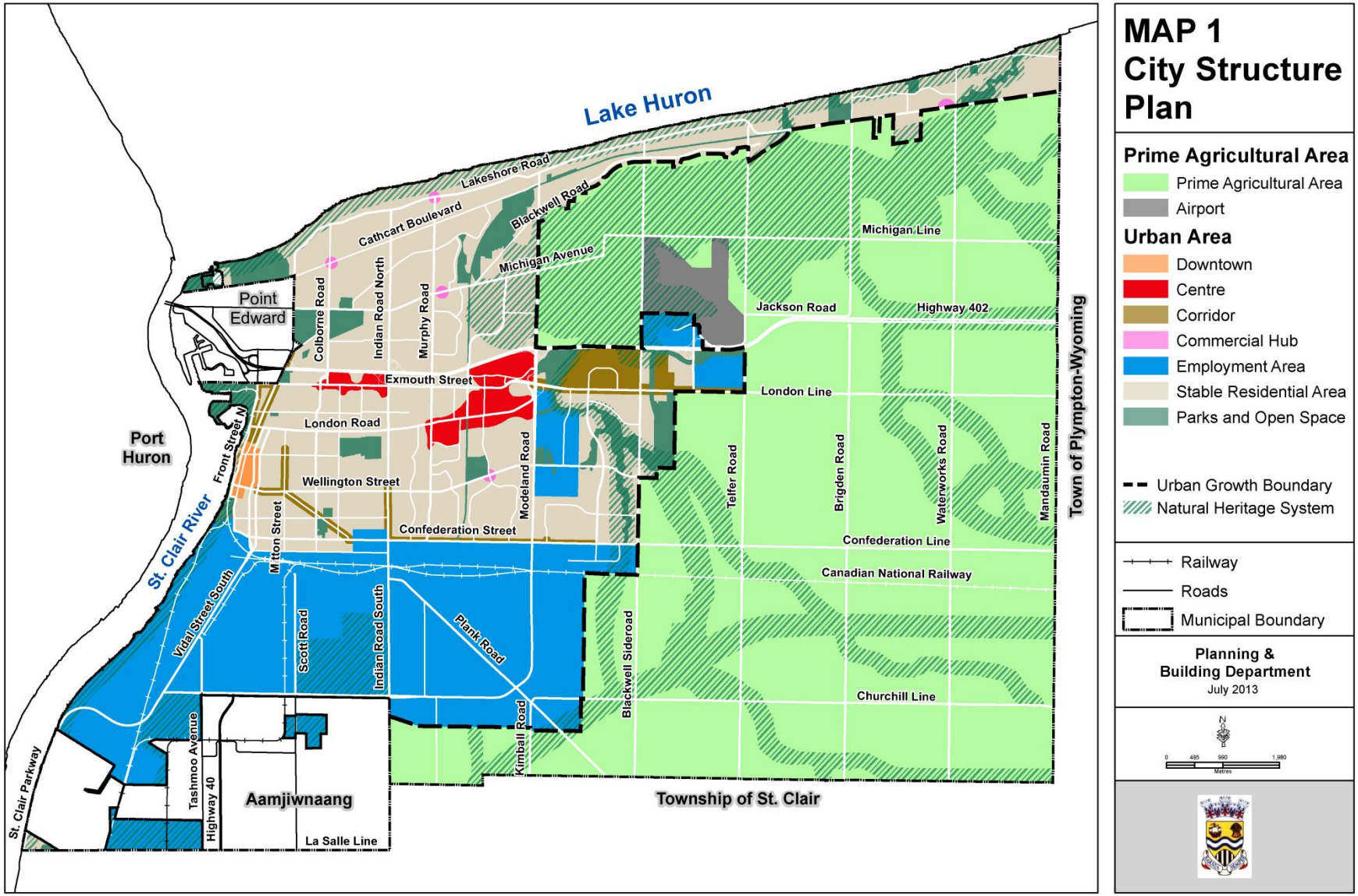
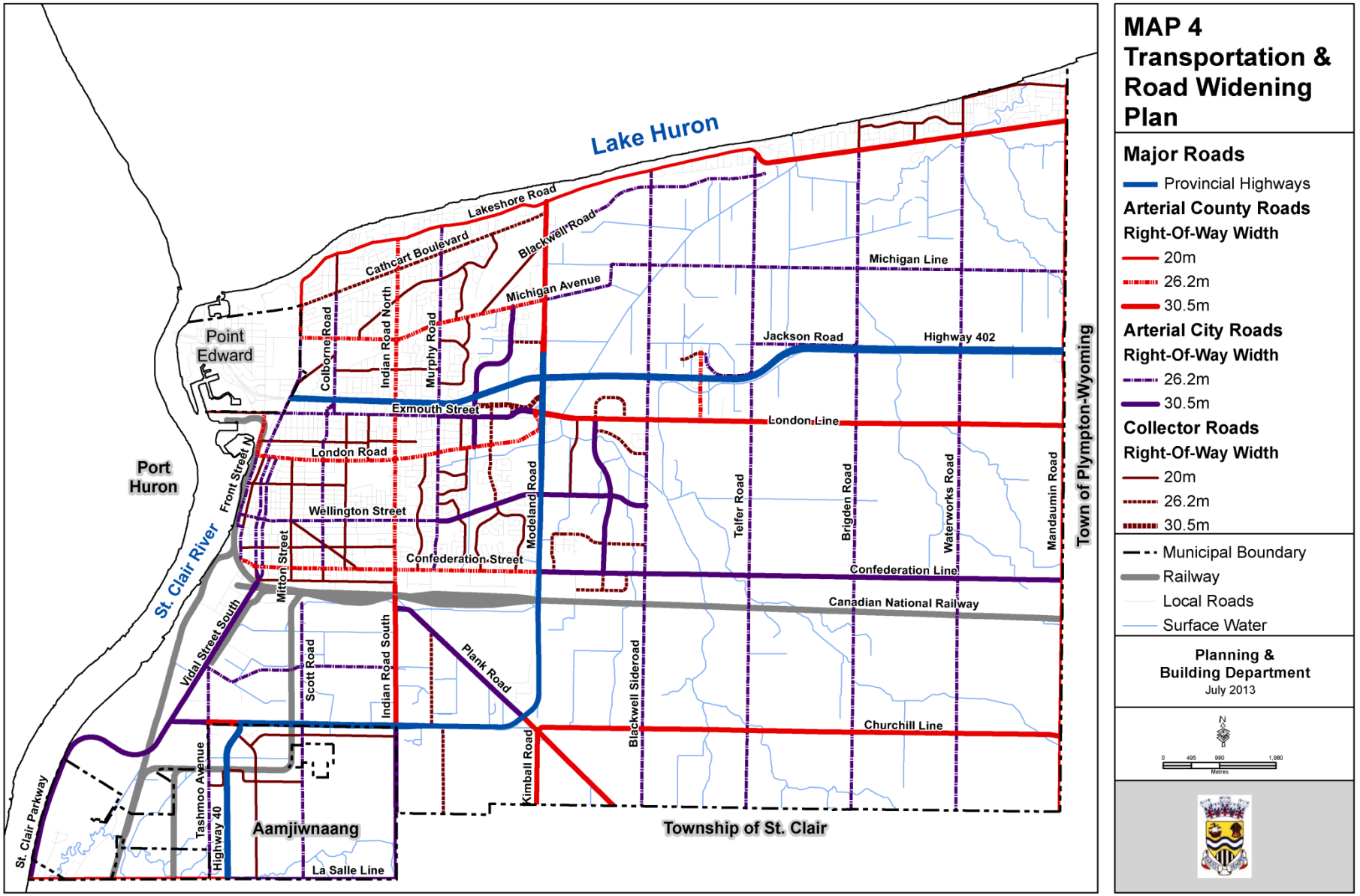


Exhibit 2.2 - Draft Official Plan Map 4: Transportation & Road Widening Plan



MAP 4
Transportation & Road Widening Plan

Major Roads
- Provincial Highways

Arterial County Roads
Right-Of-Way Width
- 20m
- 26.2m
- 30.5m

Arterial City Roads
Right-Of-Way Width
- 26.2m
- 30.5m

Collector Roads
Right-Of-Way Width
- 20m
- 26.2m
- 30.5m

- Municipal Boundary
- Railway
- Local Roads
- Surface Water

Planning & Building Department
July 2013

2.3 County of Lambton Official Plan

The County's current Official Plan includes policies supporting the County road network and cycling and walking. It also includes supporting general policies for the Sarnia Airport, marine ports and railways. Policies that support public transit are included, although no Sarnia Transit routes currently extend into the County.

2.4 Active Transportation-Related Studies

Input on active transportation planning was provided for the TMP preparation from the following sources, and was reviewed, considered and incorporated into the active transportation plan where appropriate:

2.4.1 Bluewater Trails Committee

The Bluewater Trails Committee is a committee of Sarnia City Council formed in 1996 with the mandate to develop, maintain, market and plan a safe network of pathways and trails in the City of Sarnia. Their contributions to the development of this TMP included provision of the following information:

1. Bike Friendly Street Proposal – The Committee provided the city with a proposal to connect the various existing trails and bicycle paths via "Bicycle Friendly Streets" and additional bike lanes. The proposal includes the elements of bicycle friendly streets, areas of the city to provide these streets and priorities for implementing these streets. The proposal was reviewed by the TMP consultants and many of the proposals have been incorporated into the Active Transportation Plan presented in Section 10 of this TMP document;

2. Input on Active Transportation Network Deficiencies – specifically dealing with provision of a trail along Confederation Street between Modeland Road and Murphy Road;

3. Heritage Park Subdivision Trail Connection - dealing with pathway connection to the Dow Research Park which has been evaluated as part of the Active Transportation Plan development; and

4. Sustainable Small Cities Report – This 2012 report provided to the Project Team by the Committee was prepared by the Corporate Knights magazine based on a 2011 survey of eight small-sized Canadian cities and well each performed under indicators that included ecology, economics, governance and infrastructure. Sarnia was rated 7th of the eight cities.

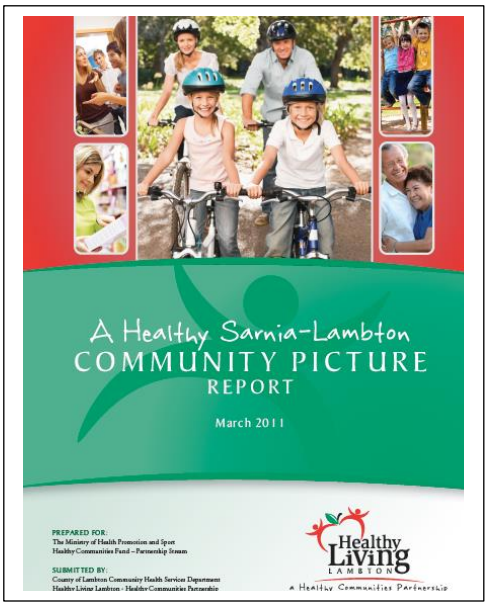
2.4.2 Bluewater Sustainability Initiative

The Bluewater Sustainability Initiative (BSI) is a community-based organization with a vision for Sarnia-Lambton to become recognized worldwide as a hybrid,

green community. It held a Sustainable Community Conference in March 2012, and the findings were provided to the TMP Project Team including actions to get Sarnia and Lambton County moving forward to be leading sustainable communities. For the near term, the conference actions items included a focus on bike friendly and active transportation, and the use of green transportation.

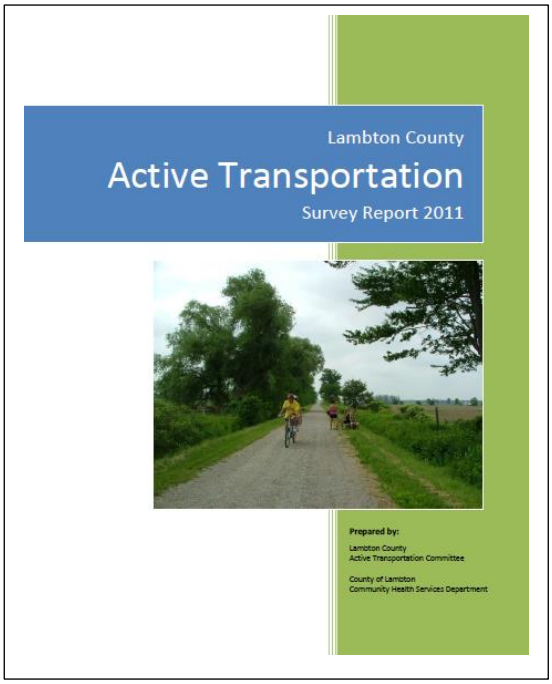
2.4.3 Healthy Living Lambton

The County of Lambton Community health Services Department provided coordination to bring together community partners to create a Healthy Living Lambton Healthy Communities Partnership to make the community a healthier place. A Community Picture report was prepared in march 2011 that includes an emphasis on active transportation for students amongst many other recommended actions.



2.4.4 Lambton County Active Transportation Committee

The Committee issued this report in June 2012 to report the results of an Active Transportation Survey to identify residents' barriers to being physically active, and to gauge interest in having more active transportation options in the community. Among its findings is identification of barriers to using active transportation, improvements that would encourage more active transportation use including access to public transit and improved transportation to school for children.



3. ROADWAY TRAFFIC OPERATIONS

3.1 Existing Roadway Network Level-of-Service

In order to understand the general travel conditions on the City's arterial and collector road network, an analysis was conducted of the Level-of-Service (LOS) the 28 strategic network intersections listed on Exhibit 3.1 and shown on Exhibit 3.2.

Exhibit 3.1 - Strategic Traffic Analysis Intersections

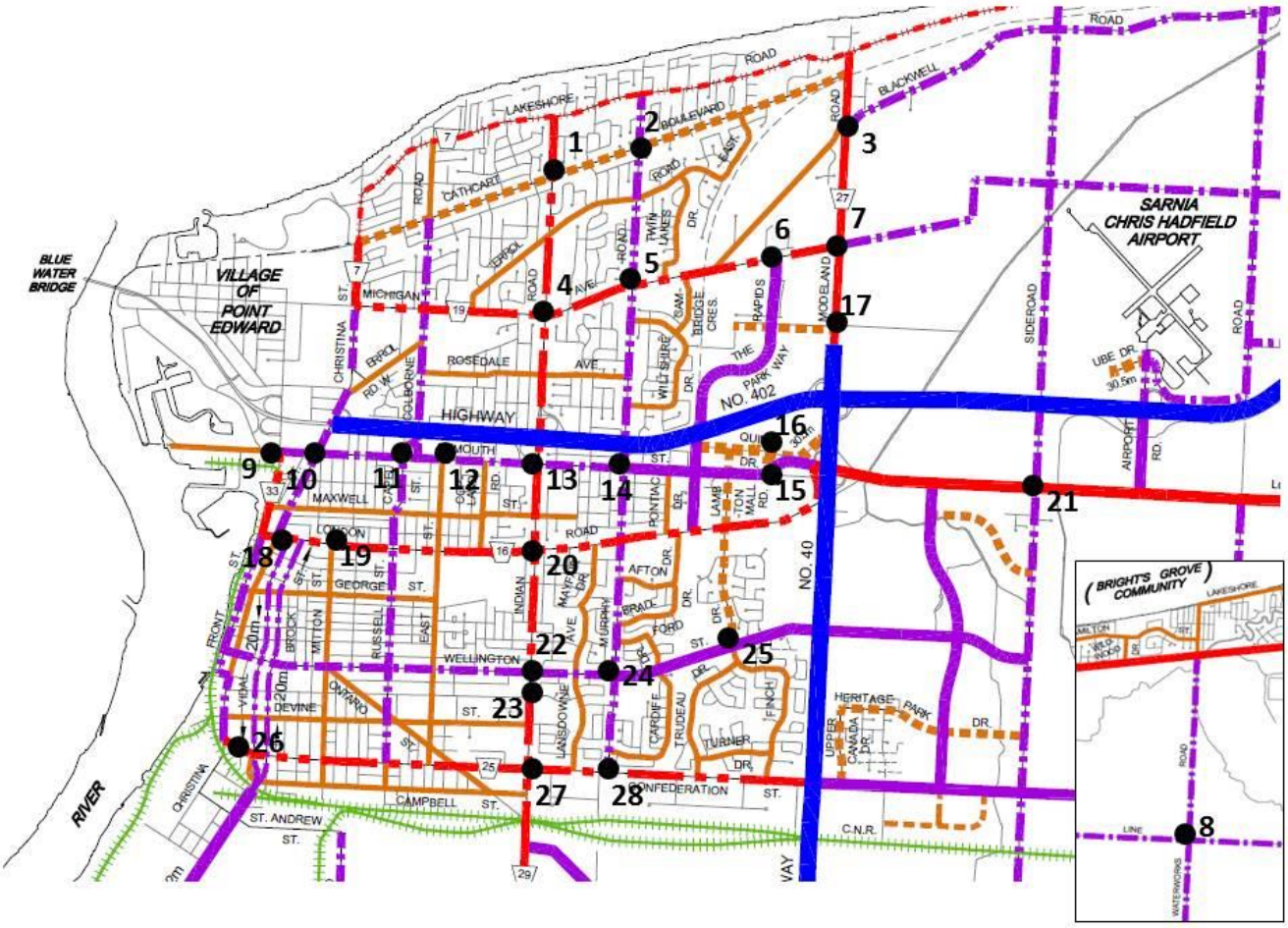
Signalized

IntID	*E-W Road*	*N-S R*
4	Michigan Ave	Indian
5	Michigan Ave	Murpl
6	Michigan Ave	The R
7	Michigan Ave	Mode
9	Exmouth Rd	Front
10	Exmouth Rd	Christ
11	Exmouth St	Capel
12	Exmouth St	East S
13	Exmouth St	Indian
14	Exmouth St	Murpl
15	Exmouth St	Barcla
16	Quinn Dr	Barcla
17	Berger Rd	Mode
18	London Rd	Christ
19	London Rd	Mitto
20	London Rd	Indian
21	London Line	Black
22	Wellington St	Indian
24	Wellington St	Murpl
25	Wellington St	Finch
26	Confederation St	Vidal
27	Confederation St	Indian
28	Confederation St	Murpl

Unsignalized

IntID	*E-W Road*	*N-S Roa*
1	Cathcart Blvd	Indian Rd
2	Cathcart Blvd	Murphy F
3	Blackwell Rd	Modelanc
8	Michigan Line	Waterwo
23	Talfourd St	Indian Rd

Exhibit 3.2 - Intersection Traffic LOS Analysis Locations



3.1.1 What is Level-of-Service?

The *Highway Capacity Manual* provides measurements of signalized intersection operation levels based on a qualitative measure of traffic flow at an intersection. The resulting intersection Level-of-Service (LOS) is dependent on vehicle delay and vehicle queue lengths at the approaches to a signalized intersection. It is calculated as the ratio between traffic volumes and approach capacities, called the V/C Ratio, and is described by the following LOS ratings. The objective in most small to medium-sized cities is to avoid LOS E/F:

- A= Free flow
- B=Reasonably free flow
- C=Stable flow
- D=Approaching unstable flow
- E=Unstable flow
- F=Forced or breakdown flow

More specifically, the conditions that exhibit these LOS ratings are:

LOS	Description	V/C Ratio
A	No traffic signal phase is fully utilized, with the intersection approach appearing open and turning movements made easily.	0 – 0.59
B	Occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted with platoons of vehicles approaching the intersection.	0.60 – 0.69
C	Operation is stable though with more frequent fully utilized signal phases, meaning some drivers may have to wait one red signal phase and longer queues develop behind turning vehicles. This condition is generally considered normal and acceptable in most urban intersection design.	0.70 – 0.79
D	Motorists experience restriction and instability of traffic flow, with delays to short delays to approaching vehicles in the peak periods. There are still enough signal cycles with lower demand to permit occasional clearance of developing queues to prevent excessive backups.	0.80 – 0.89
E	Intersection capacity is reached. There are long queues upstream of the intersection, and delays to vehicles may extend to several signal cycles.	0.90 – 0.99
F	Saturation (gridlock) occurs, with vehicle demand exceeding the available capacity.	1.00 or greater

For Sarnia, turning movement and signal timing data was collected and analysed for the 28 strategic intersections listed in Exhibit 3.1. The intent of this exercise was to broadly identify overall traffic LOS across the whole city's roadway network.

3.1.2 Existing LOS Measurements

Based on the traffic volumes and signal timing information collected for each of the analysed intersections, and the assigned capacity of the road (the V/C Ratio), the LOS was calculated as follows in Exhibit 3.3**.** Using Synchro™ Version 6, the existing LOS at these intersections in the weekday AM Peak Hour and PM Peak Hour was calculated to identify any existing capacity or operational deficiencies at these key signalized intersections. The existing LOS results are presented on Exhibit 3.4 for the morning AM Peak Hour and Exhibit 3.5 for the PM Peak Hour.

Exhibit 3.3 - Existing Strategic Intersection LOS

IntID	Name	AM Peak			PM Peak		
		V/C	Delay	LOS	V/C	Delay	LOS
1	Cathcart Blvd & Indian Rd		7	A		8	A
2	Cathcart Blvd & Murphy Rd		6	A		6	A
3	Blackwell Rd & Modeland Rd		4	A		5	A
4	Michigan Ave & Indian Rd	0.36	15	B	0.28	14	B
5	Michigan Ave & Murphy Rd	0.30	14	B	0.34	14	B
6	Michigan Ave & The Rapids Pkwy	0.27	17	B	0.19	16	B
7	Michigan Ave & Modeland Rd	0.38	15	B	0.27	11	B
8	Michigan Line & Waterworks Side Rd		2	A		2	A
9	Exmouth Rd & Front St	0.27	18	B	0.37	20	C
	Exmouth Rd & Christina St	0.30	14	B	0.33	14	B
11	Exmouth St & Capel St	0.24	16	B	0.41	18	B
12	Exmouth St & East St	0.20	24	C	0.37	23	C
13	Exmouth St & Indian Rd	0.28	13	B	0.51	14	B
14	Exmouth St & Murphy Rd	0.56	28	C	0.71	31	C
15	Exmouth St & Barclay Dr	0.26	19	B	0.51	20	B
16	Quinn Dr & Barclay Dr	0.20	14	B	0.39	15	B
17	Berger Rd & Modeland Rd	0.33	13	B	0.26	9	A
18	London Rd & Christina St	0.28	14	B	0.30	15	B
19	London Rd & Mitton St	0.24	11	B	0.41	12	B
20	London Rd & Indian Rd	0.30	22	C	0.49	25	C
21	London Line & Blackwell Side Rd	0.23	15	B	0.28	16	B
22	Wellington St & Indian Rd	0.39	19	B	0.71	29	C
23	Talfourd St & Indian Rd		2	A		4	B
24	Wellington St & Murphy Rd	0.24	21	C	0.30	22	C
25	Wellington St & Finch Dr	0.29	19	B	0.46	21	C
26	Confederation St & Vidal St	0.47	17	B	0.17	15	B
27	Confederation St & Indian Rd	0.66	23	C	0.74	28	C
28	Confederation St & Murphy Rd	0.43	15	B	0.69	25	C

As found in most cities, the afternoon PM Peak Hour experiences the highest traffic volumes in Sarnia, owing to more discretionary trips being made (work to home with shopping, recreation, social, etc.). However, Exhibit 3.3 shows that today, the strategic Sarnia intersections generally operate well in this busier PM Peak Hour, with exception noted further on in this section.

Exhibit 3.4 - Existing AM Peak Hour LOS

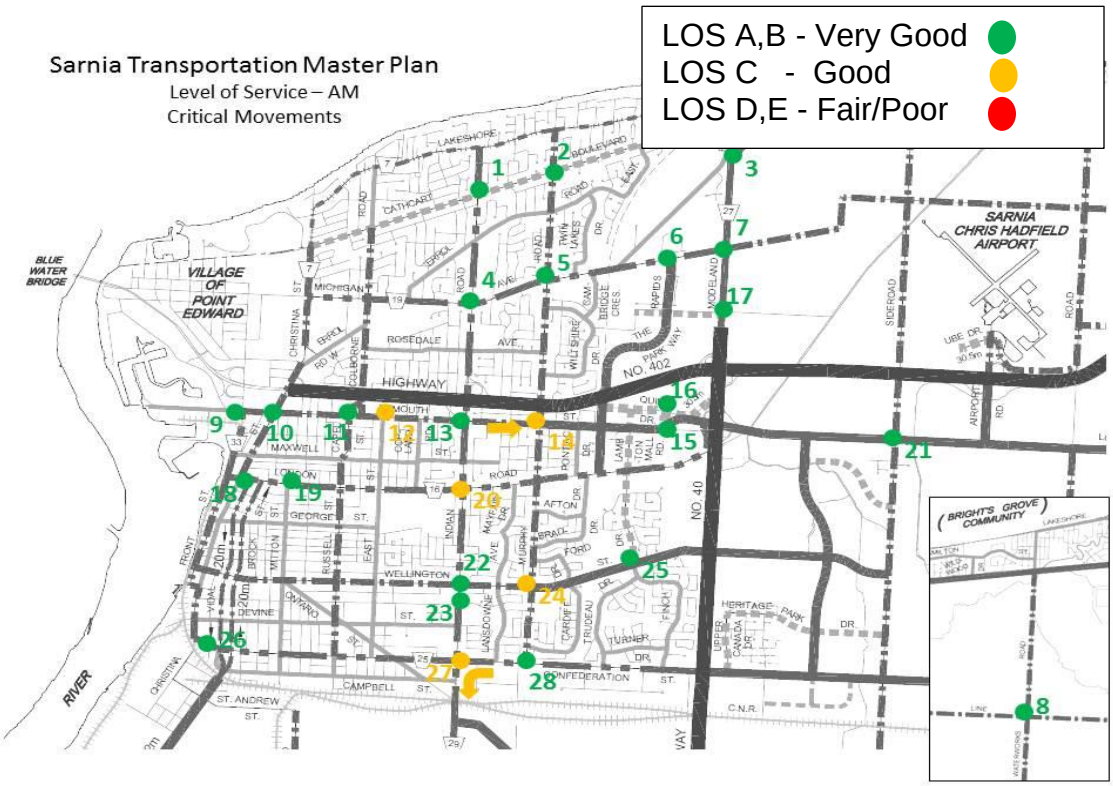


Exhibit 3.5 - Existing PM Peak Hour LOS

Overall, Sarnia road network operates well in the AM peak hour with only a few critical movements. In the PM, however, there are multiple movements that face capacity and queue problems due to higher volumes.

Both critical movements in the AM peak hour were found to be critical in the PM peak hour as well. The eastbound through movement in the intersection of Exmouth St & Murphy Rd faces volumes near capacity, which results in the movement operating at LOS D in both AM and PM peak hours. The westbound left turn movement volume in the intersection of Confederation St & Indian Rd actually decreases from AM peak hour to PM peak hour, but has an even higher volume-to-capacity ratio due to the intersection being busier throughout in the PM peak hour.

Multiple movements in the PM peak period were found to have 95th percentile queue lengths that exceed the storage lane length by a few meters. Despite these movements operating relatively well at LOS B or C, the short storage lanes mean that queues can spill back into the through movement lanes. In many of these cases, the extension of the storage lane by 5 to 10 meters can resolve the problem.

In the PM peak hour, four intersections on Exmouth St were found to have at least one critical movement each. Only two of these intersections (#14 and #15) are coordinated by offsets. Coordinating all the signalized intersections on Exmouth St may reduce the delays at these intersections, especially for the eastbound and westbound through movements.

These conclusions were made based on the following criteria, with the critical locations listed as follows:

- LOS D or worse (35.0s or higher average delay)
- V/C ratio over 0.80 (volume near lane capacity)
- Queue length (95th percentile) at or exceeding the storage lane length

AM Peak Hour

IntID	Name	Mvmt	Volume	V/C	Queue (m)	Lane (m)	Delay (s)	LOS
14	Exmouth St & Murphy Rd	EBT	358	**0.87**	89	736	**51**	**D**
27	Confederation St & Indian Rd	WBL	366	**0.83**	86	105	33	C

PM Peak Hour

IntID	Name	Mvmt	Volume	V/C	Queue (m)	Lane (m)	Delay (s)	LOS
11	Exmouth St & Capel St	WBL	150	0.39	**22**	**20**	18	B
13	Exmouth St & Indian Rd	EBL	242	0.64	**47**	**40**	19	B
14	Exmouth St & Murphy Rd	EBT	469	**0.88**	135	736	**47**	**D**
		WBT	487	**0.80**	81	902	**35**	**D**
15	Exmouth St & Barclay Dr	WBL	82	0.27	**23**	**20**	24	C
		SBR	205	0.28	**22**	**15**	18	B
16	Quinn Dr & Barclay Dr	WBL	333	0.58	**43**	**40**	14	B
20	London Rd & Indian Rd	NBL	106	0.23	**22**	**20**	19	B
22	Wellington St & Indian Rd	EBT	476	**0.92**	143	839	**44**	**D**
		WBL	88	**0.91**	**42**	**35**	**86**	**F**
23	Talfourd St & Indian Rd	EB	72	0.44	16	861	**43**	**E**
27	Confederation St & Indian Rd	WBL	269	**0.97**	70	105	**70**	**E**
		NBR	575	0.73	**98**	**95**	33	C
28	Confederation St & Murphy Rd	EBL	470	**1.02**	97	100	**61**	**E**

3.2 Future Transportation Planning Context

According to the City of Sarnia Official Plan, three land use forms in the City will influence most of the travel growth over the next 20 years in terms of local trip origins and destinations:

- Employment areas;
- Shopping Districts; and
- Two Designated Development Areas

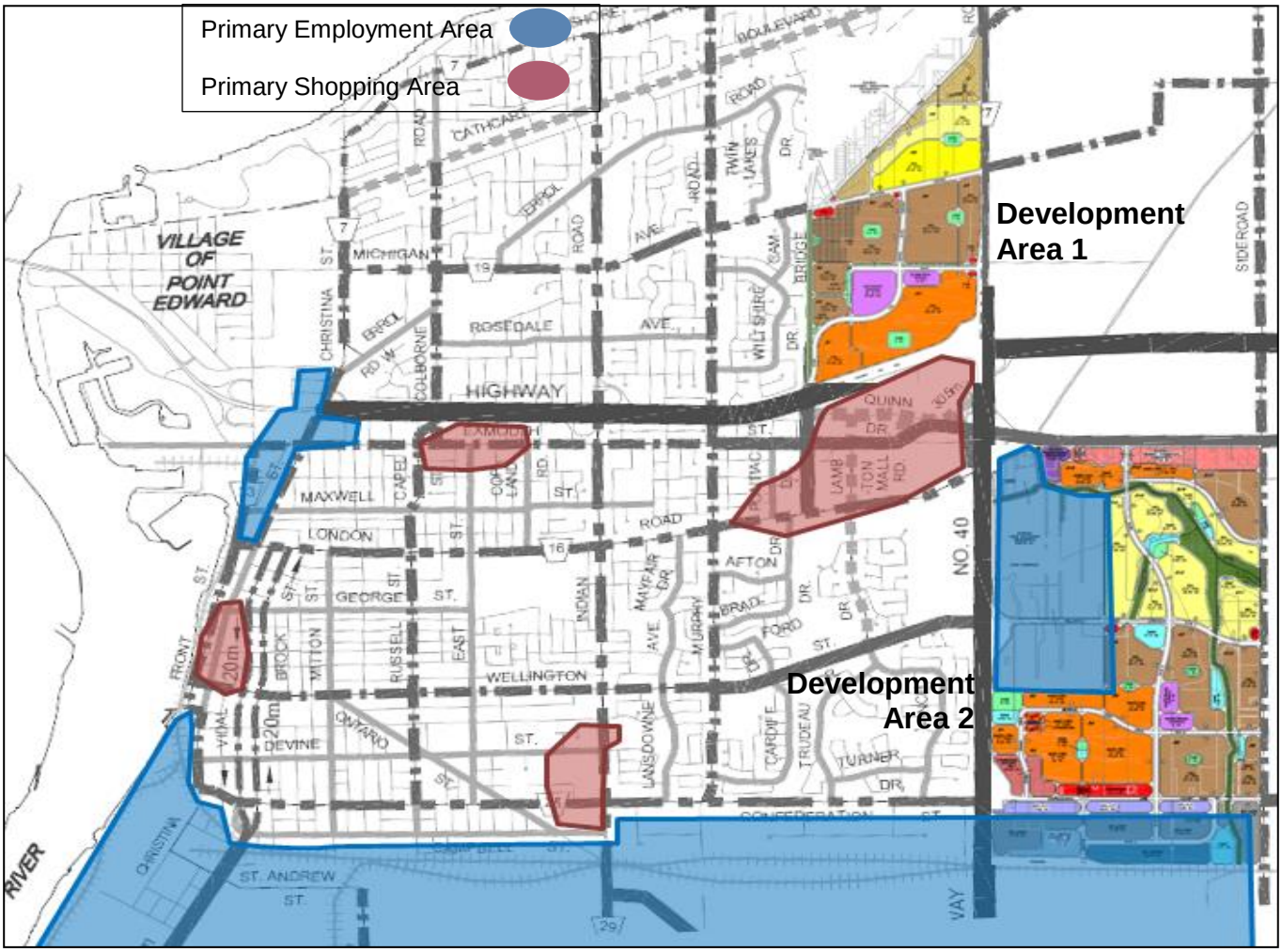
These areas are conceptually outlined on Exhibit 3.6 and represent the main context for future transportation planning in Sarnia over the next 20 years. It shows the employment areas in blue and shopping destinations in red, along with the designated Development Area 1 to the north and Development Area 2 to the south.

To forecast future travel generated by these local trip origins and destinations, the following general forecasting rules were used:

- Residential trips exiting the development areas are attracted to employment centres in the AM peak hour and shopping/recreational destinations in the PM peak hour;
- Commercial and industrial trips exiting the development areas are attracted to residential districts in the PM peak hour;

- Major arterials (identified using the AADT traffic volumes) have higher attraction rate of trips regardless of existing traffic conditions;
- Trip routes will optimize distance; and
- Local roads will not be used unless near origin or destination of trip.

Exhibit 3.6 - Major City Traffic Generators



3.3 Future Travel Demands

Future peak hour traffic forecasting and analysis was based on the existing conditions analysis previously reported in Section 3.1, and the future transportation planning context reported in Section 3.2. New development plans and area breakdowns were provided by the City. The Institute of Transportation Engineers (ITE) trip generation rates were applied to land uses planned in the two Development Areas.

The future Synchro travel demand forecasting model network was built based on the existing conditions road network and these City growth forecasts. Additional

roads were added to the network based on the two Development Area plans shown on Exhibit 3.6 (Schedule A-3.1 and Schedule A-3.2). Schedule A-3.1 is the development area north of Highway 402, while Schedule A-3.2 is the development area south of Highway 402 and east of Modeland Road. Road configurations and capacities for newly added roads were assumed to be similar to adjacent or attached existing roads.

The forecasting found that not all 28 analysis intersections are affected by development-generated trips. For example, intersection #8 – Michigan Line & Waterworks Sideroad – was not affected by development-generated trips due to its long distance away from the two planned developments. Some intersections were impacted minimally for similar reasons, such as intersection #1 (Cathcart Boulevard & Indian Road) and #18 (London Road & Christina Street).

Internal trips within Development Areas and inter-development area trips were accounted for to eliminate double-counting at intersections located in between the two development areas, such as intersection #15 (Exmouth Street & Barclay Drive) and intersection #17 (Berger Road & Modeland Road).

Overall, the 28 analysis intersections experience a 30% growth in traffic volume on average in the AM peak hour and 26% growth on average in the PM peak hour. The resulting trip growth from completion of the two planned Development Areas plus general background traffic growth in the city is show on Exhibit 3.7**.**

Exhibit 3.7 - 20-Year Traffic Growth Patterns

AM Peak Hour

PM Peak Hour

This forecasting shows that despite a considerable overall increase in traffic, most Sarnia intersections are expected to continue performing at a good LOS C or better. However, four intersections are near or overcapacity in either or both AM and PM peak hours:

- Intersection #22 (Wellington Street & Indian Road);
- Intersection #27 (Confederation Street & Indian Road);
- Intersection #14 (Exmouth Street & Murphy Road); and
- Intersection #15 (Exmouth Street & Barclay Drive).

These four intersections expected to operate overcapacity lie in the path between development areas and the major employment district to the south. In the peak hours, these intersections are used by numerous home-work and work-home trips.

Other critical movements that were identified in the existing conditions analysis are also found in Exhibit 3.8, such as the eastbound through movement at Exmouth Street & Murphy Road, and the westbound left movement at

Confederation Street & Indian Road. All existing critical movements experience even higher delays in the future conditions.

In the AM peak hour, critical movements were found at the three near or over-capacity intersections identified in Exhibit 3.8. In particular, the westbound left movement at Wellington Street & Indian Road, and the westbound left movement at Confederation Street & Indian Road deteriorate into LOS F. These intersections do not have available capacity to shift around using alternative signal timing plans, so alternative routing or additional capacity is required at these intersections.

In the PM peak hour, several critical movements belong to intersections that are also operating at LOS E/F and approaching their design capacities. Congested intersections such as Exmouth Street & Murphy Road and Confederation Street & Indian Road are likely to fail under future forecast volumes.

Unsignalized movements also suffer higher delays in the future conditions. The eastbound and westbound movements at Talfourd Street & Indian Road operate at LOS F in the PM peak hour. These unsignalized movements must wait for clear gaps in northbound and southbound traffic on Indian Road, which does not come often under the increased volumes in the future.

Exhibit 3.8 - Critical Roadway Movements: Combined Development and Background Growth

AM Peak Hour						
ID	Name	Mvmt	Volume	V/C	Delay (s)	LOS
2	Cathcart Blvd & Murphy Rd	WBL	94	0.58	55	F*
4	Michigan Ave & Indian Rd	WB	750**	0.85	30	C
14	Exmouth St & Murphy Rd	EBT	396	0.90	53	D
		SBL	540	0.89	31	C
22	Wellington St & Indian Rd	EBT	490	1.08	88	F
		WBL	135	1.50	302	F
		WBT	432	0.82	35	C
26	Confederation St & Vidal St	SBT	1253	0.86	26	C
27	Confederation St & Indian Rd	WBL	685	1.56	285	F

PM Peak Hour						
ID	Name	Mvmt	Volume	V/C	Delay (s)	LOS
2	Cathcart Blvd & Murphy Rd	WBL	61	0.61	86	F*
13	Exmouth St & Indian Rd	EBL	302	0.95	56	E
14	Exmouth St & Murphy Rd	EBL	180	0.83	43	D
		EBT	518	0.88	43	D
		WBT	643	0.95	49	D
		SBL	352	1.17	127	F
		SBT	418	0.83	40	D
15	Exmouth St & Barclay Dr	EBL	338	0.99	67	E
		SBL	439	1.27	166	F
		SBT	97	1.27	166	F
		NB	309**	0.84	45	D
16	Quinn Dr & Barclay Dr	WBL	481	0.90	33	C
20	London Rd & Indian Rd	NBT	698	0.85	40	D
22	Wellington St & Indian Rd	EBL	87	0.91	86	F
		EBT	712	1.32	182	F
		WBL	83	0.85	70	E
		WBT	550	1.22	141	F
		NBT	768	0.86	32	C
23	Talfourd St & Indian Rd	EB	80**	0.77	109	F*
		WB	108**	0.61	52	F*
24	Wellington St & Murphy Rd	EBL	273	1.09	110	F
25	Wellington St & Finch Dr	EBL	197	0.92	63	E
		WBT	492	0.80	32	C
27	Confederation St & Indian Rd	EBT	717	0.83	33	C
		WBL	328	1.44	246	F
		NBR	738	1.17	125	F
28	Confederation St & Murphy Rd	EBL	519	1.20	127	F

* unsignalized intersection LOS is calculated differently
** total volume for the approach

3.4 Main Roadway Network Mitigation Measures

Several intersections or individual traffic movements are projected to fail in the future conditions, especially with the additional trips generated by build-out of A-3.1 and A-3.2 Development Areas.

Future network issues and recommended mitigation actions are summarized in Exhibit 3.9.

Exhibit 3.9 - Future Network Issues and Recommended Mitigation Actions

ID	Intersection	Issue	Recommended Action(s)
13	Exmouth St & Indian Rd	EBL critical in PM	Signal phase re-optimization
14	Exmouth St & Murphy Rd	Several critical movements in AM/PM, intersection overcapacity in PM	Convert EBR lane to EBTR with 2 through-traffic receiving lanes
			Signal coordination along peak direction on Murphy Road
			Add another southbound lane
15	Exmouth St & Barclay Dr	EBL and SB (all) critical in PM	Add a dedicated southbound left lane, provide alternate access route(s) to the shopping destinations
20	London Rd & Indian Rd	NBT critical in PM	Signal phase re-optimization
22	Wellington St & Indian Rd	Several critical movements in AM/PM, intersection overcapacity in AM/PM	Signal coordination along peak direction on Indian Road
			Provide WBL permitted protected
			Widen intersection by one lane each direction
23	Talfourd St & Indian Rd	EB/WB critical in PM	Signalize intersection
			Signal coordination along peak direction on Indian Road
24	Wellington St & Murphy Rd	EBL critical in PM	Signal phase re-optimization
25	Wellington St & Finch Dr	EBL critical in PM	Signal phase re-optimization
27	Confederation St & Indian Rd	Several critical movements in AM/PM, intersection overcapacity in AM/PM	Provide WBL permitted protected
			Signal coordination along peak direction on Indian Road
			Widen intersection by one lane each direction
			Encourage carpooling for work-related trips
28	Confederation St & Murphy Rd	EBL critical in PM	Signal phase re-optimization

3.5 Capacity Constraints

Three intersections are projected to operate near- or over-capacity in the future conditions:

- Exmouth Street & Murphy Road;
- Wellington Street & Indian Road; and
- Confederation Street & Indian Road.

Due to existing properties and structures around these intersections, adding through lanes or turning movement bays would be difficult and costly.

Intersections near highway ramps and bridge crossings also cannot be widened due to physical constraints.

Physical improvements are also required at the intersection of Exmouth Street and Barclay Drive to accommodate the traffic entering and exiting the shopping destinations. From the current 2-lane southbound configuration with SBL/SBT shared in one lane and SBR in the other, the intersection should be upgraded to have at least one lane for each SBL/SBT/SBR (3 lanes total). The 3-lane configuration can also be modified to allow left turn from the centre lane (shared SBL/SBT in the centre lane).

3.6 Signal Coordination and Optimization

Signals at arterial road intersections such as along Indian Road should be re-coordinated from Confederation Street to Wellington Street to maximize flow in the peak direction. The peak directions in the AM peak hour are generally southbound and westbound at the major intersections, and the peak directions in the PM peak hour are generally northbound and eastbound at the major intersections.

Signal phases at major intersections should be re-optimized based on observed turning movements in the future. As demonstrated by the future forecast scenario with development growth, several movements are likely going to experience a sharp increase in traffic volume. It is recommended that the city conducts turning movement counts every year nearly completion of construction in the Development Areas for at least three years and re-optimize signal timings as necessary.

In conjunction with the coordination effort, the Talfourd Street and Indian Road intersection may benefit from signalization. At this current unsignalized configuration, the intersection cannot handle the future volumes. Despite being in close proximity with the major signalization at Wellington Street & Indian Road, careful coordination of offsets can ensure that the through-traffic on Indian Road flows well while allowing local traffic on Talfourd Street to operate at a reasonable level of service.

3.7 New Major Roadway Network Capital Investment

Exhibit 3.10 lists the estimated capital cost of recommended intersection and major road improvements in Sarnia over the next 20 years resulting from this TMP. The total cost estimate in 2014 dollars is $5.65 Million to implement these projects. Note that the two road widening projects will require Environmental Assessment approval.

Exhibit 3.10 – Major Roadway Network Improvement Capital Cost Estimate

MAJOR INTERSECTION CAPACITY IMPROVEMENTS	
Exmouth & Murphy – add another SB lane	$100,000

Exmouth & Barclay – add SB left turn lane	$100,000
Talfourd & Indian - signalize intersection	$250,000
Confederation & Indian – widen intersection one lane each direction	$200,000
Sub-Total Major Intersection Improvements	$650,000
MAJOR ROADWAY WIDENING / EXTENSION	
Widen Exmouth Street 1 lane/direction based on widening from London Line to Rapids Parkway Extension - extend to be determined through EA	$2.2 M
Extend Rapids Parkway to London Rd. 1560 m	$2.8 M based on $1800/m
Sub-Total Road Widening/Extension	$5.0 M
TOTAL Capital Road Projects recommended in TMP	**$5.65 M**

4. Public Transit Service

This section of the Transportation Master Plan provides a summary of the main findings and recommendations made for the provision of conventional and specialized transit service in Sarnia. It provides a more comprehensive approach to Sarnia's transportation planning provided by the TMP process. This includes the planned role that public transit plays as part of the City's transportation system, and will continue to play for the next 20 years. Reference should be made to the complete **Volume 2: Transit Master Plan** for more detailed information on the City's 10 year transit service plan.

4.1 Existing Transit Services

The City of Sarnia provides conventional and specialized transit services within the city and to the Village of Point Edward under an operating contract between the Village and the City. The conventional transit service, "Sarnia Transit", is a fixed route system. The specialized transit service, "Care-A-Van", is an on-demand, door-to-accessible-door operation. Care-A-Van users must meet eligibility criteria, based largely on their disability and inability to use the conventional transit service, and must pre-book trips.

Over 1.3 million passenger trips were taken on both Sarnia Transit and Care-A-Van services in 2013. Service is provided seven days a week and generally from 6:30 a.m. to 11:00 p.m. on weekdays, 8:00 a.m. to 11:00 p.m. on Saturdays, and 8:30 a.m. to 6:30 p.m. on Sundays.

4.1.1 Transit Routes

The conventional transit system is comprised of a network of 11 main routes which include two peak-only routes, one route serving the Village of Point Edward and one route serving the Bright's Grove area. Supplementing regular service routes are special trips on routes serving secondary schools, Lambton College, and the chemical valley employment area. There are separate distinct route network and route variations for weekdays, weekday evenings and Saturdays and Sundays. A demand-response service is provided in the evenings in one area of the city replacing two fixed routes (5 and 7). Service requires 15 vehicles in peak hours.

The Care-A-Van service is provided by five vehicles at maximum trip times and includes service outside the Transit Service Area within the municipal boundaries.

The Sarnia Transit route network has two main types of routes:

- Cross-town (east-west) routes that serve major corridors and connect major destinations and transit terminals; and
- Local and neighbourhood routes that primarily serve or feed into the crosstown routes.

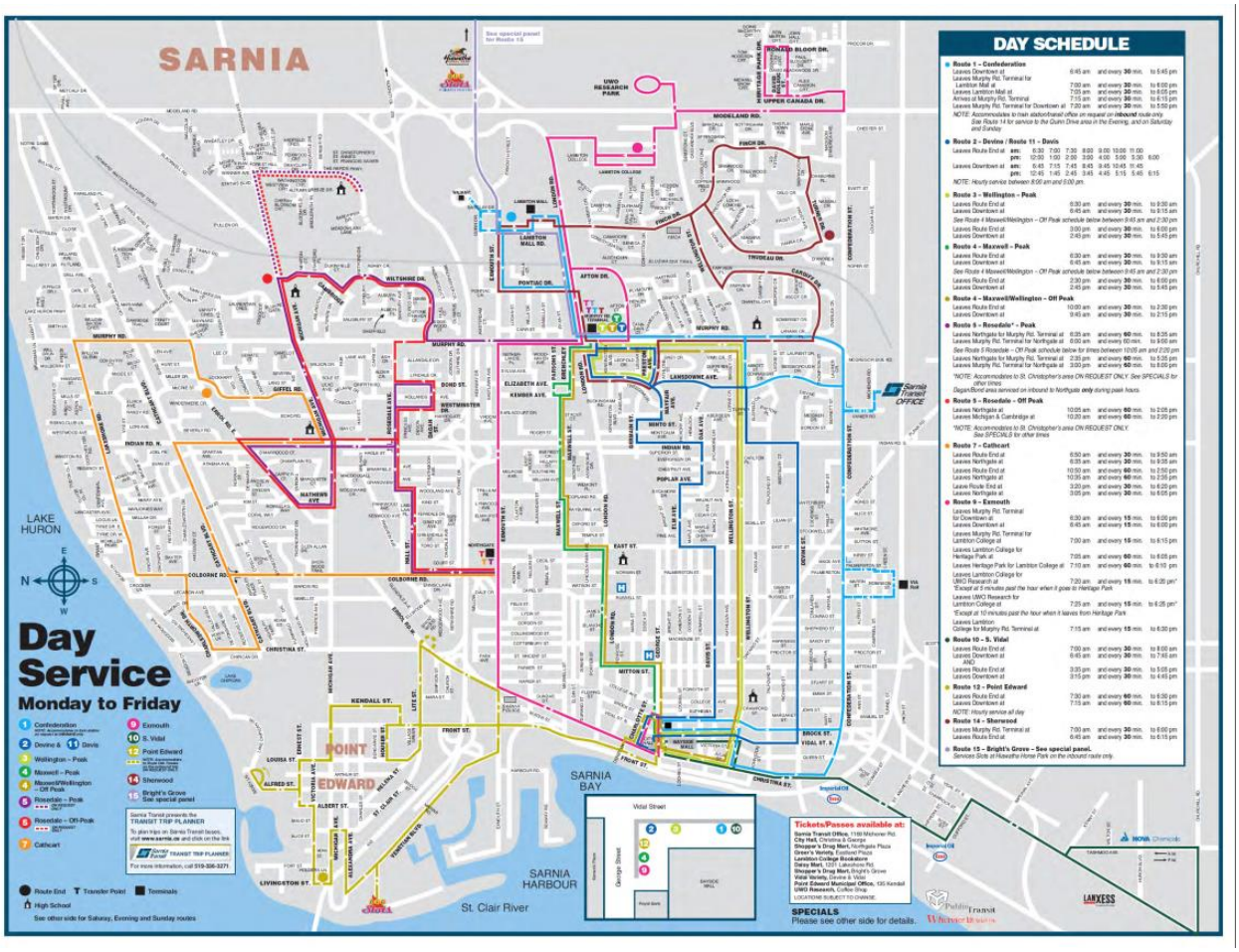
There are three major transfer points where Sarnia Transit's routes converge and timed transfers are provided for users who must take more than one route to complete their trip:

- **Downtown Sarnia** terminal, located at the southwest corner of George Street and Vidal Street North, adjacent to Bayside Mall;
- **Northgate terminal, located at the rear of the Shoppers Drug Mart at Exmouth Street and East Street; and**
- **Murphy Road** terminal, located adjacent to the Superstore at Murphy Road and London Road.

As shown on Exhibit 4.1, generally, all cross-town routes serve both the Downtown and Murphy Road terminals, while the Northgate terminal primarily provides connections to local routes serving the north end of Sarnia.

Sarnia Transit has a fleet of 23 vehicles with a mix of large and small high-floor and low-floor accessible buses. There are six specialized transit vehicles for the Care-A-Van service. The transit department employs 74 full and part-time people for the combined conventional and specialized services.

Exhibit 4.1 - Weekday Day Service Network

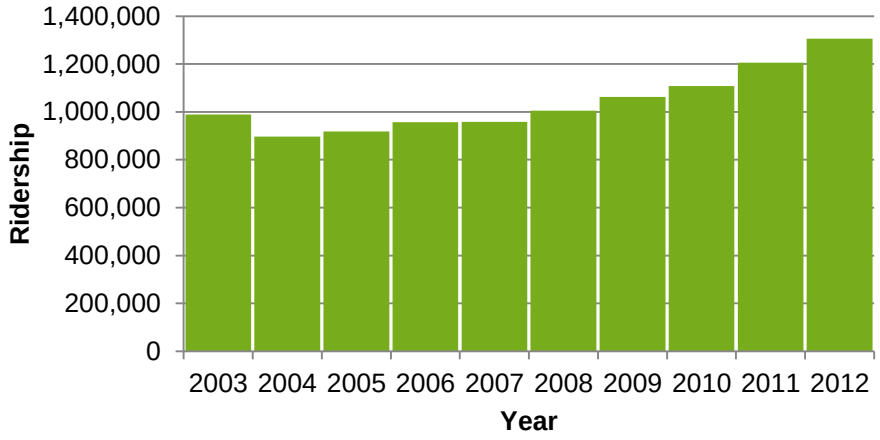


4.1.2 Transit Ridership

Sarnia Transit ridership has increased over the past several years as shown on Exhibit 4.2, reflecting similar trends in transit ridership across the country. Between 2003 and 2012, ridership increased by over 30%, with approximately 1.3 million rides taken in 2012. The increase in ridership has occurred while population in Sarnia has remained stable over the past decade and despite downturns in the local and regional economy. Changing demographics, increased cost of car ownership, an increase in the student population at Lambton College, particularly the influx of international students, have contributed to ridership gains, particularly on routes serving the college and areas where students are residing. Much of this growth has occurred without significant increases in capacity or changes in route structure.

For Care-A-Van, over 35,000 trips were taken in 2013.

Exhibit 4.2 - Annual Transit Ridership 2003-2012



One of the key measures of system ridership is rides per capita, represented by total ridership per population served. In 2011, Sarnia Transit served approximately 16 rides per capita, which is below both the national average for its population group (22 rides per capita) and that of its peer group (26.6 rides per capita). The increase in ridership in 2012 raised the rides per capita to 17.6. Systems with higher rides per capita provide a higher level of service than Sarnia, as measured by service hours per capita. Most peer systems have also experienced greater population and employment growth over recent years.

4.2 Opportunities to Improve Transit Services

4.2.1 Conventional Transit – Sarnia Transit

The review of the Sarnia's transit services conducted as part of the Transportation Master Plan/Transit Master Plan identified the following opportunities for improving Sarnia's conventional transit services:

Route Network and Service Levels

- Update transit service standards to reflect current and future context;
- Increase service to high ridership corridors including Exmouth Street and Devine Street;
- Restructure the route network to better reflect travel patterns, such as introduction of north-south routes and improved service to major destinations – Lambton College, Lambton Mall, Walmart;
- Continue to serve the downtown as the employment, social and cultural heart of the city;
- Improve service to employment areas in the south end of city, including measures to improve ridership to Chemical Valley. Routes currently do not provide attractive north-south orientation that would better suit work-based trips;
- Adjust routes to improve on-time performance and to provide bus operators with the opportunity to continue a high level of customer service while meeting scheduled run times;
- Provide options for serving new growth areas including phasing options; and
- Address service needs in the north end to increase ridership where routes are under-performing.

Transit System Infrastructure

- Buses – adopt a long-term fleet replacement plan and review vehicle size strategy; reduce spare ratio through greater standardization of fleet;
- Terminals – Consider and identify locations for new terminals with enhanced passenger amenities;
- Bus stops – re-design to be distinctive; review number and location of stops; assess for AODA accessibility compliance and develop upgrade plan; and
- Shelters – implement regular cleaning and maintenance program; increase number of shelters; adopt location selection criteria.

General

- Transit Special Service Area (TSSA) - expand or eliminate;
- Transit-oriented Development (TOD) and Transit Supportive Measures - adopt transit supportive policies; review parking rates in relationship to cost to use transit;

- Accessibility – accept mobility aids on Sarnia Transit,
- Intelligent Transportation Systems (ITS): identify opportunities to use emerging technologies to improve communications/information sharing with customers, track on–time performance. A separate report on Transit and City-wide ITS needs has been prepared and should be referenced; and
- Increase transit promotion and marketing including updating the transit system's corporate image.

4.2.2 Specialized Transit Service – Care-A-Van

Care-a-Van provides an invaluable service for the city's elderly and disability communities. It remains imperative that there exists, however, non-discriminatory access to accessible conventional services, where available, with Care-a-Van acting as a "safety net" for people who cannot use the conventional transit services. Philosophically, specialized transportation is not intended to be a comprehensive system of transportation for individuals with disabilities but, rather, a system that can provide individuals with disabilities the same public transportation service opportunities available to the general public.

For the City's specialized transit service, Care-A-Van, the following are the opportunities for improvement:

- Alter the Care-a-Van booking requirement to be 24 hours (1 day) in advance (and up to seven days). Same day service will be available where practical (on a space available basis);
- Introduce a 20 minute scheduling window for trip reservations with scheduling to be done in real time with trip confirmations completed at time of trip booking;
- Review eligibility criteria and eliminate reference to trip purpose;
- Adopt automated scheduling system and other demand management interventions to improve efficient utilization of vehicle and staff resources;
- Allow Care-a-Van registrants to travel free on Sarnia Transit fixed route services to encourage the voluntary use of accessible fixed route services by Care-a-Van registrants able to use conventional transit; and
- Adopt service standards regarding trip times and trip acceptance, maximum trip times, on-time performance, cancellations and no-shows, service utilization, user assistance and cost recovery.

Overall, increases in future demand for Care-A-Van service over the term of the Transit Master Plan, as a result of changes in the population demographics through aging, can be accommodated through more efficient scheduling and

vehicles utilization practices without an increase in the resources (vehicles or staffing) required to deliver the service.

4.3 Transit Policies

The Transit Master Plan provides a 10-year program for improving Sarnia's transit services. To guide the development and management of the City's transit service and to increase transit ridership and modal split over the long term, the following Vision, Mission Statement, Objectives and Goals and Service Standards are proposed which form part of the Transportation Master Plan. The following goals and objectives as well as the Transit service plan provide a 10-year forecast of transit needs. This plan can be extrapolated to 20 years. However, given the dynamics of change in any community over such an extended period of time, it is recommended that the City conduct a new transit review within 10 years.

4.3.1 Transit Vision, Mission, Goals, Objectives and Service Standards

Vision

The long-term vision for the transit system is one that emphasizes quality of life, sustainability and economic development described as follows:

- **Quality of Life** – Transit needs to provide mobility options for residents and tourists to ensure access to work, education, health care, shopping, social and recreational opportunities.
- **Sustainable** – Transit needs to be a cost effective alternative to the automobile for environmental reasons, affordable for the community, and fiscally responsible to the taxpayers.
- **Economic Development** – Transit needs to position itself as an "economic engine" for community growth and prosperity, with services and costs reflective of the City's economic development initiatives and consistent with the growth in its residential, commercial and tourism sectors.

Mission

To achieve the long-term vision for transit, the following mission statement is proposed:

To provide cost-effective transit services that enable all residents to access work, education, health care, shopping, social and recreational opportunities in Sarnia, and that are competitive with the automobile in terms of proximity, schedule reliability, frequency, and travel time.

This statement should be featured in all City and Transit promotional material as well as in the City's key policy and planning documents.

Objectives

To realize the vision and mission, the following 10-year objectives intended to position Sarnia Transit to be a significant contributor to the City's vision of quality of life and sustainable development are proposed.

Objective 1: To Improve Service Levels and Ridership

Sarnia Transit service levels will be progressively increased to attract new users particularly the non-student market. To do so, the City will improve its transit services to encourage people to leave their cars at home and increase the modal split for transit. There is potential for increasing ridership and the modal split as the current route structure is discouraging ridership.

- ***Services*** *– increase annual vehicle hours for the conventional service from 62,000 (2013 level) to 81,000 over the next 10 years.* This translates into an approximate 3% annual increase which is needed to achieve the desired increased ridership levels.
- ***Ridership*** *– increase annual revenue passengers from 1.3 million in 2013 to 1.9 million over the next 10 years.* This represents an approximate 3.0% per annum increase consistent with the increase in service levels.

The service and ridership objectives are to be accomplished through an improved and uniform route structure throughout all service hours and more direct two-way services in the main travel corridors which reflect established travel patterns.

Objective 2: To Improve System Productivity and Cost-Effectiveness

Maximizing the efficient use of transit system resources including manpower, equipment and vehicles, facilities, and systems will enable Sarnia Transit to continue to be cost-effective. The objectives are focused on system financial policies and the productivity of resources:

- ***System Financial Policy*** *– attain an operating cost recovery, exclusive of capital cost, of 38% over the short term; the 2013 cost recovery rate was 38%.*
- ***Municipal Investment*** *– gradually increase the municipal investment to $52.00 per capita level by 2024; the current investment level is $38.04 (2012) per capita. The higher investment will permit service levels to improve consistently over the 10 year timeline and represent an annual increase of approximately 3%.*
- ***Fare Policy*** *– adjust the fare structure and rates at regular intervals so that passenger revenues increase with inflation and maintain the cost recovery target.*
- ***Service Utilization*** *– increase the service utilization rate from 19.5 revenue passengers per vehicle service hour to 23.0 revenue*

passengers per vehicle service hour over 10 years through service improvements and active promotion of transit use.

- ***Modal Split** – increase the transit modal split from the 2006 level of 2.0% to 3.5% within 10 years.*

Objective 3: To Improve Service Quality and Customer Satisfaction

In order to become more competitive with the private auto, Sarnia Transit will need to improve its schedule adherence, service reliability, and the appeal and accessibility of the buses and transit infrastructure.

Service Standards

Service standards provide the policy basis for planning and managing municipal transit services. Standards include considerations for service coverage, frequency of service, and system performance. The following service standards set out by Sarnia Transit are summarized below:

Level of Service: Level of Service standards set out warrants for the provision of transit service within the service area and included:

- *Coverage of 90% of the city within a 400-metre walk of transit during peak periods;*
- *Minimum provision of hourly bus service where provided, with an increase in service where ridership exceeds 8 revenue passengers per vehicle hour; and,*
- *Evening and Saturday service provided where average ridership exceeds 8 revenue passengers per vehicle hour.*

System Performance: these standards set out targets for ridership and overall system financial performance and include:

- Routes achieving a minimum of 8 revenue passengers per vehicle hour; where not achieved, a reduction to 60-minute service would be considered; and,
- Overall system revenue/cost ratio target of 38% each year.

4.3.2 Transit Strategies

Investment

Adopt the peer level of financial investment. This strategy would result in substantial improvements to transit services in the long term (10 Years) to 2024 and would bring the service level and ridership up to those of Sarnia's peer cities.

Service

The objective of the Sarnia Transit Master Plan is to make changes to the transit system so that it can better serve the needs of the community, increase transit use and improve its performance according to the policy framework. Specific

strategies for improving Sarnia Transit services over the short term (to 2018) and long term (to 2024) are outlined and include:

- Short term service strategies concentrating on improving the basic structure and frequency of the transit routes with an improved network design starting in 2015 with service to new residential areas, standard 30-minute frequencies, improved span of service and elimination of different route network structures; and
- Long term service improvements to 2024 focus on improvements in transit service levels to that of Sarnia's peers.

As noted previously, the foregoing strategy provides a 10-year forecast of transit needs. This plan can be extrapolated to 20 years. However, given the dynamics of change in any community over such an extended period of time, it is recommended that the City conduct a new transit review within 10 years.

4.3.3 Transit Special Service Area

In 2003, City Council adopted a "Transit Special Service Area" By-law which both defines the area within which conventional transit service is provided, and within which property taxes include the cost of transit. Properties outside of the defined "Transit Service Area" (TSA) do not pay taxes towards transit. The TSA represents a boundary of approximately 450 metres from a transit route. Effectively, this approach limits where conventional transit will be provided. It also has the effect of limiting the financial investment available for conventional transit. As a result, the population served by Sarnia Transit is 71,420. The TSA boundary and the concept of the TSA were last reviewed in 2009 and no change was made to the boundary or the By-law at that time. Care-A-Van service is not subject to this same limitation and is funded from the general levy.

There have been a number of requests to have transit service extended to areas outside the TSA but these have been declined. At the same time, most future development within the City is projected to occur outside the TSA such that a change to the TSA boundary will need to be considered. It may be appropriate, at that time, to revisit the purpose and benefit of having a separate service area for Transit. In concept, transit service should be available to all residents, subject to the application of approved transit service policies as detailed within the Public Transit Master Plan, and all residents and property owners should contribute to the provision of public transit as a general benefit to the community.

As well, there is currently an inequity between the provision of and funding for specialized transit compared to conventional transit which may no longer be appropriate.

Most future development within the City is projected to occur outside the TSA such that the TSA would need to be revised and expanded to meet the future transit service needs of the City, if that is desired by City Council. At the same

time, there is inconsistency in the application of the TSA between the conventional and specialized transit services wherein Care-A-Van service is not subject to the same boundary limitation and is funded from the general levy.

In order to deliver transit service to the newly developing areas of the City as well as eliminate the policy conflict between the conventional and specialized transit services, the City should consider rescinding its Transit Special Service Area By-law.

4.4 Accessibility Strategy – Sarnia Transit and Care-A-Van

With the City providing both a fixed route conventional public transit service, there should be a unified approach to serving people with disabilities that is designed to optimize the features and flexibility of both services while minimizing the financial investment required.

The conventional transit service, in accordance with Provincial policy on accessibility, has moved towards accepting people with disabilities through the purchase of low-floor buses with kneeling capabilities, a mobility device ramp and two wheelchair positions per bus. These features will continue to be enhanced by the upgrading of bus stops and related infrastructure to accept mobility devices as outlined within this transit service plan.

The overall objective is that the conventional service would be utilized by persons who are able to do so while the specialized service would be dedicated to those persons who cannot access the conventional service, as defined by eligibility criteria. In this context, it is to be emphasized that Care-A-Van is for those persons unable to use an accessible public transportation system, not for those who find it more difficult, are reluctant or unwilling to use an accessible public transportation system. It is important to recognize that determining and managing the demand for transportation is done sensitively as there are many customers who have good and bad days regarding their disabilities, and to ensure that customers using Care-A-Van can function independently when arriving at their destination.

At the same time, the City can facilitate a more integrated approach between accessible conventional transit service and its specialized transit service. It can build on current initiatives and further foster a user-friendly, accessible conventional service that voluntarily attracts older adults and riders with a disability away from specialized transit services thereby increasing available space on the specialized service. The City's accessible public transit system provides a higher degree of trip-making flexibility and facilitates greater travel spontaneity and independence. A truly accessible transit system can become the preferred choice for many people with a disability as well as ensure that the City's transit services remain in full compliance with the Accessibility for Ontarians with Disabilities Act (AODA).

Volume 2: Transit Master Plan includes short and long term recommendations to improve accessibility on the conventional transit service.

4.5 Transit Master Plan Recommendations

4.5.1 Conventional Transit – Sarnia Transit

Based on the review and assessment of Sarnia's transit services, the overall transit and transportation needs identified within the City and in comparison with Sarnia's peer group, a 10-year Transit Master Plan has been developed. The Plan has the following key features designed to support the overall objective of increasing transit ridership and modal split over a 10-year period:

- Restructuring of the conventional transit route network to better respond to the travel patterns within the city and, particularly, more effectively serve existing and future growth areas;
- Increase transit service levels from the current (2014) level of 0.79 revenue-hours of service per capita and ridership level of 17.6 rides per capita to 1.13 revenue-hours and a rides per capita level of 25.8;
- Accept wheelchair and scooter users on the conventional transit service; and
- For the specialized transit "Care-A-Van" service, emphasize use of the service through changes to eligibility criteria and monitoring by persons unable to use the conventional transit service.

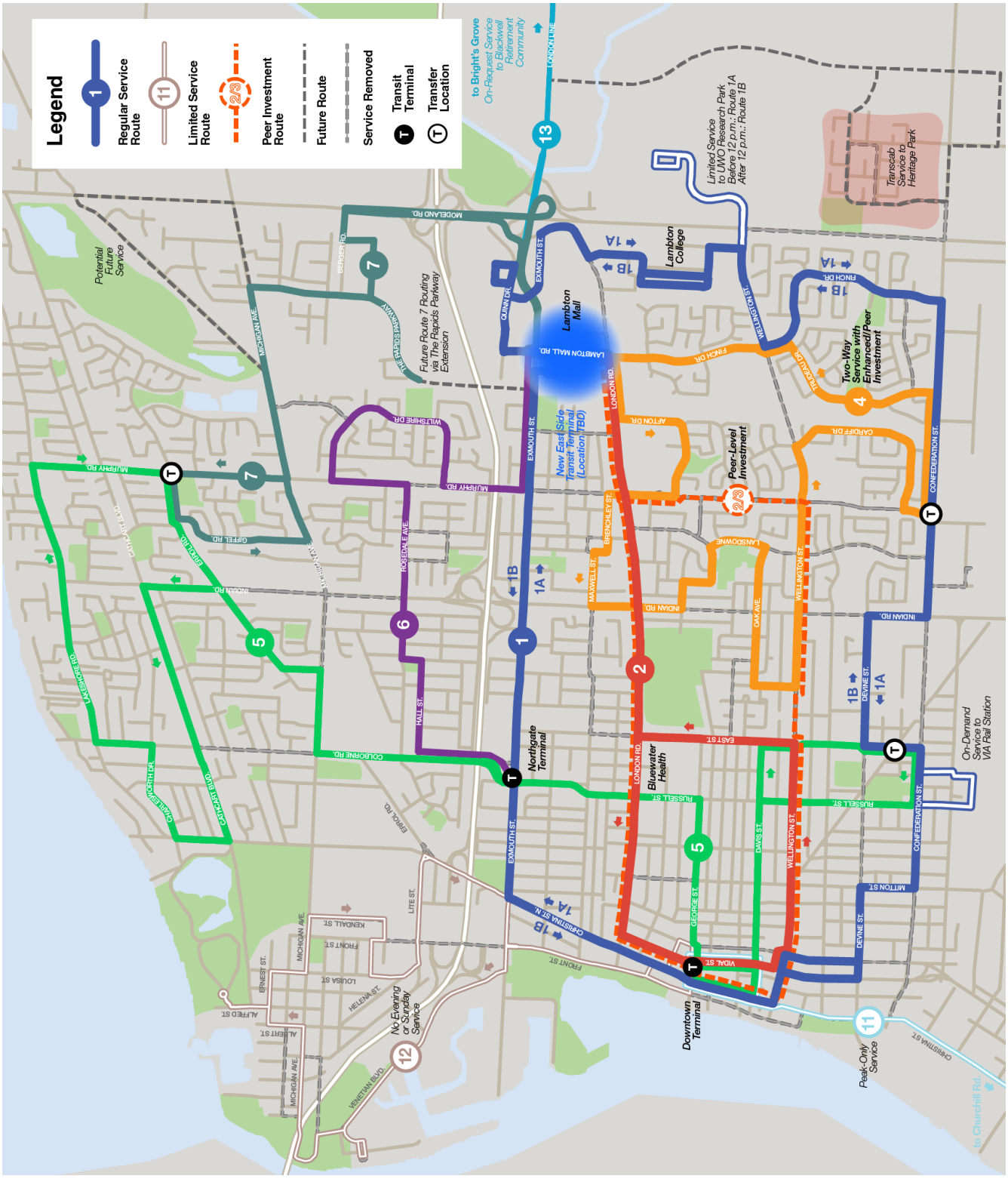
With the projected growth in transit ridership of approximately 32% over 10 years, the transit modal split would increase from the current level of approximately 2.0% to 3.5%.

A key element in the transit route network re-structuring is to relocate the existing Murphy Road terminal east of Murphy Road to the vicinity of the Lambton Road Mall, and to introduce a new north-south route along the Colborne Road- Russell Street corridor as well as to provide demand-response services in the selected new growth areas, primarily east of Modeland Road south of London Line.

Exhibit 4.3 presents the recommended route network which forms the basis for transit services over the long term. The route network and associated service levels are based on the goals, objectives and service standards outlined in the policy section and the following three levels of investment:

- **Initial** - reflects a marginal increase of 1.3% in revenue service hours compared to existing levels;
- **Enhanced** - reflects an increase in service levels by 17% compared to existing levels in year five;
- **Peer -** reflects an increase of service to peer average levels, representing approximately 32% increase in service hours compared to existing levels by year 10.

Exhibit 4.3 - Recommended Transit Route Network



Ultimately, increasing investment beyond the "initial" level is recommended in order to improve service, attract ridership, and serve future growth areas.

The proposed route network has been designed to achieve the following key objectives:

- Provide increased and more direct service to major transit destinations, including Lambton College, Lambton Mall, and Walmart/Sarnia SmartCentres;
- Improve transit service in north Sarnia by providing a direct connection to Lambton Mall (Route 6) and by providing a new north-south crosstown route that serves Bluewater Health, downtown Sarnia, and Confederation Street (Route 5);
- Minimize route network differences between peak, off-peak and day-of-the-week time periods;
- Reduce the system's average operating speed and improve service reliability;
- Expand regular transit service to Secondary Plan Development Area 1 and the secondary schools located on The Rapids Parkway;
- Introduce demand-responsive services with a proposed "TransCab" service to Heritage Park and an on-demand service to the Blackwell Sideroad area; and
- Allow for changes with minimal increase to revenue hours in the initial stages of implementation.

Each increase in investment level will allow for more frequent service (particularly in off-peak periods), expanded service periods, and additional routes. A summary of the variations in service levels, investment and revenue service hours for each investment level over the period of the Transit Master Plan is provided in Exhibit 4.4.

Exhibit 4.4 - Investment Levels for Proposed Transit Network

	Initial	Enhanced	Peer
	Service levels based on maintaining existing investment in transit with a marginal increase in revenue service hours.	Service levels based on increasing investment in transit and revenue service hours by approximately 17% to increase frequency of service on most routes.	Service levels based on increasing revenue service hours to peer average levels. Would represent a substantial increase in investment in transit.

Service Span			
Weekdays	6:30 a.m. to 11:30 p.m.	6:30 a.m. to 11:30 p.m.	6:30 a.m. to 11:30 p.m.
Saturdays	8:30 a.m. to 11:30 p.m.	8:30 a.m. to 11:30 p.m.	8:30 a.m. to 11:30 p.m.
Sundays	8:30 a.m. to 6:30 p.m.	8:30 a.m. to 6:30 p.m.	8:30 a.m. to 10:30 p.m.
Revenue Service Hours			
Regular Service	61,237	70,917	79,924
Specials	1,300	1,300	1,300
Total	62,537 (+1.3%)	72,217 (+16.9%)	81,224 (+31.5%)
Revenue Service Hours per Capita	*0.96*	*0.98*	*1.12 (peer avg: 1.06)*

4.5.2 Estimated Transit Operating Costs

Based on the transit system improvements recommended in the Transit Master Plan, the total operating cost for Sarnia Transit, including a 2.5% inflation factor, is estimated to change from $5.22 Million in 2012 to $5.61 Million in Year 1 of the improvement program. This is estimated to then increase to $6.34 Million in Year 5, and $7.16 Million in Year 10.

The City's net annual investment specifically in the conventional transit operating cost would increase from $3.07 Million in 2012 to $3.35 Million in Year 1, $3.43 Million in Year 5 and $3.22 Million in Year 10. This represents a 5% increase in conventional transit service investment in Year 10 compared to Year 1.

4.5.3 Care-A-Van

The City's specialized transit service, Care-A-Van, will continue as an important service with improvements in efficiency through the following actions:

- Review eligibility criteria to ensure service is provided to appropriate residents;
- Adopt automated scheduling system and other demand management interventions to improve efficient utilization of vehicle and staff resources;

- Allow Care-a-Van registrants to travel free on Sarnia Transit fixed route services to encourage the voluntary use of accessible fixed route services by Care-a-Van registrants able to use conventional transit; and
- Adopt service standards regarding trip times and trip acceptance, maximum trip times, on-time performance, cancellations and no-shows, service utilization, user assistance and cost recovery.

Overall, increases in future demand for Care-A-Van service over the term of the Transit Master Plan, as a result of changes in the population demographics through aging, can be accommodated through more efficient scheduling and vehicles utilization practices without an increase in the resources (vehicles or staffing) required to deliver the service.

4.6 Benefits of Investing in Transit

Public transit provides a wide range of benefits to individuals, businesses and urban areas as a whole. The Canadian Urban Transit Association and the Federation of Canadian Municipalities have published a series of Issues Papers which summarize the benefits of public transit pertaining to health, the natural environment, socio-cultural environment (quality of life).

These benefits include:

- Economic activity and spending through transit industry supply chains, operations, research and new product development;
- Increased labour mobility for numerous economic sectors, particularly downtown businesses;
- Increased personal mobility for people who choose not to drive or otherwise cannot reach work, shopping, health care or other services by car; and
- Public health and safety benefits including those derived from cleaner air and fewer traffic accidents and the corresponding health care requirements.

An additional benefit is the property impact of enhanced land accessibility that increases residential and commercial values. Another is a reduction in traffic delays and congestion costs.

For Sarnia specifically, the benefits of an improved public transit service would be:

- Support for the City's growth plan by:
  - **Attracting and retaining businesses -** Business growth will be essential to the City's future economic viability and vitality. Enhanced transit service can help attract and retain these businesses by

improving accessibility and reducing costs for companies. For example, construction and maintenance costs can be significantly reduced for a business along a transit line if there was no need to construct a parking lot.

  - **Attracting and retaining residents -** An efficient transit system enhances the image of a city to potential new residents, by providing options and choices in how to get around a city. The added option of transit can help families reduce costs, young professionals to avoid the burden of car ownership
  - **Serving new areas -** Providing quality transit into newly developed areas sooner, rather than later, has proven to increase transit usage in residential and commercial areas. In addition, transit lines will influence how a community develops by encouraging transit-oriented development.

- Supporting local business and the tourism industry by providing access for residents in the region to work opportunities, particularly for lower wage earners that work in the service industry who may not have access to a private vehicle;
- Supporting the tourism industry by providing transit access to key attractions and trip generators. This would make the city more attractive to tourists who do not have access to a car or for those unfamiliar with the city;
- Mobility options for the aging population whose demands for a high quality of life will require a level of mobility equal to what they experience today;
- Reduction in the cost of living by reducing reliance on the automobile; and
- Reduction in pollution (GHG's) and resulting in improved air quality.

Overall, financial support for public transit by a municipality should be viewed as an "investment" in the community, in the City's "infrastructure" and should be viewed as an on-going commitment by recognizing that the service is valuable to those using it and it is appropriate that users contribute to the cost to provide the service in addition to general support by the community.

5. PUBLIC CONSULTATION

5.1 Notices

The Notice of Study Commencement was published in the Sarnia Observer on August 11, 2012 (a copy is enclosed in **Appendix A**). Technical agencies, utilities, special interest groups and First Nations were notified of this EA process by mail dated August 10, 2012 by IBI Group. The notification letter included the Notice of Study Commencement and a response request sheet inviting participation in the Class EA. The agencies, utilities, First Nations and Special Interest Groups contacted are listed below. Copies of the complete mailing list and template of the letter and response request are enclosed in **Appendix A**.

- Aboriginal and Northern Development Canada
- Department of Fisheries and Oceans
- Transport Canada
- Ontario Reality Corporation
- Ministry of Agriculture and Food
- Ministry of Tourism, Culture and Sport
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ministry of the Environment
- Ministry of Aboriginal Affairs
- Ministry of Transportation
- County of Lambton
- Sarnia Lambton Chamber of Commerce
- Sarnia-Lambton Economic Partnership Sarnia Transit Advisory Committee
- Sarnia Accessibility Advisory Committee
- Lambton Active Transportation Advisory Committee
- Bluewater Trails
- Village of Port Edward
- CP Rail
- CN Rail
- Bluewater Bridge
- St. Clair Catholic School Board
- Lambton Kent District School Board
- VIA Rail
- Chris Hadfield Airport

5.2 Public Information Centres (PIC)

5.2.1 PIC #1

PIC #1 was held on November 6, 2012 to introduction the TMP and Transit Master plan, including the Care-A-Van service. It gave members of the public an opportunity to ask questions and provide comments about local transportation challenges, priorities and ideas.

Approximately 59 people attended the PIC, which was held at the Sarnia Arena at 134 Brock Street South in Sarnia (see **Appendix A** for the attendance registrar). The display panels are in **Appendix A**. In total 64 comment sheets were submitted to the project team during or after the PIC (they can be found in **Appendix A**).

A number of issues were raised concerning the need of additional walking and cycling routes. There was also emphasis on safer cycling routes. It's important to stress the "Share the Road" philosophy, as well as promote cycling awareness and cyclist's understanding of the rules of the road. Roads in the Walmart area need to be improved (e.g. traffic, not safe for cyclists).

5.2.2 PIC #2

The purpose of PIC #2 held on June 25, 2013 was to present future transportation plans for transportation network improvements. Approximately 32 people attended the PIC, which was held at Clearwater Arena at 1400 Wellington Street in Sarnia (see **Appendix A** for the registrar). In total 18 comment sheets were submitted to the project team during or after the PIC (they can be found in **Appendix A**).

The comments focused on a number of areas that were unsafe for cyclists (e.g. South Vidal Street overpass), and areas where bike lanes should be put it (e.g., Lakeshore Road to Bright's Grove). There are a number of lights throughout the city that need a car to activate them, holding up cyclists. A number of intersections were highlighted that had operational deficiencies.

5.2.3 PIC #3

The third and final PIC was a drop-in format held at the Clearwater Arena where members of the project team were available to answer questions and address concerns. The session was held on May 22, 2014 with approximately 18 individuals signed in. Members of the project team were available to explain the information presented including the Municipal Class EA process. Display panels and the PIC summary including comment sheets are included in **Appendix A**.

Most comments from attendees involving the proposed Active Transportation Plan focused on the planned Confederation Street path and Heritage Park to Wellington Street extension being priorities, making Howard Watson trail

crossings safer and ensuring that the Howard Watson Trail is preserved in plans to extend The Rapid Parkway south to London Road. For Public Transit, most comments were generally supportive of the recommended new terminal and route restructuring, but some concern was noted about fare increases being counterproductive to increasing ridership.

Throughout the TMP project, public comments have focused mainly on Active Transportation and Public Transit. For the Strategic Road Network Projects recommended in the TMP, the only comments noted and recorded at PIC #3 involved both support for and concern about The Rapids Parkway Extension, and desire to have the City use low cost, simple ways of improving intersection operations where required. Some felt that because of the City's slow but steady growth, there are no major roadway traffic problems.

5.3 Outreach Meetings

A number of outreach meetings were held with representative of the local active transportation groups (Bluewater Trails Committee, Bluewater Sustainability Initiative, Bike-Friendly Lambton) and specialized transit users during the preparation of this TMP.

6. TRANSPORTATION POLICY DEVELOPMENT

6.1 Complete Streets Policy

*"*Complete Streets" are designed, operated and maintained to enable safe access for all users. Pedestrians, cyclists, transit riders and motorists of all ages and abilities must be able to safely move along and across a complete street. For the City of Sarnia, a Complete Streets policy can assist the City in implementing the purpose of this TMP, which is "*to apply an integrated planning approach for the strategic planning of the City's transportation system using an integrating planning approach…"*

6.1.1 Complementary City Policies

In addition to supporting the purpose of the TMP vision, a Complete Streets policy is complementary to the following types of City policies and plans:

- Official Plan
- Zoning Bylaw
- Integrated Community Sustainability Plan
- Development Standards
- Accessibility Planning
- Active Transportation Planning
- Recreation & Leisure Planning
- Environmental Planning

A Complete Streets policy can enable those responsible for the provision of conventional transportation infrastructure and services within the City to effectively integrate transportation into the overall vision and fabric of the City.

A Complete Streets policy would also be complementary to the Pedestrian Charter recommended in the Active Transportation Plan (Section 12) to create an urban environment in all parts of Sarnia that encourages and supports walking.

6.1.2 Importance of Complete Streets

The importance of Complete Streets lies in the function of streets and roadways within the community fabric. Access to adjacent lands, whether they are residential, employment, commercial, institutional or recreational is oriented to the streets. Streets are meeting places for social and business interaction through access and mobility. Unlike corridors that solely serve rail, air, water, utilities, recreation, or natural areas, streets integrate many elements of our society and therefore need to provide access to the broad range of citizens within that society.

A Complete Streets policy is intended to shift the City of Sarnia from the decades-long focus of providing streets to move cars, to providing streets where people can interact and move about whether they are on foot, on a bicycle, on a new or alternative form of transportation[1], in a bus or in a car. Every street needs to accommodate pedestrians at a basic level with the provision of sidewalks, walkways or "safe space".

There is even a need for safe crossings of freeways (Highway 402) to be provided for pedestrians. The needs of pedestrians with cognitive, mobility or visual impairments must be incorporated into the design of those pedestrian facilities.

As the volume of motor vehicles, their speed and size increase, cyclists need separate space or alternative corridors (see TMP Section 12). An efficient transit system will focus on a network of compatible streets and land-uses (see TMP Section 4) . Efficient truck routes are also required to ensure goods movement to and within the City. The car-dominated culture also necessitates the provision of streets for motorists. All of those user needs must be provided for within the context of localized culture and physical form.

A Complete Streets policy can empower and direct citizens, elected officials, government agencies, employers, businesses, developers, bureaucrats, planners, architects and engineers. It requires a change in policies and practices to ensure that the entire right-of-way is routinely planned, designed, constructed, operated, and maintained to enable safe access for all users that are appropriate for local context and needs.

6.1.3 Recommended Complete Streets Policy Foundation

In creating a coordinated and integrated transportation system that provides realistic alternative travel options to the auto, and in recognizing the benefits of walking and cycling to our health, community and environment, it is recommended that the City of Sarnia adopt a Complete Streets policy to plan, design, operate and maintain streets to enable all users of all ages and abilities – pedestrians, cyclists, transit riders and motorists – to safely move along and across City streets. The principle of Complete Streets supports compact, sustainable development. It is intended to be applied comprehensively but with flexibility to reflect local context. The Complete Streets policy should:

- Incorporate the principle of Complete Streets into all transportation projects except where cyclists and pedestrians are prohibited by law, or there is a demonstrated absence of need. Safe crossings of facilities that prohibit use by pedestrians and cyclists are still required. All

[1] In Ontario, the following types of new and alternative forms of transportation are allowed to operate on streets; Limited Speed Motorcycle, Motor-Assisted Bicycle (moped), Motor Tricycle, Bicycle, Electric Bicycle (e-bike), Personal Mobility Devise (motorized wheelchair, medical scooter preferably on sidewalks), Low-Speed Vehicle and Segway Human Transporter/Personal Transporter.

exceptions must be justified and approved at a senior staff level, i.e. City Engineer or their delegate;

- Integrate Complete Streets with the complementary Active Transportation Strategy (TMP Section 12) that supports active transportation in a variety of non-street corridors such as parkland, natural areas, woodlands, river and creek corridors, stormwater management facilities, utility corridors, transit and rail corridors, etc.; and
- Incorporates the principle of Complete Streets into all aspects of the City's responsibilities for streets including:

  Planning and Design:

  - Planning of streets and street networks City-wide, in secondary plans and plans of subdivision;
  - Design of street networks, corridors, intersections, site-specific improvements and traffic calming; and
  - Design of new construction, reconstruction, retrofit and resurfacing roadway projects.

  Maintenance and Operations:

  - Construction within or adjacent to street rights-of-way including maintaining pedestrian and cyclist access and mobility through construction zones and in traffic management plans. Operation of streets and intersections, including signage, pavement markings, traffic control and illumination; and
  - Maintenance of streets and alternatives for pedestrians and cyclists, i.e. trails, including seasonal and repair work. Seasonal includes maintaining the surface free of disabling debris, water, snow, and ice. Repair includes attention to spot repairs, hazards and overall wear or deterioration.

  Communications:

  - Public consultation and communications;
  - Advisory committee responsibilities and function;
  - Review of roadways within the City under the jurisdiction of the Ministry of Transportation, Ontario (MTO) or County of Lambton; and
  - Collaboration with the County on travel demand management (TDM) initiatives.

  Asset Management:

  - Audits of streets and alternatives for pedestrians and cyclists, i.e. trails;

  - Annual reviews of the development and implementation of the sidewalk, trails and bikeway network;
  - Establishment of performance standards that reflect the safety, convenience and needs of all users; and
  - Data collection procedures and analysis that benchmark and track how well streets are serving all users.
- Implement the Complete Streets principle by restructuring City procedures associated with the above responsibilities, where required, including budgetary and funding models, rewrite any City standards and guidelines as required and train appropriate City staff to understand and incorporate the needs of all users in their daily work.

The recommended Official Plan policy statement in support of Complete Streets is as follows:

Plan for, design, build, operate and maintain a City road network that provides for Complete Streets, meaning that users of all ages and abilities including pedestrians, cyclists, transit users and motorists are able to interact and move safely along and across City streets.

6.2 Exmouth Street Assessment

Existing traffic volumes and intersection operations along Exmouth Street were assessed as part of the TMP development and found to currently operate at a good Level-of-Service (LOS A to C) as reported in Section 3.1.2, with the exception of the Exmouth Street/Murphy Road intersection that operates with a fair Level-of-Service (LOS D) during the AM and PM peak hours. Retail-related trips are also causing delays at the Exmouth Street/Barclay Drive intersection during the PM peak hour. This peak hour congestion also affects transit operations in these areas.

Over the next 20 years, the combination of background and development-related traffic growth on Exmouth Street is expected to worsen certain turning movements to a poor LOS E/F in the PM peak hour at:

- the Indian Road intersection eastbound left turn to LOS E;
- the Murphy Road intersection southbound left turn to LOS F; and
- the Barclay Drive intersection eastbound left turn to LOS E and the southbound through and left turn movements to LOSF.

Actions are required to avoid these poor intersection operations as follows:

- in the short term provide three lanes southbound and northbound at the Barclay Drive intersection – left, through and right;
- in the short term convert the eastbound right turn lane at the Exmouth/Murphy intersection to an eastbound shared through/right turn and with two through traffic receiving lanes;

- in the longer term, plan on widening Exmouth Street by one additional lane/direction in the eastbound and westbound directions, with the extent, impacts and cost of this widening to be confirmed by conducting a Schedule 'C' Municipal Class Environmental Assessment (EA);
- the recommended extension of the Rapids Parkway (see Section 6.3) is expected to provide some relief to the Exmouth Street congestion in the area with potential signalization of the Quinn Drive / Barclay Drive and Quinn Drive / Rapids Parkway extension intersections.

6.3 Rapids Parkway Extension

The part of Rapids Parkway that has been constructed north of Highway 402 currently provides access to new subdivision development in that area, and operates at an acceptable LOS because of light traffic volumes. However, as Development Area 1 west of Modeland and north of Highway 402 is built out, and generates the additional AM and PM peak hours trips previously shown on Exhibit 3.7, the Exmouth/Murphy and Exmouth/Barclay are expected to be over capacity. The Rapids Parkway extension under Highway 402 to Exmouth Street and ultimately London Road using the existing highway tunnel will provide a new direct link to/from the retail area south of the highway, while also preventing overloading of the Berger Road and Modeland Road intersections. A conceptual alignment of the extension to the highway is shown in Exhibit 6.1.

Exhibit 6.1 - Rapid Parkway Extension Concept

The extension design and traffic operation changes would be addressed in a Schedule 'C' Municipal Class EA, including the alignment under the highway along the existing trail, integration of the trail with the extension as part of the Active Transportation plan, signalization of the Parkway/Exmouth intersection and potential signalization of the Parkway/Quinn and Parkway/Berger intersections to be confirmed in the EA. It is recommended that the City schedule the EA commencement before 2017 at the latest.

6.4 Vidal-Brock Corridor Assessment

Vidal Street and Brock Street currently operate as a one-way couplet in the southern part of Sarnia, linking the central city and downtown with the "Chemical Valley" industrial area to the south. The couplet has three lanes southbound on Vidal Street and three northbound on Brock Street, and currently operates with a good Level-of-Service in both the AM and PM peak hours. Each street serves about 1,100 vph in the peak direction and about 500 vehicles in the non-peak direction, which is far below the three lane capacity of 2400 vph on each three lane leg (800 vph per lane) of the couplet.

One of the long-standing questions asked of the TMP is whether the one-way couplet should be reverted to two-way operations on Vidal and Brock Streets. Although past traffic volumes to and from Chemical Valley once warranted the couplet, employment reductions over the past 20 years now means the six lane couplet capacity is no longer required to serve current traffic volumes. If the couplet was reverted to two-way operations, the existing intersection widths would permit no more than one through lane per direction on each street plus intersecting street turn lanes where required. The result would be that some of the existing street width on Vidal Street and Brock Street would be converted to alternative use such as bike lanes, widened boulevards and sidewalks or a combination of both. This would reduce the through-flow capacity of the streets, but improve access to adjacent land use from two-way streets.

This TMP has concluded that the best course of action for the Vidal/Brock couplet is to maintain the current one-way configuration. This is recommended for three main reasons:

- A bike route can be provided on Brock Street without reverting to two-way operations. The Active Transportation Strategy in Section 12 of this TMP includes a Core Bike Lane Route along Brock Street extending from the existing Vidal Street South bike lanes north to London Road;
- Maintain the one-way couplet preserves the road capacity for the future. Reverting to two-way operations and then back to a one-way couplet if needed in the future is not seen as a feasible, achievable possibility; and
- The need for improved traffic capacity and operations between Vidal/Brock and Highway 402 can be achieved if and when needed in the future by enhancing the capacity of a north-south street such as Christina Street through intersection traffic control improvements and/or capacity

optimization for example through peak period or complete removal of on-street parking. This would have to undergo further study as a Schedule 'B' Municipal Class EA and associated corridor traffic study.

6.5 Functional Roadway Classification

The functional road classification used by the City of Sarnia is found on Schedule 'C' of the current Official Plan, entitled Transportation & Road Widening Plan. Roads are classified by jurisdiction – Provincial Highway, County Road and City Road, and by function – Highway, Arterial and Collector and Local. The new Draft Official Plan being finalized in 2014 uses a very similar classification system. Both use a standard approach to road classification and no changes are recommended.

However, since the classification system and associated guidelines are often used to establish or confirm acceptable traffic characteristics on any City street, it is important that the Official Plan clearly describe these basic operating characteristics for each road classification. The most basic characteristics are:

Type of Classification	Road Classification Characteristic
Road Design	• Right-of-Way Width • Vehicle Type • Streetscape Features
Road Operations	• Adjacent Land Use • Traffic Volume (AADT) • Design Speed • Average Running Speed
Accessibility	• Land Service / Access • Transit Service • Cycling Facility • Pedestrian Facility

Also, the City should consider expanding the description of the road classifications used in the Official Plan to better describe road functions and required right-of-way as follow:

- Provincial Highways
- Arterial County Roads
    - Urban Major (30.5m)
    - Urban Minor (26.2m)
    - Rural (20m)

- Arterial City Roads
    - Urban Major (30.5m)
    - Urban Minor (26.2m)
- Collector Roads
    - Urban Major (30.5m)
    - Urban Minor (26.2m)
    - Rural (20m)

6.6 Corridor Design Guidelines

This TMP recommends that rather than the City developing and using its own road ROW requirements and cross-sections, established guidelines from the Ontario Traffic Manual (OTM) should instead be used. Provincial guidelines for roads change and evolve over time, and using the OTM as the basis for the City's corridor design guidelines will ensure that the most current information will always be applied in Sarnia.

The purpose of the Ontario Traffic Manual (OTM) is to provide information and guidance for transportation practitioners and to promote uniformity of treatment in the design, application and operation of traffic control devices and systems across Ontario. The objective is safe driving behaviour, achieved by a predictable roadway environment through the consistent, appropriate application of traffic control devices. Another purpose of the OTM is to provide a set of guidelines consistent with the intent of the Highway Traffic Act. The OTM is made up of a number of Books, which are generated over time, and for which a process of continuous updating is planned. This is why the following OTM books specific to municipal road corridor design should be used by the City as the basis for road design guidelines:

- Book 5: Regulatory Signs – to instruct road users on what they must, should or should not do in moving through a road corridor;
- Book 12: Traffic Signals – on the design and operations of traffic signals, including under what conditions they are warranted;
- Book 15: Pedestrian Control and Protection - to provide practical guidance and application information on the planning, design and operation of pedestrian roadway crossings for transportation practitioners and to promote uniformity of approaches across Ontario;
- Book 18: Bicycle Facilities – to provide practical guidance on the planning, design and operation of cycling facilities in Ontario. It applies to facilities within the road right-of-way, and does not include off-road trails through parks, ravines, Hydro corridors or open space. It is for use by traffic engineers, planners and other transportation practitioners, and promotes a uniform approach across the province; and

- Book 20: Traffic Calming – to provide guidelines on under what conditions to consider the use of traffic calming measures, and a review of applicability of alternative calming measures and their effect on calming traffic.

6.7 Roundabouts as Intersection Control

The modern roundabout is an unsignalized intersection in which traffic moves around a central island of varying size and design in a one-way direction. Roundabouts are engineered to offer several potential advantages over signalized and stop controlled intersections, including improved safety performance, less delay, shorter queues (particularly during lower volume periods), reduced speeds, and improved aesthetics for community enhancement. In some applications, roundabouts can avoid or prolong the need for expensive widening of an intersection approach that would otherwise be necessary under traffic signal control.

Modern roundabouts include specific design and traffic control features to promote slower entry speeds, safer driving conditions, and smooth and continuous flow. The fundamental principles of a modern roundabout that distinguish it from other circular intersections are:

- **Yield at Entry** - Traffic within the circulatory roadway has priority and entering vehicles must yield. This creates a smooth flow and eliminates the possibility of congestion developing within circulatory roadway;
- **Traffic Deflection** - Traffic entering the roundabout is directed or channelled to the right with an appropriate curved path into the circulating roadway that avoids the central island. This deflection helps to reduce speed as it forces drivers to make a change in direction when entering the roundabout; and
- **Geometric Curvature** - The radius of the circulatory road and the angles of entry can be designed to slow the speed of vehicles. Key geometric design parameters and the fastest speed path are critical to achieve proper design.

Use of roundabouts for effective traffic management is becoming common throughout North America. They are well suited to the operating speeds, traffic volumes, and vehicle types found on many of City of Sarnia roadways. The feasibility and benefit of providing a modern roundabout should be determined through an Initial Screening followed by an Intersection Control Study and should be considered where:

- The installation of traffic signal control at an existing intersection has met the applicable warrants;
- At a new City road intersection; and/or
- Improvements at a City road intersection to address safety or capacity concerns.

When considering the use of modern roundabouts in Sarnia under any of these conditions, the TMP recommends that the following screening information be used to determine if a roundabout is feasible:

- Type of existing traffic controls;
- Status or corridor improvements;
- Collision history over past 5 years;
- Persons with disabilities users;
- Traditional road improvement planned;
- Traffic signal warrants;
- Proposed roundabout size (number of lanes); and
- 20-year life cycle cost estimate.

6.8 Traffic Calming

While the City of Sarnia does not currently have a formal Traffic Calming policy, the Draft Official Plan (June 2014) does reference the need for traffic calming in the vicinity of schools. It also includes traffic calming as a measure to improve the safety of pedestrians and cyclists.

The 1998 Canadian Guide to Neighbourhood Traffic Calming by the Canadian Institute of Transportation Engineers (CITE) and the Transportation Association of Canada (TAC) in the Canadian Guide to Neighbourhood Traffic Calming defines traffic calming 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 calming measures are not only geometric changes to the roadway, and include signage, awareness and education programs to reduce vehicle speeds, minimize conflicts, and increase safety for all users.

The aim of a Traffic Calming policy is to provide rationale and recommendations on implementing traffic calming, and to establish a methodology for traffic calming measures and procedures tailored to the City of Sarnia. The recommended traffic calming methodology described in this TMP section aims to create a balance between the conflicting needs of the service providers (i.e. transit, EMS, maintenance equipment, private vehicles) by recognizing the shift in transportation and urban design principles where roads are not designed only for cars.

This Traffic Calming policy incorporates the following key principles:

- Sustainable community future vision;
- Shift away from an auto dominated society;
- Support and encourage healthy lifestyles and safe communities,
- Consider the cumulative impacts of traffic calming on emergency response times;

- Encourage and support walking and cycling of all ages and levels of ability;
- Support Walking School Bus and Active and Safe Routes to School practices, and
- Provide a mechanism to review and select any traffic calming measures that best serves the issues identified.

6.8.1 Traffic Calming Methodology and Measures

Traffic calming has traditionally only been considered for lower order streets as seen in neighbourhoods, subdivisions and around schools. However, there has been a significant shift in how the higher order roads such as Arterial and Major Collectors are now being planned and designed. They are being seen as multi-modal transportation corridors where all modes of transportation are equally planned and designed within the municipal right-of-way. This new `Complete Streets' concept includes traffic calming incorporated within the streetscape design. Cities that place an emphasis on walking, cycling, connectivity to transit systems and overall intelligent land use strategies to promote wider travel choice are more likely to become an accessible place and therefore, sustainable place.

There are a number of different traffic calming measures that can be used to address neighbourhood traffic intrusion and traffic speed issues, and to achieve the street design concept of Complete Streets. In Sarnia, the application of traffic calming should consider a wide range of measures that can be implemented. This traffic calming "toolbox" includes:

Active Traffic Calming Measures	
Vertical Deflections	**Horizontal Deflections**
• Speed humps, speed cushions and speed tables • Raised Crosswalks • Raised Intersections • Textured Pavement	• Narrowed Travel Lanes • Curb Extensions • Raised Median Islands • On-Road Parking Bays • On-Road Exclusive Bike Lanes • Modern or Mini-Roundabouts and Neighbourhood Traffic Circles • Intersection Channelization • Directional Road Diverters and Closures
Passive Traffic Calming Measures	
• Neighbourhood and Location-Specific Signage (NOTE: does not include Stop Signs) • Vehicle-Activated Traffic Calming Signs (VATCS), i.e. Radar Speed Signs	

- Pavement Colourization
- Pavement Warning Markings and Reflective Pavement Markers

It should also be noted that Stop Signs are a traffic management tool, not a traffic calming measure. The use of Stop Signs is not included in the traffic calming policy as they are not intended as traffic calming devices.

6.8.2 Context Sensitive Impacts and Trade-Offs

Any potential installation of traffic calming measures must consider and balance the pros and cons of the installation using criteria that includes, at a minimum, traffic operations and effectiveness, public safety, measure-specific or cumulative impacts on emergency response times, impacts on transit operations (where applicable), property impacts, aesthetics and capital and life cycle cost.

For example, vertical measures, particularly speed humps and speed cushions are relatively low cost items compared to most other physical forms of traffic calming and are proven to have the most impact on speeding traffic. However, they create some real and perceived impacts to transit, winter maintenance operations and especially emergency response. Alternatively, horizontal deflection measures (i.e. bump-outs, chicanes, roundabouts at intersections), deflect vehicle paths laterally. They have minimal impacts on services and operations but in general, also have less impact on speeding traffic.

Increased cumulative use of certain types of traffic calming devices will negatively impact emergency (fire) vehicle response times, and may result in the need for additional fire stations and staff to maintain Council-approved response times.

6.8.3 Recommended Policy

This new recommended policy for Sarnia reflects the current state of traffic calming in North America.. The decision making process for traffic calming is described in four stages (Initiation, Review, Study and Approval) and are summarized in the following sections.

6.8.4 Method of Initiation

An initial request to consider the use of traffic calming anywhere in the City of Sarnia can be made by an interested resident or residents, a Councillor, a neighbourhood group, school council or business group. A municipal department can also initiate a traffic calming request.

It is important that emergency service providers become involved in any consideration of traffic calming at the initial consideration stage. In Sarnia this includes the Fire Department, Police Services, Lambton EMS and Sarnia Transit.

6.8.5 Method of Review

When an initiation request is made, City staff should undertake a two-part screening investigation using the following warranting:

Exhibit 6.2 - Technical Traffic Calming Warrants

CRITERIA	MEASUREMENT
Phase 1	
Operating Speed (85th percentile)	Recorded greater than 10 km/hr over posted limit
Motorized Traffic Volumes: Local Street 2-lane Collector Street	 Counted > 900 vpd Counted > 2,000 vpd
Phase 2 If Phase 1 Minimums Are Met	
Cycling / Pedestrian Traffic Volumes	Counted or Observed
Collision History	Recorded
Emergency Response Use	Input
Transit Use	Input
Road Grade (max. 8%)	Calculated
Proximity to Schools and School Crosswalks	Observed

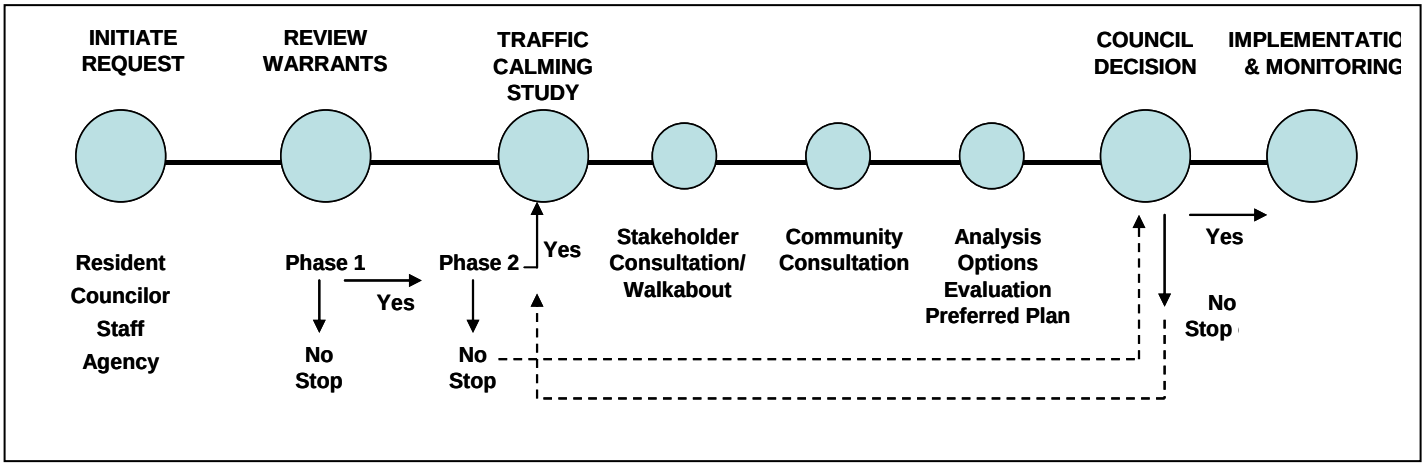
The Review/Warranting Process extending through the Phase 1 and Phase 2 screening investigations does **not** require polling of residents to determine any minimum level of support from the affected or general community. The Process is intended to be a technical exercise to determine if further consideration of traffic calming is warranted.

Resident input will be collected and considered if the Process is found to be warranted from the Phase 1 and 2 investigations, but it should not dictate whether a study is initiated. This is because there may be cases where calming is technically warranted for the public good, but residents in proximity to the involved street or streets oppose calming. This approach is recommended because of the impact that traffic calming has on everybody using public streets (more than just the abutting residents), and how resident opinion often varies on the use of calming.

6.8.6 Study Process

If after the Phase 1 and 2 screening traffic calming is warranted, the process then moves to the study stage as shown on Exhibit 6.3 and described as follows:

Exhibit 6.3 - Recommended Traffic Calming Study Process



- City Staff will report the results of the Phase 1 and 2 screening investigation, and where the results warrant further consideration of a traffic calming program, Council should be asked to authorize City Staff to commence a Traffic Calming Study of the subject location or area;
- A Traffic Calming Study should be designed to include consultation with affected residents, the general community and involved stakeholders including City and Region departments; and
- There should be no limitations on the types of traffic calming measures to be considered in Traffic Calming Studies. Instead, the Studies should evaluate all appropriate measures, with appropriateness determined by road classification, traffic conditions, terrain, adjacent land use, stakeholder and public input and best practice information on the application and effectiveness of traffic calming measures elsewhere in other comparable cities.

6.8.7 Approval Process

Traffic Calming Studies should include community involvement in a form and scope appropriate for each study. This should include a minimum of two (2) points of contact with the community and general public to; 1) discuss the problems and improvement options, and 2) to discuss the preferred traffic calming plan.

The final decision to implement a Traffic Calming Study should rest solely with City Council in response to technical information provided by the Study and input from affected residents and the larger community.

Any approval of a Traffic Calming Study should include a monitoring program to measure the degree of traffic change provided by the program up to two (2) years following installation.

6.9 Transportation Noise Attenuation

Noise impacts associated with transportation-related traffic is often dealt with in urban areas through the application of a noise attenuation policy. For the City of Sarnia, a noise attenuation policy is recommended in response to four types of transportation-related conditions:

1. Noise Attenuation with no associated road works;
2. Noise Attenuation associated with Arterial Road widening;
3. Noise Attenuation with new development roads; and
4. Noise Attenuation associated with rail lines.

6.9.1 Noise Attenuation Not Associated with Road Works

The following guidelines should be used with respect to the construction of "retrofit" noise attenuation barriers on roads where adjacent residential development currently exists:

- Where a road is not being widened, "retrofit" noise barriers will only be considered;
- Adjacent to arterial roadways only when the present traffic volume exceeds 10,000 vehicles per day;
- On a total block basis, and not an individual lot basis unless the lot is not associated with adjacent lots being used for the same purpose; and
- On receipt of a sufficiently signed petition in conformity with the provisions of the *Local Improvement Act*, R.S.O. 1990, C. L.26.

Construction priority to install noise attenuation barriers not associated with other roadway works should be established by:

- Chronological order of certification by the City Clerk of the sufficiency of the petition to install noise attenuation in accordance with the provisions of the Local Improvement Act, R.S.O. 1990, C. L.26; and
- Sufficient funds are available in the current year's budget.

Where a valid petition is received from property owners to install noise attenuation, the construction cost should be treated as a Local Improvement with 2/3 of the cost to be paid by the property owner(s) and 1/3 by the County.

6.9.2 Noise Attenuation Associated with Arterial Road Widening

Excessive noise levels from high traffic volume roads may negatively impact residential land uses. Traffic noise generated by arterial road widening or new residential development roads at the following levels is considered to be above the acceptable provincial standard, as defined by the Ministry of the Environment Environmental Noise Guideline NPC-300, will be required to incorporate noise attenuation measures into the development. In these cases, construction of a noise barrier will be recommended for consideration by residents and the City of Sarnia:

1. The point of traffic noise reception is generally 3 metres off the back of the dwelling;
2. A noise barrier will be required where projected noise within 10-years will exceed 65 decibels; or
3. A noise barrier will be required where projected noise within 10-years will exceed 60 dBA and the difference between existing and proposed noise exceeds 5 decibels.

The “Existing” and “Projected Noise” is determined utilizing noise forecasting software such as the STAMSON 5.04 noise prediction software, which is the recognized “standard” for transportation noise modelling in Ontario.

The following guidelines should be used for the installation of "retrofit" noise barriers in conjunction with arterial road widenings where adjacent residential development currently exists:

- The installation of "retrofit" noise barrier walls is intended to ensure that existing residential backyards backing onto arterial roads which are widened to four lanes or greater are not subjected to significant noise level increases from levels that exist in the design year;
- The road to be widened must be classified as an Arterial road in the City’s Official Plan;
- The property must be in residential use, and must also be back lotted onto an arterial road;
- Masonry walls or other suitable materials or earth berms will be used and the design, placement and height will be determined through a noise study;
- The noise barrier will be built within one foot of the property line on the road allowance. Private property working easements must be provided at no cost to the City; and
- This policy does not apply to the provision of noise barriers associated with the development of new residential uses which back onto arterial roads.

6.9.3 Noise Attenuation Associated with New Development Roads

The development of residential land uses on lands in close proximity to arterial roads and provincial highways should have regard for potential impacts from noise, vibration and/or safety concerns. Where a proposed development does not comply with provincial guidelines for acceptable levels of noise, as described above in Ontario Ministry of the Environment publication NPC-300 Environmental Noise Guideline, mitigation measures may be required through the development approval process.

6.9.4 Noise Attenuation Associated with Rail Lines

None of the provisions of this TMP regarding noise attenuation apply to any sound arising from the operation of any railway which operates under the Railway Act of Canada, or from any plant or work in connection with any such railway.

6.10 Ministry of Transportation Integration

Highway 402 and Highway 40 within the City of Sarnia are under the jurisdiction and control of the Ministry of Transportation (MTO). In addition to all the applicable municipal requirements, all proposed development located in the vicinity of a provincial highway within the MTO's permit control areas defined under the *Public Transportation and Highway Improvement Act* (PTHIA) will also be subject to MTO approval. Early consultation with the MTO is encouraged to ensure the integration of municipal planning initiatives with provincial transportation planning. Any new areas in the municipality identified for future growth that are located adjacent to or in the vicinity of a provincial highway or interchange/intersection within MTO's permit control area, such as Development Area 1 and 2 in Sarnia, will be subject to MTO's policies, standards and requirements. Direct highway access is discouraged and often prohibited.

The following summarizes the MTO's permit control areas under the *Public Transportation and Highway Improvement Act*:

- An MTO permit is required to:
    - Place a building, structure, entrance or any road within 45 m of the limit of any highway, 180 m of the centre point of any intersection (on King's Highways) and 395 m of the centre point of any intersection or interchange (on controlled-access highways);
    - Place a sign 400 m of the limit of the highway; and
    - Change the use of land in a way that will generate large amounts of traffic (note that all roads are considered to be large traffic generators) 800 m of the limit of the highway;
- New entrances or the upgrading of entrances, location of buildings, signs and encroachments within MTO's permit control area of a provincial highway will be subject to the approval of MTO. Where the requirements

of MTO exceed those of the municipality, MTO requirements will be met despite recommendations contained elsewhere in this TMP; and

- For major development proposals for large traffic generators within the permit control area of a provincial highway, the MTO will require an application to prepare a transportation impact assessment in accordance with its "General Guidelines for the Preparation of Traffic Impact Studies". The main purpose of a Traffic Impact Study is to determine how the transportation impacts of a proposed development or redevelop can be mitigated and addressed in a manner that is consistent with the objectives of the MTO. The Traffic Impact Study also serves as the basis for the identification and evaluation of transportation related improvements or measures to be included as a condition of access approval, including funding, for the development or redevelopment. The ministry may consider the use of City-approved criteria stipulated in Section 10 of this TMP dealing with Transportation Impact Studies.

The City and the MTO will work cooperatively with respect to the planning of land development and associated access connections within the MTO's permit control area adjacent to all provincial highways and interchanges within the City, in order to protect for the future safety, operation and capacity of both the provincial highway network and the City and County transportation corridors for the movement of people and goods.

7. TRAFFIC SIGNAL SYSTEM (TECHNICAL)

The TMP was required to conduct an assessment of the traffic data communications infrastructure. The objective of this technical report, included as **Appendix B** of this TMP, is to review the existing traffic signal control system (i.e. central software, and field equipment) and identify equipment upgrades/replacement necessary to support the TMP.

This report in **Appendix B** is divided into the following sections:

- **Introduction**
- **Section 2** – describes the traffic signal control system standards in details;
- **Section 3** – presents an overview of the inventory of the existing traffic signal control system;
- **Section 4** – proposes a future advanced transportation management system architecture, and describes the evolution of the City's existing traffic signal control system components; and
- **Section 5** – provides report recommendations.

The main recommendations of this Procurement Plan: Traffic Signal Control System Assessment are:

- City staff continue to implement Intelight controllers, with distributor support from Tacel;
- City staff continue to procure NEMA TS2 Type 2 controller cabinet assemblies;
- City staff start to replace ageing Siemens controllers with Intelight controllers, where budgets and resources permit;
- The City continues to use the GTT Opticom IR system;
- In the longer term City staff investigate opportunities to use City-owned communication assets for traffic signal control; and
- In the longer term City staff investigate the benefits of implementing an ATMS for traffic signal control.

8. ROAD SAFETY REVIEW

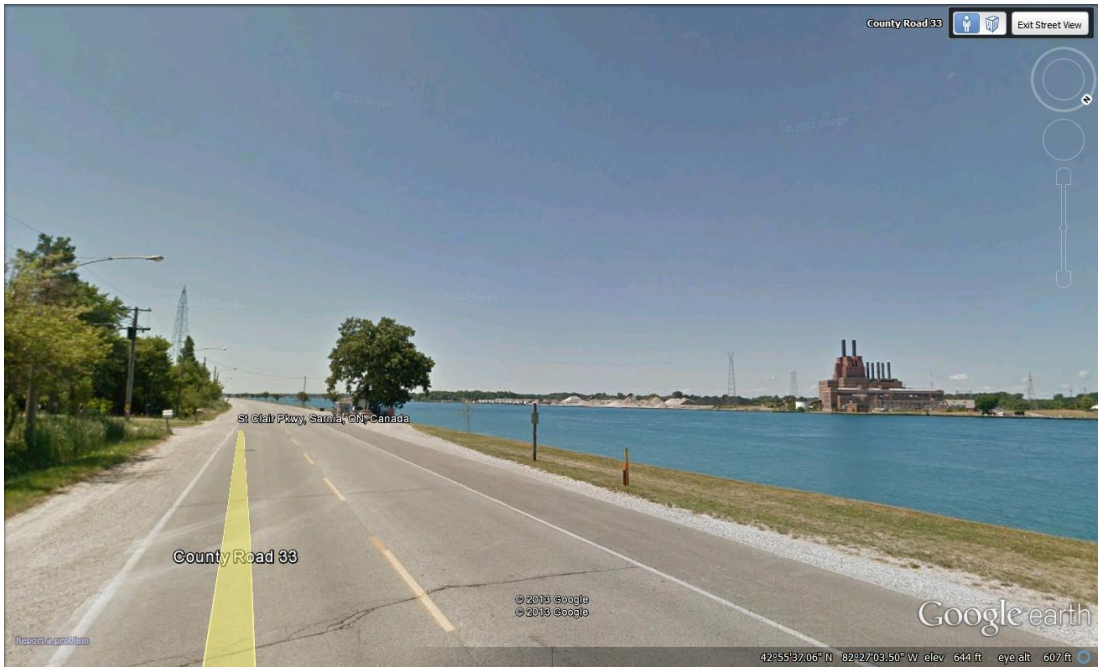
One of the TMP requirements noted in the study RFP was to "conduct a safety review of St. Clair Parkway/River Road (between Suncor Curve and LaSalle Line) and Waterworks Road (between Lakeshore Road and Michigan Line) to determine the need for guide rails including cost analysis".

8.1 St. Clair Parkway from Suncor Curve to LaSalle Line

This road section, part of the St. Clair Parkway, runs through the Aamjiwnaag First Nations and is part of the St. Clair River Trail. It includes one lane of traffic per direction and is designated as an On-Street Cautionary Bike Route by Bluewater Trails. It experiences less than 3,000 AADT (2,850 in 2012).

It is located in very close proximity to the edge of the St. Clair River as clearly shown in Exhibit 8.1, and there is currently few barriers between the road and the steep drop into the river along this section. This City considers this a potential road safety issue and asked that safety mitigation measures be investigated involving installation of guide rails along the river edge.

Exhibit 8.1 - St. Clair Parkway and St. Clair River



IBI Group investigated this road section and came to the following conclusions:

- The slope of the grass boulevard between the road and river edge is the critical element to determine is a barrier is warranted. If the slope between the road and river edge is considered "non-recoverable" (i.e.,

>4:1), there would need to be a run out area at the toe. Since the river is at the toe, there is no run out, and that would mean that a barrier is warranted;

- Conversely, if the slope is less than 4:1 (i.e., “recoverable”), and the clear zone is wide enough, then no barrier is required;
- In a situation like this, the first option is typically to review the clear zones along the road, based on geometry, traffic volumes and operating speeds, and identify specific locations where barriers such as guide rails are practical;
- If the objective is to reduce the likelihood of drivers running off the road, then barriers would have to be installed along the entire corridor. This latter approach would have to consider how people currently use the roadside in the area and what would have to be done to accommodate those uses (e.g., parking areas and pedestrian access);
- As far as the aesthetic value is concerned, a steel beam guide rail would interfere with the scenic quality of the road and river edge. More attractive barrier alternatives (e.g., masonry walls) would get very expensive; and
- The road is also on First Nations land so that community would have to agree to any changes along the road edge.

IBI Group has concluded, based on available information on the road provided by the City, barriers do not appear to be warranted for the embankment along the river. However, hazards within the clear zone between the river and road edge may require removal, including trees and structures. More detailed road design information would be required to identify conclusively where these treatments and guide rails may be warranted.

The basic cost of installing a steel beam guide rail along one side of the road is $115/m, excluding any other safety or aesthetic treatments. If this was applied to the 2500m west side of the Parkway between the Suncor Curve and LaSalle Line, the cost would be in the area of $300,000 minimum.

8.2 Waterworks Road Between Lakeshore Road and Michigan Line

The second road section noted for a safety analysis is Waterworks Road between Michigan Line and Lakeshore Road. This is a basic straight rural road as shown on Exhibit 8.2, with abutting ditches confirmed as the safety issue. IBI Group’s initial conclusion is that the corridor needs upgrades, potentially consisting of shoulder widening (including paved shoulders and rumble strips), slope flattening, and installation of guide rails as required (based on the specific cross-section).

Exhibit 8.2 - Waterworks Road

These conclusions would need to be confirmed using road cross-section information and topographic mapping to estimate the extent of such improvements. However, guide rails appear to be warranted from 700m south of Lakeshore Road to Michigan Line. The cost of installing basic steel guide rails along both side of this 750m section of Waterworks Road would be in the area of $200,000.

9. PUBLIC PARKING

9.1 Downtown Public Parking

9.1.1 Public Parking Supply

Downtown Sarnia currently has 515 public off-street parking spaces in the following locations, plus private spaces in the Bayside Centre made available for public hourly and monthly permit parking:

Exhibit 9.1 - Existing Downtown Public Parking Spaces

Public Lot	# of Spaces
Charlotte Street Lot	70
Front Street Lot	100
Lochiel Street Lot	20
Parkway Lot	39
Vendome Lot	68
Victoria Street Lot	126
CNR Lot	60
Julia Street Lot	32
TOTAL	515

The downtown area also includes approximately 500 on-street parking spaces. One of the questions posed to the TMP has been whether this existing supply is adequate to meet downtown parking demand. This is an important question because an undersupply of parking does not support downtown business, while an oversupply lowers the value of the parking spaces and competes directly with transit use to and from the downtown, and the future transit use targets included in the Transit Master Plan.

A random survey was conducted of downtown business owners and staff on June 5, 2013. In terms of parking supply, 19 of 21 respondents said there is not enough on-street parking in the downtown to meet demand. Another 13 of 21 said there is not enough off-street parking in the public lots, but 12 of 21 thought these lots are conveniently located to serve downtown businesses.

The conclusion is that the City's downtown parking supply is adequate to meet current demand based on observation of parking lot occupancy and utilization during typical weekdays and weekends. However, the supply of on-street parking is limited by available street frontage and regulations on the location of parking stalls. The off-street parking supply, while well located in different parts

of the downtown, is sensitive to desirable walking distances and loss of spaces through property development.

The first important recommendation this TMP makes regarding the downtown parking supply is that the city ensure that equilibrium of downtown parking spaces is maintained. This means that any significant loss of off-street parking spaces, defined as more than 20% of a lots supply, should be countered with the provision of make-up parking located as close as possible to the lost parking. This can be done in three ways in order to maintain the parking supply equilibrium:

- the City purchase or lease property for this make-up parking;
- the City enter into an agreement with the developer responsible for the lost parking supply to make up this loss by a corresponding increase in the development-related parking supply beyond that required by the City's Zoning Bylaw; and/or
- the City accept cash-in-lieu of parking as allowed by the Official Plan to maintain a parking reserve fund for the supply and management of public off-street parking.

9.1.2 Free Public Parking

In addition to the question of downtown parking supply, the cost of this parking has also been an issue. The June 5, 2013 downtown merchant survey was split 10 to 11 on whether the existing two hour free on-street parking limit is sufficient. However, all respondents felt that this two hour free limit during the day needs to be maintained, plus the free after 6:00 p.m. and on weekends parking. Furthermore, the survey found that most respondents felt the current $0.50/hour cost in off-street lots is reasonable. So the two main parking cost issues are the free parking time limit, and the actual price of parking as discussed next.

9.1.3 On-Street Parking Time Limit

Regarding the free parking time limit, the TMP supports those merchants who feel the City should maintain the weekday two hour on-street free limit, and does not recommend extending this to three hours as others have suggested. This is because on-street parking is the premier, most convenient parking available in the downtown. It provides the best service to users of the downtown, and so parking costs and limits should be used to maximize the turnover of on-street parking stall so that it can be available to the maximum number of users in a day. Extending the free parking to three hours would have a number of detrimental consequences as seen in other cities that have tried this approach:

- Extended free on-street parking will be used by downtown business staff. This is often indicated early in the morning when downtown on-street parking spaces are occupied but business have not opened;

- Three free hours makes reparking easier for staff and customers who want to park on the street. The principle behind short-term parking in a downtown is that if a person needs to park for more than two hours, they should park off-street in a lot; and
- Chalking tires is a common way of managing on-street parking time limits, but cars can still be moved and reparked. In order to effectively prevent reparking, the City would need to purchase advanced handheld tracking and recording equipment to better manage the parking time limit.

Maintaining the two hour limit as a uniform duration on all downtown parking meters is also recommended, rather than using different time limits in different parts of the downtown. This maintains a more consistent and clear on-street parking system and reduces user confusion.

Another potential way to provide free on-street parking in the downtown involves a parking token program where merchants would buy tokens at a discount rate, then give them to customers as they see fit. Since the City has no on-street parking meters, these tokens could be used for off-street parking, or implemented if parking meters are introduced in the future. A parking token program could be effective at encouraging return visits to the downtown, and is used in some cities such as Oshawa and Oakville.

9.1.4 Public Parking Rates

Setting the price of parking involves more than just revenue generation because it can address a number of transportation objectives. It can be implemented as a Transportation Demand Management (TDM) strategy to reduce vehicle traffic and encourage use of alternative travel modes. The price of parking also forms part of a parking management strategy to reduce parking problems in specific areas such as downtowns. Finally, the pricing is typically used by municipalities and developers to recover some of the capital and maintenance costs of their parking facilities.

In most cities today, the emphasis is no longer on minimizing the cost of parking. Instead, a number of other basic factors are commonly being used to set responsive, effective parking prices and meet related transportation objectives, including:

- Manage and price the most convenient parking to favour priority users. Charge higher rates and use shorter parking periods for the most convenient parking spaces, usually on-street to increase turnover;
- Improve parking methods by using electronic pricing systems that accommodate various payment methods (i.e. cash, credit card, debit card) to allow motorists to pay just for the time they need;
- Most municipalities now avoid discounts for long-term parking such as ‘early-bird’ rates and cheap monthly rates; and

- Always set parking prices to equal or exceed transit fares. Unfortunately this is not happening in Sarnia where a monthly parking pass in the downtown city lots is $33.90-$44.64 depending on the lot, but the monthly transit pass is $66.00.

One way to determine if the City's current parking rates are appropriate is to compare them to other similar sized cities as follows:

Exhibit 9.2 - Comparison of Parking Rates

City (population)	Sarnia (73,000)	Sudbury (158,000)	Windsor (216,500)	Kitchener (205,000)	Guelph (116,000)	Kingston (117,000)
Public On-Street	$0 free 2 hrs, after 6p.m. and Saturday	$1.00/hr	$1.25/hr	$1.25/hr	$1.50/hr	$1-$1.50/hr
Public Off-Street to 6 p.m. Monthly	$0.50/hr $36.73-$44.64/ Month	$1.00/hr $30-$65/Month	$1.00/hr $22.60-$67.80/ Month	-- $69-$125/ Month	-- $20-$105/ Month	$1.00/hr $45.60-$97/Month

The conclusion reached from these comparisons is that the free two hour on-street parking in Sarnia is somewhat unique when many comparable cities are charging at least $1.00/hour. Similarly, the off-street monthly rates in downtown Sarnia are at the low end of other municipal monthly rates, as is the Bayside Centre rate of $25/month for outdoor and $55/month for indoor parking. This does not mean that this TMP automatically recommends increasing parking rates in downtown Sarnia, but it does highlight that the current rates are at the low end of the range of rates charged by the other cities. This means that the downtown Sarnia rates already provide an advantage for Sarnia downtown parkers compared to other cities.

9.2 Parking Enforcement

9.2.1 Infraction Fines

Almost all responders to the June 2013 downtown merchant parking survey felt that the level of parking enforcement in the downtown is too strict. The City's Bylaw Enforcement staff issue parking infraction tickets as a way of managing the downtown parking supply. A comparison of some typical infraction fines is provided as follows:

Exhibit 9.3 - Comparison of Parking Fines

Infraction	Sarnia	Sudbury	Windsor	Kitchener	Guelph	Kingston
Expired Meter	$20	$20	$20	$15	$20	$25
Accessible Parking	$300	$300	$350	$300	$300	$300
Parking In Loading Zone or Bus Stop	$20-$30	$21	$35	$40	$40	$30

Based on this comparison, it appears the set fines for parking infractions in Sarnia are average compared to other jurisdictions. It is important that the fines remain reasonable because if they are too low, some motorists may not follow the regulations and simply treat the fines as a parking fee. However, they should also not be too high to be considered excessive, unfair and a detriment to downtown business vitality. The rule of thumb that the City can use is that the greater the difference between the parking rate and cost of a fine, the less chance of the parker deciding to take a risk and let the meter expire, or risk other violations.

9.2.2 Ticketing Grace Period

The image of parking enforcement with the public and downtown businesses can be enhanced through the application of a grace period option before issuing tickets, where possible. This approach would have the enforcement officer delay issuing a ticket, for a time-related infraction only, when a short delay (i.e. maximum 10 minutes) is feasible. Where feasible, a grace period becomes an enforcement practice including first issuing a warning notice, followed by a ticket following the grace period.

A parking grace period is typically less than 10 minutes over the time limit or the period just becomes extended free parking. It also requires an enforcement practice that allows enforcement staff to return to graced parked vehicles within maximum 10 minutes to see if the vehicle has moved. With the manual enforcement practice used in Sarnia that covers large enforcement areas in the downtown, providing a short parking grace period is not feasible to manage,

9.3 Accessible Parking

Availability of accessible parking can be a major issue for people with mobility disabilities, but was not specifically identified as a downtown Sarnia issue in developing this TMP. However, under the Accessibility for Ontarians with Disabilities Act (AODA) and actions of the Sarnia Accessibility Advisory Committee (SAAC), accessible parking is required in the downtown. The AODA includes regulation for the provision of accessible parking spaces in Ontario. In addition, the following accessibility recommendations are made for Sarnia in general, and specifically for the downtown:

- Allocate 2% of downtown on-street parking to accessible parking through the signage and geometric design of accessible parking stall. The SAAC should be consulted in selecting the location of these accessible spaces;
- Also consult with SAAC in developing a snow removal strategy in the downtown that priorities access for the disabled, for example to public buildings and bus stops; and
- Work to identify, remove and prevent accessibility barriers along all public streets and in public parking lots.

9.4 Zoning Bylaw Provisions

Parking requirements in the city overall, and specifically in the downtown are regulated by Section 3.37 of the Sarnia Zoning Bylaw. The Bylaw waives parking requirements in the 'D' Downtown Zones except for multiple use apartment dwellings, and the TMP strongly supports this provision as a TDM-related initiative supporting use of alternatives modes to and from the downtown.

It is also recommended that once the next mandatory five-year review is conducted on the City's Official Plan, the City review the minimum parking space requirements and parking space dimensions in the Zoning Bylaw to ensure they support the city's TDM objectives (i.e. do not result in excess parking supply) and reflect changing automobile designs regarding vehicle dimensions and use of alternative fuel sources (i.e. electric charging stations). A basic comparison of parking provisions in the Sarnia Zoning Bylaw as shown below suggests that in some cases, the City should consider updating specific land use provisions that significantly differ from the norm today, or at least reaffirm the Sarnia provisions that differ significantly:

Land Use Example	Sarnia	Kitchener	Windsor	Milton
Residential – single, duplex, townhouse	1.5/unit	1.0/unit	1.0/unit	2.0/unit
Convenience Retail	1/20m2	1/20m2	1/22.5m2	1/20m2
Elementary School	1.5/classrm	1.0/classrm	1.5/classrm	2.0/classrm
Financial Establishment	1/20m2	1/28m2	1/45m2	1/20m2
Office	1/30m2	1/28m2	1/45m2	1/30m2
Personal Services	1/20m2	1/40m2	1/22.5m2	1/22.5m2
Restaurant	1.4.5m2	1/7.5m2	1/7.5m2	1/9m2

In addition, the City should include bicycle parking provisions in the Zoning Bylaw. Suggested minimum requirements are offered as follows:

Land Use	Minimum Bicycle Parking Spaces
Dwelling, Apartment	0.2 space/unit
Dwelling, Retirement	0.1 space/unit
Elementary and Secondary Schools	5% of the required parking spaces
All other Commercial, Employment and Institutional Uses	3% of the required parking spaces

The parking space dimensions included in the Zoning Bylaw were also review in terms of today's best practices, and found to be comparable to other cities. Therefore, the only other recommendation this TMP makes regarding parking provisions in the Zoning Bylaw is to consider provisions that allow for reduction in parking requirements. This is already done through the waiving of parking requirements in the 'D' Downtown Zones except for multiple use apartment dwellings. Further parking reductions across the City can be provided through shared parking opportunities, and parking reductions (i.e. 10-30%) for non-residential uses and mixed use developments. Potential parking reduction is intended to support Transportation Demand Management in a city.

9.5 Public Parking Management

9.5.1 Area Permit Parking

In some areas of the City, special provisions may have to be applied for the management of public parking in order to avoid any negative impact of inappropriate parking. One good example in Sarnia involves Bluewater Health (the Hospital). The Hospital must generate its own parking revenue to support patient programs and services, and so charges visitors $1.25 for the first half hour and $1.50 for each subsequent hour up to a maximum daily cost of $7.50 with no in-out privileges.

While there is an ample supply of surface and underground parking at the Hospital for visitors and staff, some surrounding area property owners have noted concern that Hospital parking will spill over onto nearby streets to avoid the on-site rates. To help prevent this, the City has instituted No Parking/No Stopping provisions on most of the surrounding streets in close proximity to the Hospital, with a two hour limit on other nearby streets.

Enforcement of these on-street parking limits should control any Hospital-related parking on the street. However, if City enforcement and surrounding property owner complaints suggest that Hospital-related parking has in fact spilled over onto surrounding streets, then a more effective parking management option to control this would be to establish and enforce a residential parking permit program on blocks surrounding the Hospital. With this type of program, parking would be restricted on all streets in the designated permit parking area except for permit holders.

A residential parking permit program involves issuing parking passes to residents in a designated program area that allows them to park on the street. These stickers are usually provided annually based on the number of vehicles registered to a particular address within the permit area. Any parked vehicle within the program areas that does not display a pass is automatically ticketed.

As with most parking permit programs, a residential permit program must be actively enforced to be effective. However, the enforcement can be relatively straightforward to manage on foot. Management of public parking on commercial properties for use of customers and clients only can also be enforced by property owners through observation and reporting.

9.5.2 Improve Wayfinding and Signage

A comprehensive, uniform wayfinding and signage program for the City's downtown parking facilities can help inform drivers of parking options and reduce any confusion about payment and restrictions. This includes maintaining common city parking lot signage with information about rates and restrictions. Overall, wayfinding in downtown Sarnia can be further improved to:

- Be more attractive and standardized – creating an 'identity' that draws attention to municipal parking option information;
- Clearly identify lots where parking is available (it is estimated that up to 15% of the traffic volumes in a typical urban downtown is hunting for a parking space). Also this information should clearly identify what parking is available for the general public and what is reserved for monthly parking so as to avoid confusion and unnecessary ticketing;
- Provide clear information on payment and policies. This is especially important for the maximum 2-hour on-street parking limit;
- Provide directions to nearby attractions, destinations and alternative parking lots in the downtown; and
- Design these signs to improve the downtown environment.

9.5.3 Promotion of Downtown Parking

In some ways, downtown Sarnia is at a disadvantage compared to other cities in not having a downtown Business Improvement Association (BIA). Most BIAs act as a promoter of their downtown and the features it offers, including parking information. The Sarnia Parking Authority website provides basic information about the lot names and locations, but more can be provided to better promote these lots. This can include:

- A more user friendly map of each downtown public lot with accessible parking;
- Downtown on and off-street prices and regulations;
- Additional information on monthly parking availability;

- A link to the City's parking bylaws and related policies;
- A direct link to contact information; and
- Web link to sites of alternative transportation options – Sarnia Transit, carpools and employee rideshare programs, bikeways and trails).

9.5.4 Parking For Veterans

Some Canadian cities provide free public parking for veterans. If Sarnia wishes to institute a similar practice as recognition of service for Canada, a pilot program can be implemented, with eligibility based on the Ontario veterans license plate. If a pilot program is initiated, it should be for one year and allow two hours of free parking at any municipal on-street or off-street parking space for any vehicle with the Ontario veteran license plate.

Enforcement if this program would not be a significant burden since the City already conducts visual inspections of parked vehicles.

10. TRANSPORTATION IMPACT STUDY GUIDELINES

As required by the Terms of Reference for this TMP, Transportation Impact Study (TIS) Guidelines were prepared for the City of Sarnia. The city currently has no such guidelines, and the full report on this subject is included as **Appendix C** to this TMP document. The following summary of the guidelines is intended to provide valuable information and analysis for city staff who review development and redevelopment proposals. These Sarnia TIS guidelines have been compiled to outline the process and structure required to produce a comprehensive transportation impact assessment for a development or redevelopment proposal in the City. A TIS includes explicit consideration of all modes of travel including automobiles, trucks, transit vehicles, cyclists and pedestrians. As a result, it is not referred to as a "Traffic Impact Study".

The main purpose of a TIS is to demonstrate that the transportation impacts of a proposed development or redevelopment will be manageable, and that the transportation aspects of the proposal are consistent with the objectives of the City of Sarnia. The TIS also provides the basis for the identification and evaluation of transportation related improvements or measures to be included as conditions of approval for the development or redevelopment application. Hereafter, all references to the terms "development" or "development proposal" will be equally applicable to redevelopment applications/proposals.

Through the TIS, the proponent must demonstrate that the application or proposal meets the following City objectives:

- That there is sufficient arterial road network capacity to accommodate the proposed development, taking into account transportation system improvements and any travel demand management initiatives which will be secured in conjunction with the proposal;

- That the development must be phased, if necessary, in conjunction with the implementation of transportation system and service improvements and any travel demand management initiatives, to ensure that supply and demand are balanced over time;

- That the proposal incorporate a suitable Transportation Demand Management strategy which includes all reasonable measures to facilitate and promote walking, cycling and transit use where available for trips to and from the site, and future potential transit service; and

- That the number of vehicular parking spaces provided in conjunction with the proposal be minimized, with consideration given to short and long term parking demands, special needs parking and commercial vehicle loading facilities.

In some cases the trip generation potential from a development proposal may be insignificant when considered in isolation. However, the cumulative effects of a number of such proposals in one area may, in combination, require transportation improvements. It is for this reason, that the City may request the preparation of a transportation impact statement to ensure that the land uses and trip generation potential of these smaller proposals can be collectively accounted for in overall planning initiatives.

10.1 Applicability

It should be recognized that the TIS Guidelines prepared for the City are relevant at the time of preparation. These guidelines will be revised, as necessary, to reflect current City, practice and accepted standards. The development proponent shall contact the City of Sarnia – Engineering Department to obtain any updates since this compilation date.

The TIS Guidelines outline general recommendations for the preparation of a TIS for submission to the City. There may be instances where the guidelines and general study assumptions may not be applicable to certain locations in the City, or specific types of developments. It should be recognized that the purpose of these guidelines is to provide a framework for the preparation of a TIS, and are not intended to substitute for good transportation engineering judgement.

10.2 Acknowledgement of Responsibility

When the scale of a development requires a TIS, it is the Proponent's responsibility to retain an experienced transportation consultant to complete the assessment. The City of Sarnia requires that a TIS be prepared and/or reviewed by a qualified firm/individual. The individual taking responsibility for the Proponent's TIS work must be a registered Professional Engineer with more than five years of applicable experience in the preparation of transportation impact studies.

Included in the TIS Guidelines is a Project Record that must be submitted with all TIS reports and addendums, including the stamp of the professional engineer taking responsibility for the work. In completing this form, the engineer is verifying that appropriate assumptions and methodologies have been used in the completion of the TIS and is indicating the individual(s) who are taking corporate/professional responsibility for the work. This information will also assist City staff in contacting the appropriate individual if clarification of any part of the transportation impact assessment is required during the review process, or at some time in the future.

10.3 TIS Requirements and Scope

There are a number of considerations in determining the need, elements and level of detail for a TIS. Generally a TIS may be required when one or more of the following are anticipated or present:

- The development proposal will add more than 100 peak-hour vehicle trips to the transportation system;
- The development is planned with an access to an arterial roadway within 200 metres of a signalized intersection;
- The development is located in an area of high roadway congestion, high operating speeds, and limited sight distance where safety is an issue;
- If in the opinion of the City, the development has the potential to create unacceptable adverse operational and safety impacts on the area road network;
- The development, its access, or type of operation, is not envisaged by local land-use or transportation plans;
- The development requires a change or an exception to a City planning or by-law policy, strategy or plan, including rezoning;
- The development is a large recreation or entertainment facility, or is in the vicinity of one, that would likely serve as a regional attraction; and/or
- If in the opinion of the City, a previous TIS prepared for the same site is outdated.

The above criteria are necessarily general and in view of the lack of definitive criteria to establish the need for and scope of a TIS for a particular proposal, the Proponent shall consult with City Staff, to determine site specific TIS requirements.

The level of detail and the required components of the TIS will be a function of the location, size and operations of the development proposal. Included in Exhibit 10.1 is a summary of the points in the development approval process where a TIS may be requested and its overall objectives.

In some cases, the size, location and nature of the proposal will be such that a detailed transportation impact study is not required. Through discussions with City staff, the proponent may be required to prepare a more basic TIS, which would outline the general characteristics of the site, its operation and trip generation potential, and a high level assessment of traffic impact, access, safety and parking requirements. This type of TIS would be a technical letter,

stamped by a Professional Engineer specializing in transportation planning, which outlines the required components agreed upon with the City.

The proposed development may lie within an area for which a recent and relevant Secondary Plan has already been completed. Under this scenario, the City shall determine if certain elements of the TIS can be omitted or directly incorporated into the current TIS work, i.e., background growth potential, identified arterial road improvements, etc.

Exhibit 10.1 - General TIS Scope

Stage of Approval	General Transportation Impact Study Scope
Secondary Plan/Area Plan	• Identification of major/arterial transportation infrastructure and operational improvements associated with area wide development potential • Determination of the collector roadway network and the major intersection configurations and type of control
Draft Plan of Subdivision	• Arterial and collector roadway requirements and operations • Phasing plan • General description of access locations and operations • Allocation of responsibility for implementation of transportation infrastructure improvements
Rezoning	• Arterial and collector roadway requirements and operations • Phasing plan • Transportation infrastructure improvements tied to phasing plan • Description of access locations and operations
Site Plan	• Access location and operations • Transportation infrastructure improvements tied to phasing plan • Site specific impacts on road network including adjacent site operations

Included in Exhibit 10.2 is an indication of the components that the City of Sarnia will require at the various points in the development process. The proponent is to review the TIS requirements included in the column representing their specific point in the development process and discuss relevancy with City staff.

The onus will be on the Proponent to demonstrate that certain aspects of the general requirements for a TIS are not required based on the point in the approval process, or availability and content of recent studies. The proponent should discuss the study scope before initiating the study.

Exhibit 10.2 - Specific TIS Elements

TIS Component	Site Development Process			
	Secondary Plan/Area Plan	Draft Plan of Subdivision	Rezoning	Site Planning
Transportation Network				
Major transportation improvements: • Planned roadways • New interchange/ intersection • Road widening • New transit routes/ services • Pedestrian & bicycle routes	√	√	√	
Local transportation system improvements: • Intersection improvements • Traffic signal installation or modifications • Traffic calming Plan		√	√	√
Long range transit route and facilities planning	√	√		
Travel Demand Analysis				
Development potential beyond the study area	√	√	√	√
Site specific travel demand from other approved developments within study area			√	√
Project specific travel demands and assignments		√	√	√
Area wide transit demands	√	√		

TIS Component	Site Development Process			
	Secondary Plan/Area Plan	Draft Plan of Subdivision	Rezoning	Site Planning
TDM measures (where applicable)	√	√	√	√
Transportation Analysis				
Arterial road link capacity, intersection location, configuration and control	√	√	√	√
Traffic control, lane requirements and operations at collector and local road intersections	√	√	√	√
Storage lengths and tapers for auxiliary lanes at all intersections		√	√	√
Impact on movement of farm machinery	√	√		
Transit route planning	√	√		
Bicycle route planning	√	√		
Off-site pedestrian facilities		√		√
On-street parking requirements/provisions		√	√	√
Driveway access & operations			√	√
Traffic infiltration potential	√	√	√	√
Traffic management plan	√	√		
Site Operations				
Driveway access design and operations including sight distances and corner clearances			√	√
On-site pedestrian/bicycle facilities and operations				√

TIS Component	Site Development Process			
	Secondary Plan/Area Plan	**Draft Plan of Subdivision**	**Rezoning**	**Site Planning**
On-site traffic calming elements				√
Parking and loading layout and design				√
Parking supply			√	√
Improvements and Funding				
Identification of major transportation infrastructure improvements	√	√	√	√
Site phasing and required improvements	√	√	√	√

Having established the TIS scope, the remainder of the TIS Guidelines document, included in **Appendix C**, outlines the acceptable methodologies for which to document the required components.

11. RURAL ROAD SURFACING

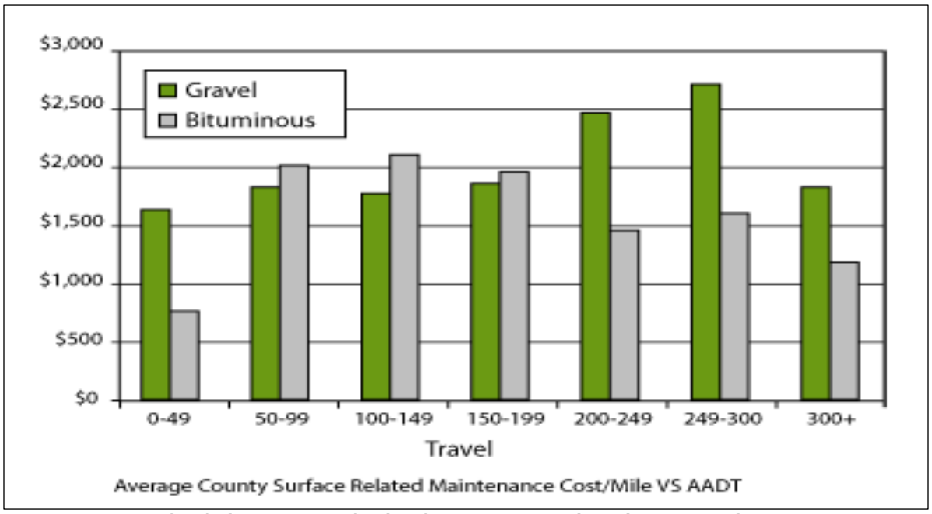
The RFP for preparation of this Plan asks that rural roads in the city that are surface treated be reviewed to determine at what time these roads need to be reconstructed or upgraded to asphalt surface roadways. Within the City of Sarnia there are 66.13 kms of surface treated roads as listed on Exhibit 11.1:

Exhibit 11.1: Surface Treated Roads in Sarnia

Street	Starting At	Ending At	Total Length
Michigan Line	Modeland Road	Mandaumin Road	9.50 km
Jackson Road	Telfer Road	Brigden Road	1.79 km
St. Andrew/Scott Road	Vidal Street S	LaSalle Road	5.82 km
McGregor Road	Plank Road	City Limits	3.22 km
Blackwell Sideroad	Lakeshore Road	City Limits	11.15 km
Telfer Road	Lakeshore Road	City Limits	11.47 km
Bridgen Road	Lakeshore Road	City Limits	11.34 km
Waterworks Road	Lakeshore Road	City Limits	11.84 km

The surface of many rural roads is generally characterized by a single or double surface treatment, chip seal or chip and tar paving. Other rural roads are surfaced with hot mix asphalt. The lifespan of a road is affected by the number of vehicles and the weight of the vehicles using it. As shown on Exhibit 11.2, while paved roads have a high initial cost, gravel roads cost more for ongoing routine annual maintenance compared to pavement when the average annual daily traffic (AADT) exceeds 200 vehicles.

Exhibit 11.2: Cumulative Maintenance Costs for Gravel vs. Paved Roads



Source: Local Highway Technical News, Technology Exchange, Summer 2005

As a result, the decision on when to pave a surface treated rural road is usually based on three main factors:

- Traffic Volume – The City of Sarnia and County of Lambton should give serious consideration to upgrading a surface treated road to some kind of paving where road sections of at least 10 km experience AADT volumes of 250 vehicles/day or greater;
- Type of Traffic – Predominant vehicles types using the road also influence the need for paving. If a road has considerable truck traffic (i.e. 10%>) and/or use by heavy haul loads, a gravel surface will be damaged faster than a paved surface; and
- Road Function – The role of a road or road section in the City's road system, as defined by the Official Plan road classification system summarized in TMP Section 6.5, will often influence when paving is advised. For example, consideration should be given to paving surface treated sections of arterial roads before collectors.

12. ACTIVE TRANSPORTATION STRATEGY

Active transportation refers to personal transport that is human-powered and non-motorised, such as walking and cycling. An active transportation (AT) strategy is an important part of any multi-modal transportation system because it enhances the range of travel options for residents, employees and visitors. The purpose of the AT strategy is to encourage the use of active transportation in Sarnia in a way that aligns with the vision and objectives of the TMP.

In this active transportation strategy, the focus remains primarily on walking and cycling. Virtually all trips start and end with walking: whether it is to or from a transit stop, a parking spot or various destinations. Thus, it is important to cultivate the walking environment for a wide range of people with different needs and abilities. Similarly, cycling extends the range of personal mobility beyond walking alone and remains relatively accessible to the public.

Other benefits of active transportation include a better quality of life by improved access to convenient, comfortable and affordable travel choices. Lower per capita transportation costs can translate to healthier household budgets with more expendable income for the local economy. Other “value-added” benefits include health benefits associated with increased physical activity and reduced traffic congestion resulting from a shift of vehicle trips to active modes.

This TMP section is divided into six sub-sections. First discussed is the context for walking and cycling in Sarnia. Next, two distinct approaches are proposed to improve the walking environment and to build a bike network. In addition to infrastructure improvements, other initiatives are discussed that promote active transportation through programming, policy, and design. Lastly, the implementation strategy is presented as well as a summary of recommendations.

12.1 Walking and Cycling in Sarnia

Active transportation accounts for 7% of the mode share in Sarnia, and this is similar to other smaller “auto-dominated” cities in southwest Ontario. However, Sarnia has several characteristics that make it both opportune and challenging for walking and cycling:

- The core area of the city has a compact urban form with relatively mixed land-uses. The grid-like street network in the downtown and surrounding communities contribute to walkable neighbourhoods and allow residents to access local businesses. The street network also provides opportunities to locate bikeways along quieter local streets adjacent to arterial roads with higher volumes and speeds;

- The size of the existing central urban area is contained in an area about 5km by 6km (bound between Confederation Drive, Modeland Road, Point

Edward and the two waterfronts). Twenty minutes on foot or by bike in the city is roughly equivalent to 2km and 5km, respectively. In addition, the topography is generally flat. Thus many destinations are generally within a walkable or bikeable distance for many residents;

- The medium size of the City together with a stable population over the last 20 years has resulted in well-established communities with stable traffic conditions. Routes with excess roadway capacity may be targeted for on-street bikeways. Growth is anticipated, but traffic impacts can be diminished by strategic investments in a multi-modal system;

- Active transportation investments can support a shift from auto trips to walking and cycling. In particular, target trips include those to and from the downtown core, the central commercial centre and other activity areas. Connecting to and from the Bright's Grove community is more challenging. However, the Howard-Watson trail provides a critical west-to-east and north-to-south link. Similarly, there are already exist designated bike lanes along Vidal Street as a route to the southwest industrial and employment lands. By providing the key linkages between these existing routes, the active transportation strategy can encourage more trips to be made by walking and cycling; and

- Narrow and discontinuous sidewalks present a challenge for pedestrians, especially the mobility-impaired. Lack of sidewalks on one or both sides of the road is common is newer communities, in particular along local residential streets. The Heritage Park community is an example of a neighbourhood that is isolated from walking and cycling opportunities. Modeland Road, Highway 402, and the railway corridor present major physical barriers for active transportation. This strategy aims to address barriers to walking and cycling by providing truly viable active transportation options for residents, employees and visitors in the city. To make cycling a viable option, there is a need for a connected network of quality bikeways that run city-wide.

Participants at the first public information centre showed strong support to improve conditions for walking, cycling and more travel options as shown here. Many of the opportunities and challenges presented in this TMP were identified by the public and other stakeholders, and reaffirmed in the feedback received during the second round of consultation.

The active transportation strategy both builds upon the unique advantages in Sarnia, and addresses on-going barriers for existing and prospective pedestrians and cyclists in the city.

To develop the strategy, the following factors were considered:

- Existing sidewalks and off-road trails;
- Crossing barriers such railway corridors, waterways and roadways with high volumes and speeds;
- Key activity areas: schools, downtown, central and other commercial zones, major destinations;
- Transit network: routes, stations and major hubs;
- Opportunities to retrofit sidewalks and on-road bike lanes along existing roadways and sidewalks, bikeways and trails in new community developments; and
- Candidate routes and priorities identified by the public, stakeholders and the Project Team.

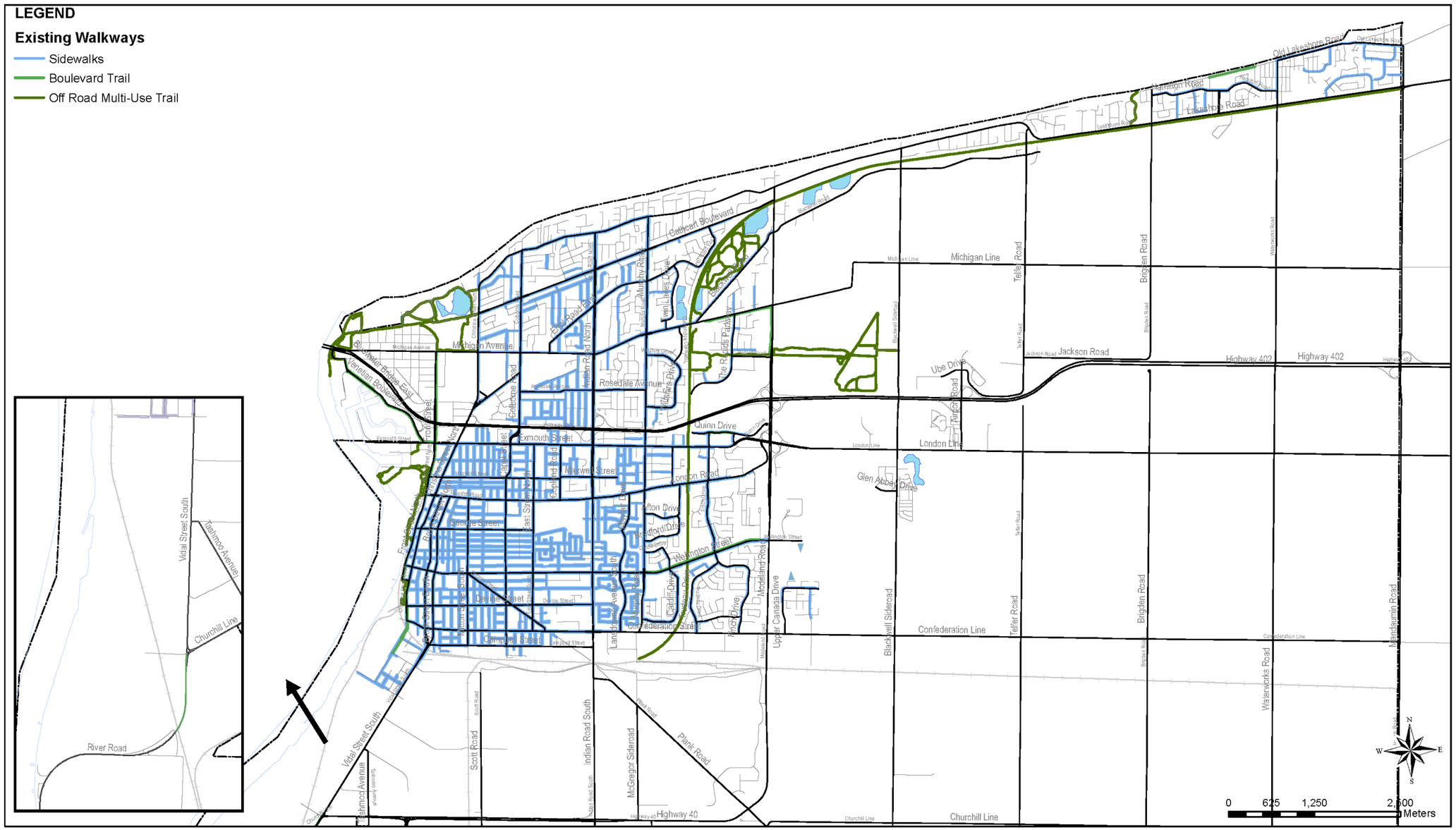
12.2 Improving the Walking Environment

Exhibit 12.3 - Principles from Pedestrian Charters in Other Ontario Cities shows existing sidewalks in Sarnia. Many streets in the downtown and south central neighbourhoods have sidewalks on both sides of the road. However, newer communities throughout Sarnia typically have sidewalks on one side of the road for collector roads and no sidewalks along local streets. The current Official Plan policy is for sidewalks on both sides of the road on arterial road. For collector roads and local roads, the policy dictates that traffic and safety data are required to warrant sidewalks. However, often traffic and safety data is not readily available in these locations and residents must submit a formal request to install sidewalks where they are missing. These policies and practices have likely contributed to the discernible lack of sidewalks in newer communities in Sarnia.

Streets without safe places to walk put people at risk. Studies have shown that residential sidewalks have 23% of the pedestrian crashes, but only 3% of the pedestrian traffic. Streets with no sidewalks have 2.6 times more pedestrian crashes, sidewalks on one side only have 1.2 times more pedestrian crashes than streets with sidewalks on both sides[2]. Thus, sidewalks on both sides of the road will provide better safer access for pedestrians to connect with transit and

[2] Knoblauch, R.L. Tustin, B.H, Smith, S. A., and Pietrucha, M. T., *Investigation of Exposure Based on Pedestrian Areas; Crosswalks, Sidewalks, Local Streets AND Major Arterials*, Report No. FHWA/RD-88/038, Federal Highway Administration, September 1998

Exhibit 12.1 - Existing Sidewalks in Sarnia



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Prepared: August-21-13

City of Sarnia
Transportation Master Plan

Map 1: Existing Sidewalks and Trails in Sarnia

other key destinations. In addition, the lack of sidewalks makes a less pleasant walking environment and strongly discourages people who may decide to walk otherwise.

This strategy aims to address the need for an improved walking environment and confront other barriers to walking in the city in three ways:

- Step one is a change in the approach to pedestrian planning and design. Revisions to the sidewalk policy, updated design practices and the endorsement of a Pedestrian Charter are three ways to show this change. See **Appendix D** for an example of a Pedestrian Charter.

- Step two is to start building sidewalks on both sides of the street for new development areas and infill missing sidewalks in the existing urban areas.

- The last step is to ensure that people can walk both along the pedestrian corridors, but also across major streets. These steps are reflected in the recommendations below and are discussed in the following sub-sections.

To improve the walking environment, it is recommended that the City:

1. Consider endorsing a Pedestrian Charter based on the example noted in Section 12.2.1 that recognizes the beneficial role of walking in Sarnia and affirms the City's commitment to improving the walking environment;

2. Revise the sidewalk policy and other related policies to encourage improvement of the walking environment as discussed in Sections 12.2.3 and 12.4.2;

3. Pursue the construction of sidewalks where missing along pedestrian corridors according to the Walkway Infill Program discussed in Section 12.2.1;

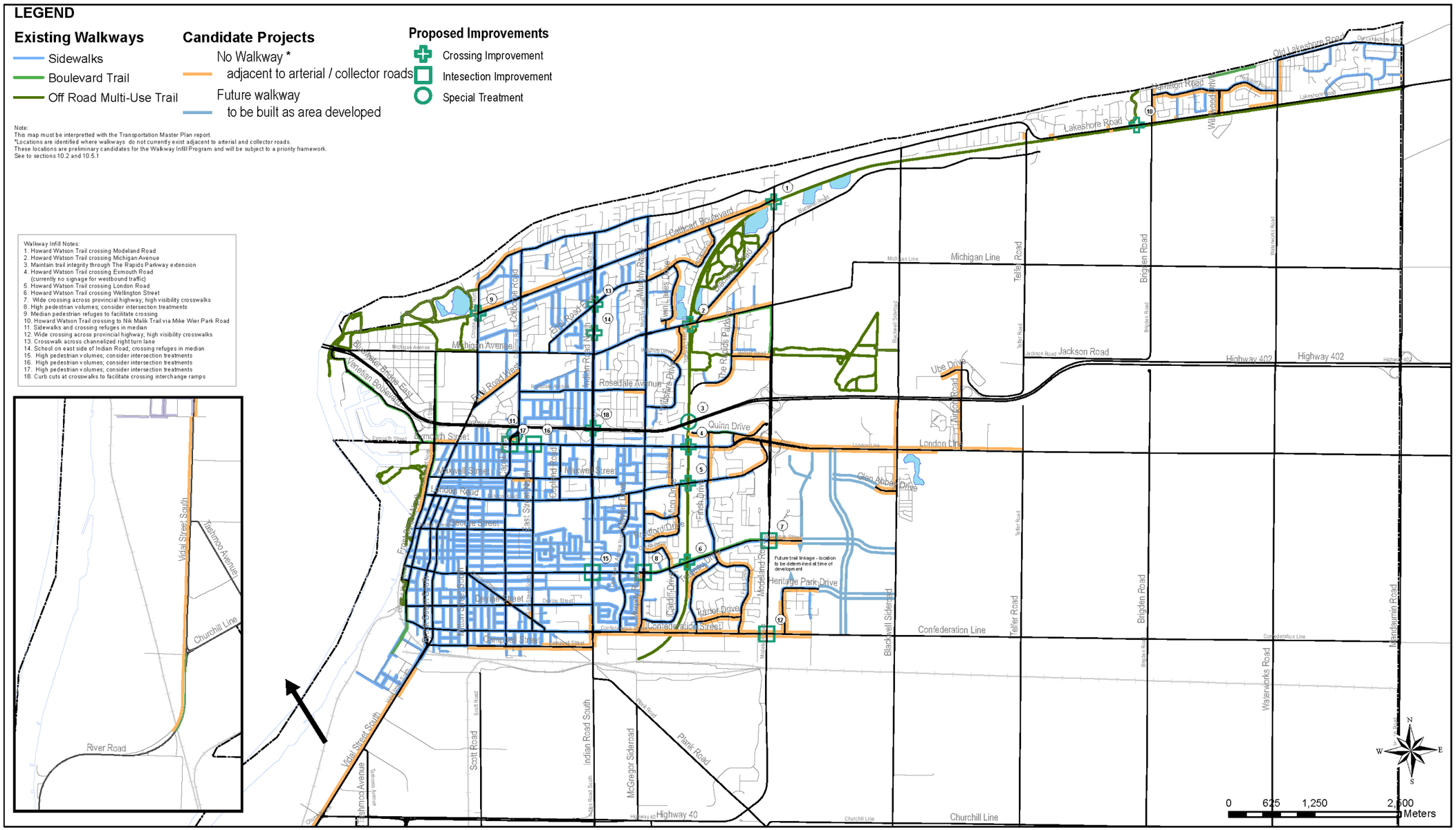
4. Pursue the installation of crossing treatments and intersection improvements to facilitate pedestrian movement across major streets as identified in Exhibit 12.2; and

5. Develop the prioritization framework (discussed in Section 12.2.2) to direct the implementation of the Walkway Infill Program.

12.2.1 Walk Friendly Policy and Design

Strong policy and design principles can support the development of better walking environments. To demonstrate a walk-friendly approach to policy and design, the City should consider developing and endorsing a pedestrian charter. A pedestrian charter is a statement of principles that show a commitment to

Exhibit 12.2 - Walkways Along Arterial and Collector Roads



IBI GROUP

Prepared: August-21-13

City of Sarnia
Transportation Master Plan
Map 2: Walkways along Arterial and Collector Roads

improving the walking environment. The City can choose to endorse pre-drafted examples such as the International Charter of Walking or prepare its own set of principles that reflect the attitudes toward walking in Sarnia. **Appendix D** shows examples of pedestrian charters from other Ontarian cities. Exhibit 12.3 highlights the principles typically captured in a pedestrian charter.

Exhibit 12.3 - Principles from Pedestrian Charters in Other Ontario Cities

Principles of a Pedestrian Charter			
• Accessibility, Increased inclusive mobility, Reduction of auto-dependence • Well designed and managed spaces and places for people • Improved integration of networks, Better and more connected walking routes • Land Use Planning that Supports Walking • Safe Roads, Reduced road danger • Prevention of crime and fear, Personal and Community Safety • More supportive leaders, A culture of walking			
Ontario municipalities with a pedestrian charter			
Ajax	Kingston	Niagara Falls	St. Catharines
Brantford	Kirkland Lake	Oakville	Stratford
Burlington	Kitchener	Oshawa	Toronto
Caledon	London	Ottawa	Waterloo Region
Hamilton	Milton	Peel Region	Welland

In addition to the charter, it is recommended that the City follow through with its stated commitment by updating the sidewalk policy to include sidewalks on both sides of the street for all roads. Exhibit 12.4 shows the proposed revisions to the sidewalk policy.

A pedestrian charter and update to the sidewalk policy represent two key policy updates that can significantly improve the walking environments. Further, the application of the revised sidewalk policy through the Walkway Infill Program (discussed in the next section) will ensure existing urban areas will benefit from the changes. Other policies related to active transportation are further reviewed in Section 12.4.2.

Note that for all new and redeveloped sidewalks and multi-use trails, the City must meet the accessibility standard for the design of public spaces as required by the AODA (Accessibility for Ontarians with Disabilities Act, 2005). Public sector organizations will be obligated to meet the requirements starting January 1, 2016. For more detailed information, see *exterior paths of trail* in part 1V.I of the Integrated Accessibility Standard Regulations 191/11.

Among other criteria, the standard sets the minimum clear width for sidewalks at 1.5m (1.2m at curb ramps). For recreational trails, the minimum clear width is 1.0m. However, it is important to distinguish that this strategy recommends boulevard multi-use trails for transportation use and not just for recreation. Best

practices to date call for a minimum width of 3.0m for multi-use trails that are designated for pedestrian and cycling use and that permit travel in both directions. Design guidance for active transportation facilities is further discussed in Section 12.4.3.

Exhibit 12.4 - Recommended Update to Sidewalk Policy

Relevant		Recommended Revision
Official Plan Policy		
4.1.8.2	Sidewalk will generally be provided within Urban Residential and Commercial Areas, along both sides of Arterial Roads and along at least one side of Collector Roads and Local Roads, where warranted by vehicular or pedestrian traffic volumes.	Sidewalks will generally be provided within Urban Residential and Commercial Areas, along both sides of the road on all streets in accordance with the Transportation Master Plan.
Proposed Walkway Policy Update for the Sarnia Transportation Master Plan		
Best practices to date recommend sidewalks on both sides of the road, especially for Urban Arterial and Collector Roads. Sidewalks on only one-side of street are not generally recommended as it weakens pedestrian safety and accessibility. It may be acceptable on an interim basis that improves existing conditions, or as appropriate for the local context.		In existing communities, walkways missing on one or both sides of an Arterial or Collector road will be retrofitted with a sidewalk or multi-use trails according to the Walkway Infill Program and Priority Framework. In new development or redevelopment areas, sidewalks will be provided on both sides of the road. Sidewalks will be constructed as soon as development begins on the developed side of the road.

12.2.2 Walkway Infill Program

The most direct way to address the lack of sidewalks in the city is to build more sidewalks. A Walkway Infill Program would support that. The goal of the Walkway Infill Program is to retrofit sidewalks on both sides of the street for all arterial and collector roads within urban areas in the city. Missing sidewalks along local streets may also be considered in the program. However, major streets are the focus due its proximity to more destinations, its exposure to traffic (both higher speeds and volume) and its potential to connect with transit routes.

Exhibit 12.2 is a map of arterial and collector roads where sidewalks are missing on one or both sides. This map serves as a starting point for candidate projects in the Walkway Infill Program. **Appendix E** provides this list of candidate projects to infill missing sidewalks or boulevard multi-use trails. It also contains a list of future walkways to be built in new communities as development occurs. Exhibit 12.2 also identifies crossing and intersection improvements.

Other candidate projects (e.g., sidewalks along local roads) may be added through the existing request process; residents are welcome to submit a letter to City staff and propose a candidate project for sidewalk infill or crossing improvement. To maintain a manageable list of projects, City staff may consider revising this standard process to 1 request per household. In the past, poor connectivity to existing sidewalks was a reason not to pursue the installation of new sidewalks. Note that this practice is not recommended to remove or exclude candidate projects from the Walkway Infill Program as it interferes with the ultimate goal of the program.

In general, the priority for sidewalk infill projects should focus on arterial and collector roads that:

- Have no existing sidewalks on either side; and
- Are located within a major activity area (i.e. employment nodes, commercial areas, school or other institutions, seniors centres, beaches and open spaces), within walking distance (i.e. 800m) of a transit stop or along a transit route.

Note that Confederation Street, east of Lansdowne Avenue is the only arterial street adjacent to an urban residential area that does not have sidewalks on either side of the road. Without designated walkways to Heritage Park, this community is isolated from the rest of the city.

It is recommended that this section is completed first (at least between Finch Drive and Upper Canada Drive) as part of the Walkway Infill Program.

However, it is also recognized that many factors must be considered when developing priorities within the Walkway Infill Program. A priority framework is discussed in the next section. Implementation of the Walkway Infill Program is discussed in Section 12.5.1.

12.2.3 Walkway Infill Priority Framework

A priority framework is recommended to facilitate the consideration of multiple factors that can influence project priority. shows some examples of priority factors.

Exhibit 12.5 - Priority Factors for the Walkway Infill Program

Other jurisdictions have developed similar frameworks based on a point system of various safety, volume and destination criteria. Candidate infill locations are assigned points based on a set of priority factors; candidate projects with the most points will have a higher implementation priority. This system is recommended for the Walkway Infill Program due to its simplicity. Exhibit 12.6 outlines a proposed point system for the priority framework.

Exhibit 12.6 - Priority Framework for Walkway Infill Program

Priority Factor	Point Recommendations
No sidewalk on either side of the street	More points given where no walkways on both sides of the street
Pedestrian fatalities within the late 3 year	Set point score per fatality
Pedestrian injuries within the last 3 years	Set point score per non-fatal injury
Lack of near-by alternative walkways	Set point score if alternate walkway not in proximity (e.g. beyond 800m)
Existing or future pedestrian activity	Descending point score for high, medium and low pedestrian activity
Existing and future vehicle traffic volume	Descending point score for high and medium range AADT (e.g. <5,000, 5K-10K, 10K-15K, 15K-20K, >20,000 vpd)
Operating Speed	Descending point score for high to medium range of operating speeds (e.g. <50kph, 50-60kph, 60-70kph, 70-80kph, >90kph)
Within major activity centre (i.e.	Set point score for if within boundary of activity area

Priority Factor	Point Recommendations
employment nodes, commercial areas, institutions, beaches and open spaces)	or within proximity to major destination (e.g. 800m)
Concentration of destination areas	Descending point score for high, medium and low concentration of destination areas
Access to elementary schools	Set point score for within elementary school proximity (e.g. within 400m)
Access to secondary school	Set point score for within secondary school proximity (e.g. within 800m)
Proximity to transit stations	Set point score for within transit station proximity (e.g. within 800m)
Location along transit route	Descending point score for full, partial, no transit route along infill walkway
Request from the public	Set point score for record of public support

Note that the actual scores for each priority factor are not provided. This approach allows for flexibility in the framework based on available data.

12.3 Building a Bikeway Network

Building high-quality bike routes is a key step towards accommodating cycling in Sarnia. One of the greatest barriers for many people towards cycling is the lack of comfortable, convenient and safe bike routes. Similar to the Walkway Infill Program, building a bike network is about providing the infrastructure for existing *as well as* would-be cyclists. It can also provide a viable alternative for people who are either transit- or auto-dependent, especially in areas where it is difficult to provide convenient frequent transit routes. Even for long distances trips, an integrated bike network supports multi-modal trips by connecting residents to and from transit service where it may be less convenient at the destination or departure point.

The approach to building a bike network depends largely on the specific urban and rural context in Sarnia. The bike network is comprised of the Urban Bike Network, which includes a wide range of bikeway types, and the Rural Cycling Strategy, proposed mainly of paved shoulders along rural roads.

The general approach to develop the Urban Bike Network is twofold: link neighbourhoods within the existing and future urban areas; and provide routes that connect to major activity areas. Other factors were also considered as discussed in Section 12.1.

Most of the existing urban Sarnia is generally confined between the Waterfronts, Point Edward, Confederation Street and Modeland Road. There are several areas that extend beyond this boundary: Bright's Grove, Heritage Park, the Western University Business Park and the industrial lands along Vidal Street. For new development areas, the approach is to incorporate bikeways into major

through streets as the new communities are developed. Further community development is anticipated within the parcel contained by Modeland Road, London Line, Blackwell Sideroad and Confederation Street.

The proposed network aims to strike a balance between:

- Providing direct routes that link communities to and from major activity areas;
- Proposing bikeways that are safe and comfortable, but also feasible to implement within a reasonable timeframe; and
- Identifying desirable routes for the long-term that may not be achievable within the timeframe of this plan.

To develop the bike network, it is recommended that the City:

- In existing urban areas, pursue the installation of the proposed bikeway along Core Routes, Connector Routes and Enhanced Routes as identified in the Urban Bike Network presented in Section 12.3.2;
- In new development areas, construct proposed bikeways along Future Bike Routes as identified in the Urban Bike Network;
- In urban areas and subject to the available opportunity such as road widening or reconstruction, support the installation of bikeways along Long-term Bike Routes as identified in the Urban Bike Network;
- In rural areas during road reconstruction, pursue the installation of paved shoulders along all City roads along the Lambton County Regional Trail System; and
- In rural area, encourage the County of Lambton to installed paved shoulders on all County Roads along the Lambton County Regional Trail System.

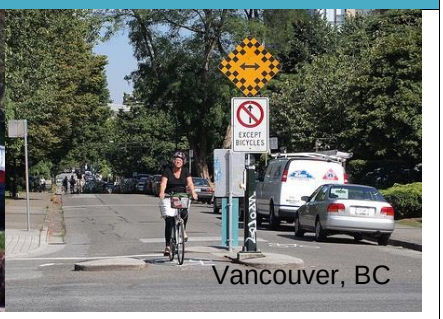
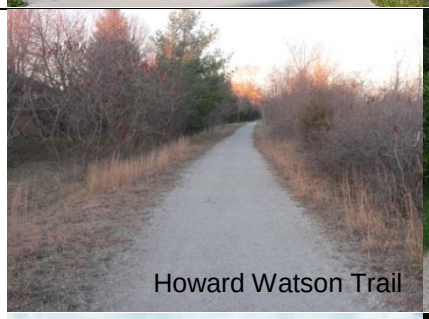
The next sections discuss bikeway types, the Urban Bike Network and the Rural Cycling Strategy.

12.3.1 Types of Urban Bikeways for Sarnia

Exhibit 12.7 shows various bikeways under consideration for the Urban Bike Network. As the network is built and bikeway design evolves, it may be appropriate to review or upgrade the proposed facility type. More information about the design of bike facilities is discussed in Section 12.3.2.

Exhibit 12.7 - Urban Bikeways for Sarnia

Bikeway Type	Other Photo Examples
Bike Lane (Conventional) Typically located on urban roads with higher volumes and speed to create a dedicated space for cyclists. Examples in Sarnia: Vidal Street	 Burlington, ON  Victoria, BC  Kitchener, ON  Waterloo, ON
Signed Route Typically located along roads where volumes and speed are low. Cyclists and motorists may share the road space. Examples in Sarnia: Cathcart Boulevard, Devine Street, Maria Street etc.	 Burlington, ON  Mississauga, ON
Shared Use Bikeway	 Toronto, ON  Mississauga, ON

Bikeway Type	Other Photo Examples
Bike Priority Street* Note: Conditions for cycling on bike priority streets are improved with a combination of measures including signage, pavement markings and traffic calming.	 Victoria, BC  Vancouver, BC
Boulevard Trail Examples in Sarnia: Wellington Street, Michigan Avenue	 Milton, ON  Ajax, ON
Off-Road Multi-use Trail Examples in Sarnia: Howard-Watson Trail	 Howard Watson Trail  Caledon, ON  Ajax, ON  Kitchener, ON

* Note that both signed routes and shared use bikeways each represent a stepped scale of treatments for Bike Priority Streets. Intensity of treatments varies based on roadways conditions (see Exhibit 12.8 - Phased Approach to Implementing Bike Priority Streets).

The existing signed routes along proposed bike priority streets are part of the first level of treatments. As the Urban Bike Network is implemented, these routes may be upgrade to shared use bikeways and potentially be upgraded

with bike detection at major intersections. Traffic calming and traffic diversion are considered long-term treatment options for an enhanced bike priority street.

Exhibit 12.8 - Phased Approach to Implementing Bike Priority Streets

12.3.2 Urban Bike Network

Exhibit 12.10 shows the proposed Urban Bike Network. It is comprised of a variety of routes, each with different roles in the Urban Bike Network. The development of these routes used many inputs as described in Sections 12.1 and 12.3, including candidate routes identified by the public and stakeholders. The proposed bikeway types (discussed in Section 12.3.1) were selected mainly based on the context of each individual corridor and less on the route classification shown in Exhibit 12.10. Note that low-cost and feasible solutions were an important factor in the development of the urban bike network.

Exhibit 12.9 - Proposed Bikeways in the Urban Bike Network

Route Class	Role	Location(s)
Urban Bike Network		
Core Routes	Form the "spine" of the Urban Bike Network and link people across the core activity centres of the City	East and west: Howard Watson Trail to Bright's Grove; Cathcart Blvd bike lanes; Talfourd St bike priority street to Wellington St boulevard trail. North and south: Vidal St bike lanes and extension into Downtown; Colbourne St/Capel St bike lanes; and Howard Watson Trail
Connector Routes	Bring people from various neighbourhoods to the Core Routes	Downtown grid of bike priority streets, Rosedale Ave to Howard Watson Trail via Wiltshire Dr, Confederations St boulevard trail to Heritage Park.
Enhanced Routes	Improve cycling conditions along corridors in high activity corridors	Front Street, Downtown

Future Bike Route	Provide links from new development to the bike network	Major streets new development areas, Heritage Park trail connection to Wellington St, Western University trail connections
Crossing and Intersection Improvements	Improve crossing conditions of bike routes across potential barriers	Howard Watson Trail at major streets (pedestrian and bike crossing signs are currently posted on Modeland Road, Michigan Avenue as shown in Exhibit 12.10, and Exmouth Street only on the west side. There is also a pedestrian-activated crosswalk signal at London Road). Various crossing improvements for bike routes across major streets. Intersection treatments where bikeways transition. Special treatments at proposed intersection improvements on Cathcart Blvd at Indian Road (road diet) and at Howard Watson Trail at Highway 402.
Other Bike Routes		
Lambton County Regional Trail	Provide cycling routes across Lambton County	See Section 12.3.3
Long-term Routes	Encourage development of bikeways as opportunities arise over the long term	Lakeshore Road, Michigan Avenue, Maxwell Street, Finch Drive, Campbell Street.

Example of an existing trail crossing at Howard Watson Trail / Michigan Avenue.

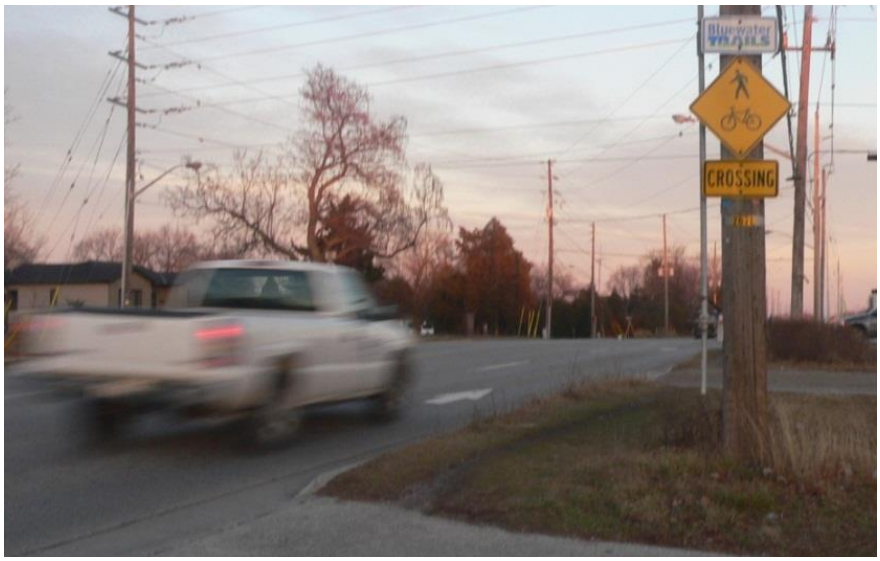
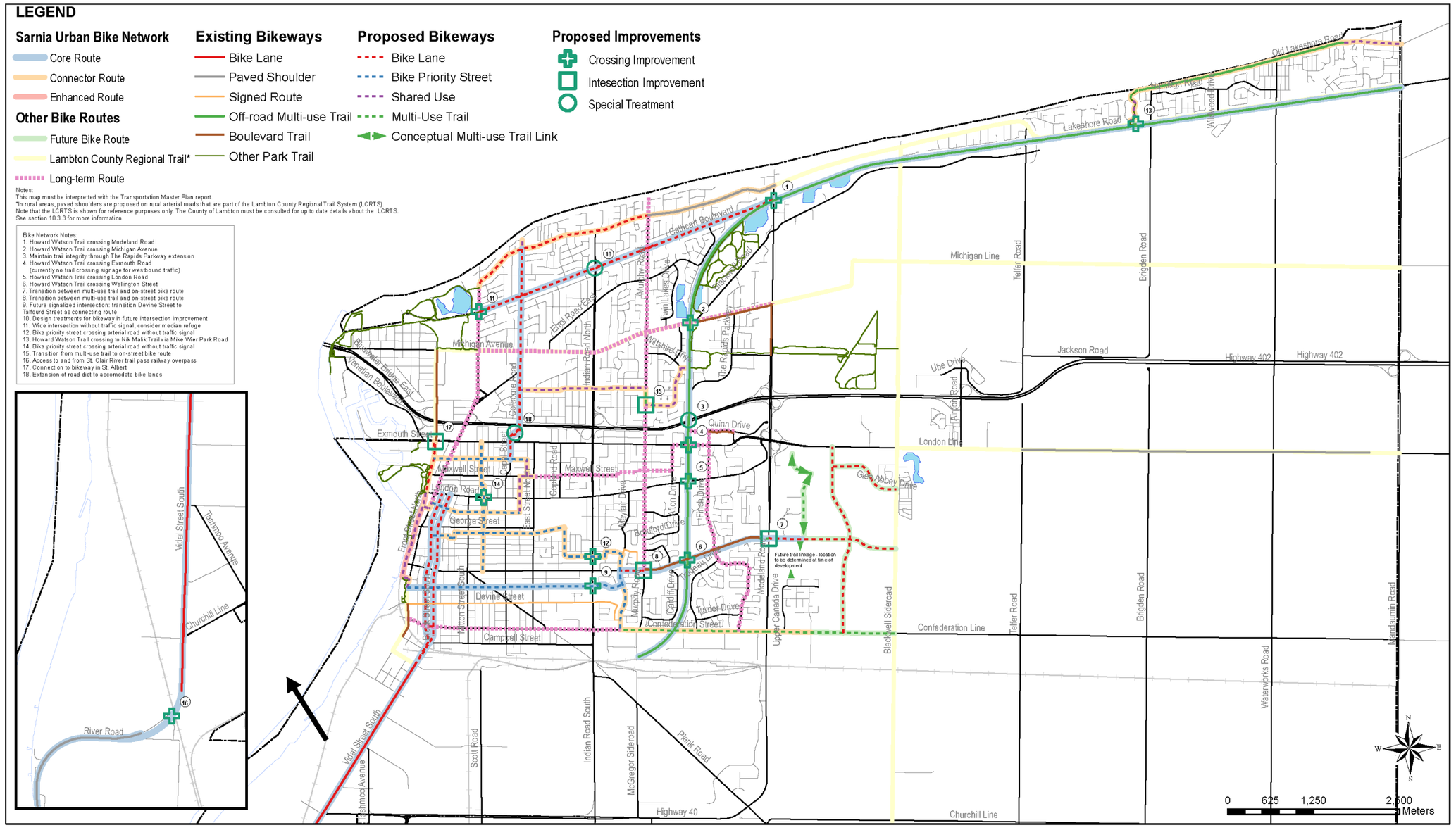


Exhibit 12.10 - Urban Bikeway Network



IBI GROUP

Prepared: August-21-13

City of Sarnia
Transportation Master Plan
Map 3: Urban Bike Network

Appendix F contains a list of bikeways proposed in the Urban Bike Network by route group and proposed facility type. **Appendix G** provides some conceptual cross-sections for proposed bike lanes within the existing right-of-way. *Note that these design concepts are provided for reference purposes only. They do not serve as design drawings. These concepts were prepared as a network development exercise to establish general feasibility of a bikeway corridor.*

12.3.3 Rural Cycling Strategy

In rural areas, paved shoulders are the recommended bikeway for rural roads in Sarnia because they:

- provide separate space for cyclists to travel comfortably alongside higher speed vehicles;
- can accommodate pedestrians traveling counter-direction; and
- can accommodate slow-moving vehicles (e.g. farm equipment) to stay to the right and allow other vehicles to pass.

Paved shoulders have added safety and economic benefits. From a safety perspective, paved shoulders provide additional recovery area, minimize roll-over risk, and reduce the risk of collision with fixed objects. They are also shown to the extend life cycle of the roadway by reducing the tendency for edge cracking within the travel lane and moving water away from the road surface before it can infiltrate the sub base. Exhibit 12.11 shows paved shoulders for walking and cycling.

Exhibit 12.11 - Paved Shoulders for Rural Walking and Cycling

Lambton County Council has reaffirmed its support of a current policy with respect to paved shoulders on County Roads. The current policy is to build a 4.0ft (1.2m) paved shoulder for roads that are identified as part of the Lambton

County Trails System (LCTS) when the road is reconstructed or rehabilitated[3]. Both County and City routes are identified as part of the Lambton Country Trail System. The County has also approved a policy guideline to partner with local municipalities to construct paved shoulders on County roads in areas where local needs are identified by trail systems are not designated as part of the LCTS.

A similar policy to the Lambton County policy would be suitable for the City of Sarnia. Exhibit 12.10 shows those routes that are currently identified as LCTS in yellow. Note that Lakeshore Road, from Modeland Road to Mandaumin Road, is not currently part of the LCTS. However, paved shoulders on this section are desirable to connect Bright's Grove to the central urban part of Sarnia. Therefore, they are included as part of the Rural Cycling Strategy by encouraging the County to update the Lambton County Trail System with this section.

As part of the Rural Cycling Strategy, it is recommended that the City:

1. Encourage the County of Lambton to update the Lambton County Trail System to include Lakeshore Road, from Modeland Road to Mandaumin Road;
2. Pursue the installation of paved shoulders along rural City roads identified in the Lambton County Trail System as they are reconstructed;
3. Encourage the County of Lambton to install paved shoulders along all rural County roads identified in the Lambton Country Trail System as they are reconstructed or rehabilitated;

Note that a width of 1.5m (5.0ft) or greater is generally recommended for paved shoulders along road where the posted speed is 70 km/h or greater[4,5]. Refer to Section 12.4.3 for more information on design guidance for paved shoulders.

12.3.4 Cycling on Sidewalks

Various options for providing cycling and trail facilities have been considered in the development of the Active Transportation Strategy. This includes the suggestion through the public consultation process that cycling should be allowed on all city sidewalks as a way of encouraging more and safer cycling off the road surface. It was eventually concluded that any option to designate sidewalks as multi-use pathways is complex, involving conformity to local bylaws and the provincial Highway Traffic Act. Most sidewalks are also only 1.5m wide and designed only to accommodate pedestrians. Therefore

[3] County of Lambton Infrastructure & Development Services Division, 2013. *2013 Paved Shoulder Construction Update.* Information Report received and filed to the Infrastructure and Development / Social and Health Services Committee on April 17, 2013 and approved by Lambton County Council on May 2, 2013. Available at: <https:/Lambton.civicweb.net/Documents/DocumentsDisplay.aspx?Id=42481> on [Accessed August 20, 2013]
[4] *Chapter 3.4 Bikeways, Geometric Design Guidelines.* Transportation Association of Canada, 1999
[5] Velo Quebec Association (2010). Planning and Design for Pedestrians and Cyclists: A Technical Guide. National Library of Canada

consideration must be given to the amount of space available on a sidewalk for both cyclists and pedestrians when sharing the space, resulting safety issues for pedestrians (especially seniors), mobility limitations for cyclists and liability issues for the City.

The root issue is that sidewalks were not designed as shared pedestrian / cycling facilities, and are not wide enough be used as multi-purpose pathways. The provincial Highway Traffic Act also prohibits adults from cycling on sidewalks, so this provincial legislation would have to be changed.

The conclusion reached by this TMP is that although some feel that cycling on a sidewalk, off the road surface, is inherently safer than cycling in an on-road bike lane or in shared traffic, the reality is that industry studies and statistics show that cycling in a properly designed and located on-road bike lane is safer that on a sidewalk. A sidewalk separates the motorist and cycling, thereby reducing the attention given from one to the other. Cycling incidents therefore occur at side street intersections and driveways where motorist and cyclists are not as aware of each other compared to being on the road.

Therefore, this TMP does not recommend sidewalk cycling for adults, and the Active Transportation Strategy lays out a plan for properly designed and located bike routes that will have to be funded by the City over the next 20 years in order to be fully implemented.

12.4 Active Transportation Strategy Implementation

A walking and bike network alone is not a complete active transportation strategy. There are other barriers that hinder people from choosing to walk or bike: lack of awareness of available facilities and rules of the road; public perception of safety and transportation attitudes; inexperience in the development community towards planning for pedestrians and cyclists. To address these barriers: the active transportation strategy must aim to support the network with education and promotion programs, directives from strong policy and sound design. These topics are discussed in the following sections.

12.4.1 Education and Promotion Programming

Together with the infrastructure, promotion and education of walking and cycling as viable travel options support the transition towards active transportation. Residents can benefit from the knowledge of nearby parks and trails, in particular about how to access them by walking and biking. Potential cyclists may be encouraged to use trails and on-road bikeways if provided with knowledge of safe cycling and the rules of the road. Promotion and education initiatives should be aimed towards addressing the questions and concerns of would-be pedestrians and cyclists and improving the safety of existing active transportation users.

Resources are limited for the City to play a leading role in education and promotion initiatives. In the active transportation strategy, the focus for city staff

will be on delivering the network, updating the policies and applying the best design practices. Outreach activities are best delivered in partnership with other agencies with more knowledge and experience in education and promotion initiatives. The City already enjoys a strong working relationship the Bluewater Trails Committee (BWT) whom pursues on-going efforts to support public awareness of active transportation. Many other opportunities exist for potential partnerships and programs.

To support the education and promotion of active transportation in Sarnia, it is recommended that the City:

1. Support and encourage on-going outreach activities that promote active transportation through continued partnership with the Bluewater Trails Committee (Exhibit 12.13 - Potential Partners and Opportunities for Program Development); and

2. Consider other opportunities to further development programs for the education and promotion of active transportation in Sarnia through potential partnerships (Exhibit 12.13 - Potential Partners and Opportunities for Program Development).

Exhibit 12.12 - Bluewater Trails Education & Promotion Programs

Bluewater Trail Initiatives	On-going Program Development
Bluewater Trails Map and list of bike routes	▪ Continue to work with BWT to update the map as new the Urban Bike Network is developed
Trail Etiquette and Safe Cycling Education	▪ Encourage BWT, together with Community Health Lambton County and Sarnia Police services, to provide educational session about safe cycling
Liaison with Lambton County Active Transportation Committee and Lambton County Regional Trail Committee	▪ Continue to support knowledge sharing with BWT and Lambton County committees
Bike Security Area – Bike Rack Loan Program	▪ Continue to support BWT in the co-management of event bike rack loan program

Exhibit 12.13 - Potential Partners and Opportunities for Program Development

Potential Partners	Role for Active Transportation	Program Development Opportunities
Lambton County Regional Trail Committee	The committee promotes healthy living through the promotion of trails and natural areas and to encourage their use in hiking, cycling and other physical activity.	Through BWT, continue to collaborate with the County and the Lambton County Regional Trail Committee in implementing the Rural Cycling Strategy.

Potential Partners	Role for Active Transportation	Program Development Opportunities
Sarnia Transit and the Sarnia Transit Advisory Committee	Active transportation can complement transit service. Transit users will benefit from better walking \ and biking connections to the transit station or routes by: improving mobility/accessibility and increasing access to recreational opportunities. Sarnia Transit may play a role in the informing users about access options by walking and biking,	Solicit feedback from Sarnia Transit and the Transit Accessibility and Advisory Committee about missing sidewalks along transit routes within the Walkway Infill Program; Encourage Sarnia Transit to provide bike parking racks at key transit stations to facilitate cycle-transit trips; and Together with BWT, collaborate with Sarnia Transit to develop a Bus 'n Bike Brochure that provides information about bike racks on buses, using transit routes to access popular trails and existing bike routes near transit stations.
Bluewater Health, Recreation Therapy London Building, Level 2 89 Norman Street Sarnia, Ontario N7T 6S3 519-464-4400, Ext. 8308	The Recreation Therapy Program goals use recreation as a treatment to promote overall well-being of patients. They may play a role in promoting walking and cycling as recreation options.	Support Bluewater Health, though BWT, in continuing to provide updated information, links and resources for walking and cycling in Sarnia;
Community Health Services, Lambton County www.lambtonhealth.on.ca	Lambton Community Health Services (CHS) already plays an important role informing the public about active transportation as a means for physical activity. Educational resources are available on the CHS website Winter Activity Toolkit	Support CHS in continuing to provide updated information, links and resources for walking and cycling in Sarnia though BWT; Encourage CHS to provide information about active transportation for physical activity and health within its resource library (i.e. pamphlets, fact sheets, booklets and on-loan books); Encourage CHS, together with Sarnia Police Service, to provide educational session about safe cycling (e.g. helmet clinics or cycling skills workshops like CANBIKE)
Sarnia Police Services	The Mission of the Sarnia Police Service is to provide a safe and secure community. Therefore may have an educational role for active transportation safety.	Encourage Sarnia Police Service, together with Community Health Services, to provide educational session about safe cycling Encourage Sarnia Police Service to create a bike registry and purchase

Potential Partners	Role for Active Transportation	Program Development Opportunities
Sarnia Lambton Economic Partnership	Walkable places are shown to improve economic performance and to be desirable places to live. Part of the Partnership's mission statement is to attract new residents, industries and investment. Supporting active transportation programs for local businesses align with mission goals.	Encourage the Economic Partnership, through the Lambton County Trails Committee, to promote the Bicycle Friendly Business Designation among local business;
Tourism Sarnia – Lambton 556 Christina Street North Sarnia, On N7T 5W6 (519) 336-3232	As the third largest economic sector in Sarnia Lambton[6], trail development and cycling can potential tourism attractors. Tourism Sarnia-Lambton may have a key role in promoting active transportation routes both to visitors and residents alike.	Encourage Tourism Sarnia – Lambton, with BWT and Lambton Country Trails Committee, to promote use and access to recreation destinations by walking and cycling.
Lambton College and the Bluewater Sustainability Initiative	Lambton College has enacted a Sustainability Policy and committed to renewing the campus environment as part of its Strategic Plan. Including Sustainability benchmarking and initiatives within the campus, among students and with community partners	Encourage Lambton College to undertake initiatives, in line with the Sustainability Policy and Strategic Plan that promote active transportation. Initiatives can include education and awareness programs around walking and cycling, campus improvements to for pedestrians, and cyclists.
Local schools, school board, and Green Communities Canada www.saferoutestoschool.ca	Green Communities Canada brought Active and Safe Routes to School (ASRTS) to Canada. The growing movement is supported by a large network of Canadian Organizations Some local school are	Encourage local schools to increase participation in the ASRTS activities through other programs – There are multiple options and level of involvement. Green Communities Canada provides support tools and resources for school travel planning, Registered walk logs, walk/wheel on Wednesdays, walking school bus, winter

[6] Sarnia Lambton Economic Partnership. Economic Sectors: Tourism Accessed at <http://www.sarnialambton.on.ca/main/ns/123/doc/57/lang/EN> on March 10, 2013.

Potential Partners	Role for Active Transportation	Program Development Opportunities
	already participating in various ASRTS activities. All schools participate in the International Walk to School Day/Week.	walk day and more. Other ASRTS participants in Ontario: Brant County, Cornwall, Guelph, Halton Region, Hamilton, Kingston, Kitchener, Waterloo, Long, Niagara Region, Ottawa, Sudbury, Windsor, York Region

12.4.2 Pedestrian and Bike-Friendly Policy Review

During the development of this Transportation Master Plan (TMP), the Official Plan for the City of Sarnia was undergoing a comprehensive review. This review provides an opportunity to align cities policies with the Active Transportation Strategy and TMP. Relevant policies were examined from the existing Official Plan and the draft policies proposed to be included in the Official Plan Review.

Exhibit 12.14 - Pedestrian and Bicycle Traffic Policies in the Official Plan is a review of policies related to walking and cycling in the existing Official Plan. Exhibit 12.15 is a review of draft policies under consideration in the Official Plan Review. Recommendations for policy revisions to the Official Plan through the Official plan review are provided.

Exhibit 12.14 - Pedestrian and Bicycle Traffic Policies in the Official Plan

Section	Official Plan Policy	Transportation Master Plan Recommendations
sidewalks and walkways		
4.1.8.1	Adequate provision will be made for sidewalks and walkways to enhance the convenience and safety of pedestrians.	No change
4.1.8.2	Sidewalks will generally be provided within Urban Residential and Commercial Areas, along both sides of Arterial Roads and along at least one side of Collector Roads and Local Roads, where warranted by vehicular or pedestrian traffic volumes.	See Section 12.2.1Walk Friendly Policy and Design and Exhibit 12.14.

Section	Official Plan Policy	Transportation Master Plan Recommendations
4.1.8.3	Facilities for the safe movement of pedestrians, including access and on-site movement, will be provided in all new developments, including the redevelopment of land.	Update to site application practices to consider pedestrians needs. The Institute of Transportation Engineer's (ITE) refer the following guidelines as a recommended practice: *Promoting Sustainable Transportation through Site Design (CITE).*
4.1.8.4	Pedestrian walkways and sidewalks will be provided within residential subdivisions to minimize walking distances between dwellings and schools, parks, transit stops and local commercial uses.	No change
4.1.8.5	Sidewalks will be separated from road pavement by boulevards in all new residential subdivisions, wherever possible.	No change
Bicycle ways		
4.1.8.6	Bicycle ways within parks and between residential areas and schools, parks and commercial facilities will be provided wherever feasible.	No change
4.1.8.7	Bicycle rights-of-way along municipal roads may be provided wherever sufficient volumes of bicycle traffic are in evidence, wherever feasible.	Update to reflect implementation strategy for the Urban Bike Network Notes: No or insufficient bicycle traffic data available to assess need corridors. Network development based on a city-wide review of needs
4.1.8.8	During most times of the year, the bicycle is a viable alternative to other modes of transportation, is environmentally sound, and supports active, healthy lifestyles. Wherever feasible, the City will promote and initiate improvements to enhance bicycling as a means of transportation.	Update to reflect Education and Promotions recommendations
Bicycle master plan		
4.1.8.9	Where appropriate, the City will prepare and implement a master plan for the development	Update to reflect the recommendations

Section	Official Plan Policy	Transportation Master Plan Recommendations
	of a bicycle route system addressing such matters as location, design, education, enforcement and encouragement. Parts of this system will be located within the public open space network so that the safety and enjoyment of its users will be enhanced. Parts of the system will also be aligned along existing roads where necessary to provide linkages to major activity centres, employment nodes and commercial areas. Consideration will be given to the potential for linking the City's bicycle routes with those of neighbouring municipalities.	associated with the Urban Bike Network
4.1.8.10	Consideration will be given to the provision of bicycle routes in the preparation and review of Official Plan policies, plans of subdivision and land severances, where such routes will contribute to the development of linkages or extensions to existing routes.	Consideration will be given to the Urban Bike Network identified in the Transportation Master Plan in the preparation and review of Official Plan policies, plans of subdivision and land severances, where such routes will contribute to the development of linkages or extensions to existing routes.
Integration of bicycles with road system		
4.1.8.11	Where appropriate, the City will provide properly designed and maintained, safe and convenient roads for bicycle travel according to the following criteria: a) the provision of on-road bicycling routes will be required on strategically planned municipal roads serving the main community, civic, service, recreational, institutional and cultural destinations within the City; the City will also support the construction of exclusive on-road bicycle lanes and widened curb lanes on designated municipal roads that serve the main destinations within the City; the expansion of off-road paths through open space areas and corridors will be supported where such facilities will not	Update to reflect reference to design guidelines in TMP Notes: Best practices to date discourage the use of wide curb lanes as bikeways.

Section	Official Plan Policy	Transportation Master Plan Recommendations
	adversely impact significant environmental features or functions; b) where bicycle lanes are incorporated into the paved roadway surface, the City will ensure that grating and on-street facilities are designed and oriented in a manner that will not create a safety hazard; and c) where possible, the bicycle system will be located to take advantage of existing and potential road and rail signalized crossings.	
Separation of pedestrian and bicycle networks		
4.1.8.12	Wherever possible within the open space system, bicycle and pedestrian networks will be separated from each other by distinct grade changes, landscaping or berming. The City will promote the use of appropriate signage, symbols or distinct surface treatments to distinguish the different networks.	Note: Potential to constrain limited resources available for AT and hinder ability to meet cost-effectiveness goals of the OP, not enough space
Lead by example		
4.1.8.13	Where appropriate, the City will provide accessible and sufficient bicycle parking areas at City owned and operated facilities in order to promote the use of the bicycle as an alternative to motor vehicles.	Notes: Policy can be broadened to providing end-of-trip facilities. Bike parking may be specified among a set of practices; other options include showers, lockers, flex-time options and/or employee incentives.

Exhibit 12.15 - DRAFT Pedestrian and Cycling Traffic Policies in Official Plan Review

	DRAFT Policy Official Plan Review	Transportation Master Plan Recommendations
Proposed Policies		
	Complete Streets considers all users during the design, maintenance, and operations of a right-of-way, and recognizing all ages and abilities by: a) encouraging street connectivity that aims to create a comprehensive, integrated, connected network for all modes; b) using the latest and best design criteria and guidelines, while recognizing the need for flexibility in balancing user needs; c) ensuring that solutions will complement the context of the community; and d) establishing performance standards with measurable outcomes.	No change
	The proposed **Functional Classification** includes Multi-use paths as corridors are designated exclusively for active transportation. Except for Provincial Highways, all other classifications (i.e. Arterial Roads, Collector Road, Local Roads and Private Road) recognize a blend of road users including private and transit vehicles as well as pedestrians and cyclists.	No change
	Cycling in the City: Policies, programs and infrastructure will be supported that create a safe, comfortable and bicycle friendly environment that encourages people of all ages to cycle for everyday transportation and enjoyment including: a) an expanded bikeway network; b) provision of bicycle parking facilities in new developments; c) provision of adequate and secure bicycle parking in key areas such as schools, Transit Terminals, civic facilities, and places of worship; and d) measures to improve the safety of cyclists through the design and operation of streets, and through education and promotion programs.	No change
	Bicycle Friendly Streets: Where appropriate, the City will provide properly designed and maintained, safe and convenient roads for bicycle travel according to the following criteria: a) the provision of on-road bicycling routes will be required on strategically planned municipal roads serving the main community, civic, service, recreational, institutional and cultural destinations within the City; b) exclusive on-road bicycle lanes and widened curb lanes on	Revise to acknowledge the Urban Bike Network and recommendations of the Active Transportation Strategy. Revise to defer design policies to the

	DRAFT Policy Official Plan Review	Transportation Master Plan Recommendations
	designated municipal roads that serve the main destinations within the City; c) where bicycle lanes are incorporated into the paved roadway surface, the City will ensure that grating and on-street facilities are designed and oriented in a manner that will not create a safety hazard; and d) where possible, the bicycle system will be located to take advantage of existing and potential road and rail signalized crossings.	Transportation Master Plan. The strategy refers to the best practices to date in design for bikeways.
	Transportation Demand Management: The City will encourage opportunities for developing Transportation Demand Management (TDM) measures, especially during peak travel periods, to reduce the use of single occupancy vehicles and encourage increased transit ridership, walking and cycling. TDM measures include, but are not limited to, carpooling programs, preferential parking for carpool members, transit pass incentives, cycling initiatives, telecommuting, flex hours, provision of private shuttles, and walking programs.	No change

Snow Clearing - In addition to the policy review, concerns were raised among staff regarding the impact of the Walkway Infill Program to City resources for snow clearing. In the past, the City has assumed responsibility for clearing sidewalks in Sarnia, except along commercial properties. While the City seeks assistance from citizens, there currently is no requirement for residents to clear snow from the sidewalk adjacent to their property. As the number of sidewalks grows, a continuation of this practice will results in a strain on the snow clearing budget.

It is recommended that the City investigate the enactment of a sidewalk snow clearing by-law to manage City resources for winter maintenance. Many cities in Ontario enact similar by-laws requiring residents to clear the sidewalks adjacent to their property within a set time period after a snow event. The City of Cambridge is an example of a city that enacted such a by-law where previously there was none. The City may continue to clear sidewalks along some areas high activity areas (e.g. along transit routes) or to assist residents unable to clear their sidewalks. For example the City of Pickering salts and ploughs sidewalks on regional roads, fronting municipal parks or property, on walks between roads and leading to schools, on bridge overpasses and on highly populated routes to school. The City of Oshawa provides a snow clearing assistance programs for residents over the age of 65 and people with disabilities

who have no able bodied resident living in the household. The City is encouraged to conduct an internal review of the available resources and to prepare an appropriate sidewalk winter maintenance plan. A balance of resources must be managed between continued winter maintenance by the City and enforcement of the by-law.

12.4.3 Active Transportation Design Guidance

Best practices for the design of active transportation facilities are quickly evolving. Instead of developing stand-alone design guidelines for the City, which may become dated, it is recommended that staff rely on existing best practices. **Appendix H** is a bibliography of active transportation design guidelines. The bibliography highlights guidelines that are highly recommended and those which are available for free. Some guidelines are specific to Ontario. Exhibit 12.16 provides a high-level overview of the basic considerations in the design of active transportation facilities.

Exhibit 12.16 - Basic Active Transportation Design Considerations

Facility Type	Basic Design Considerations
Trails	
Multi-Use Trail (2-way) Asphalt, concrete or limestone screenings path shared with pedestrians, cyclists, and other AT users	▪ Minimum width for two-way travel: 3.0m (9.6ft) ▪ Asphalt or concrete surface facilitates snow clearing ▪ Design treatment required for crossings at side streets (note: cyclists are not permitted to ride in the crosswalk as per the HTA) ▪ Adequate sight lines around curves and over hills
Boulevard Trail A multi-use trail (see above), located in-boulevard	▪ Limit number of driveways and side streets (less than 1 per 300m) ▪ Design treatment required for crossings at side streets (note: cyclists are not permitted to ride in the crosswalk as per the HTA) ▪ Minimum clearance to fixed objects (e.g. fences, utility poles etc.): 0.6m (2.0ft)
Walkways	
Sidewalks	▪ Width required for wheelchair users to turn around: 1.5m (5ft) ▪ Width required for two wheelchair to pass each other: 1.8m (5.8ft) ▪ Minimum pedestrian width (constrained corridors): 1.2m (4ft) ▪ AODA New Built Environment Standard as per Reg. 413: o Minimum clear width on sidewalks: 1.5m (5ft) o Curb ramps and walking hazard indicators required at all street crossings
Bikeways	
Bike Lane (Conventional) Generally consist of a painted line, pavement markings and reserved lane signage.	Minimum recommended width: ▪ 1.5m (5ft) to curb face with 1.2m (4ft) wide rideable surface; ▪ 1.8m when adjacent to parking, or where posted speed ≥60kph, or where commercial vehicles ≥10-12%; ▪ 1.2m may be acceptable in constrained corridors.
Paved Shoulder	Minimum recommended width depends on traffic volumes and posted

<table>
<tr><th>Facility Type</th><th>Basic Design Considerations</th></tr>
<tr><td></td><td>speed (Table below is from Velo Quebec Technical Guidelines, 2012)
<table>
<tr><th>Posted Speed</th><th>AADT <2,000</th><th>AADT >2000</th></tr>
<tr><td>50-70 km/h</td><td>1.0m (3.2ft)</td><td>1.5, (5ft)</td></tr>
<tr><td>>70 km/h</td><td>1.5m (5ft)</td><td>1.75m (5.6ft)</td></tr>
</table></td></tr>
<tr><td>Signed Route
Generally consist of bike route signs</td><td>▪ Signage is placed strategically to assist with way-finding at intersections and route confirmation at mid-block areas for long blocks.
▪ “Share the Road” signs may encourage cooperative behaviour between cyclists and motorist</td></tr>
<tr><td>Shared-Use Bikeway (posted speed ≤ 60 km/h)
Generally consist of bike routes signs and shared-use lane markings or “sharrows” which include the bicycle lane symbol and double chevron.</td><td>▪ Indicate the approximate location in the road where cyclists should ride (refer to above for signage considerations)
▪ Below are considerations from the TAC Bikeway Traffic Control Guidelines for Canada, 2nd Edition, 2012:
▪ Symbols should be placed after an intersection and before the end of a block
▪ Mid-block spacing approximately at 75m (246ft) intervals
▪ Recommended distance between the edge of pavement and the centre of the marking: minimum with no parking is 0.75m (2.5ft), but 1.0m (3.2ft) is preferred; minimum with full-time is 3.4m (11.2ft)</td></tr>
<tr><td>Bike Priority Street* (posted speed ≤ 50 km/h)
Generally consist of variety of bicycle-friendly treatments that minimize interruptions to the flow of bike traffic.</td><td>▪ Refer to Exhibit 12.8: phased implementation of signage (see Signed Route), pavement markings (see Shared-Use Bikeway), bike detection, traffic calming and traffic diversion
▪ Bike detection at major signalized (actuated) intersections
▪ Traffic calming and traffic diversion are higher-level interventions that should be considered only when there is a need to manage traffic volumes and speeds</td></tr>
</table>

12.5 Implementing the Strategy

Delivery of walking and cycling infrastructure is an important part of the active transportation strategy. The following sections discuss the cost and phasing recommendations for the Walkway Infill Program, the Urban Bike Network and the Rural Cycling Strategy. Note that costs reported in this section are based on the unit costs in Exhibit 12.17.

Exhibit 12.17 - Unit Costs for Various Active Transportation Facilities

Proposed Active Transportation Facility	Cost per kilometre	Comments
Sidewalks and Trails		
Construct 1.5m wide new sidewalk	$160,000	Costs of excavation, granular, concrete, restoration and design. Assumes no utility relocations

Proposed Active Transportation Facility	Cost per kilometre	Comments
Retrofit a 1.5m wide sidewalk	$270,000	Costs of excavation, granular, concrete, restoration and design. Assumes utility relocations for half the project length
Construct new 3.0m wide multi-use trail in boulevard	$220,000	Costs of excavation, granular, asphalt, restoration and design.
Upgrade existing 3.0m wide multi-use trail to asphalt surface	$ 60,000	Cost of additional asphalt and restoration. Assumes normal site conditions and no additional signage required.
Upgrade existing sidewalk to 3.0m wide multi-use trail	$270,000	Removal of sidewalk and further excavation to accommodate additional cost of granular, asphalt, restoration and signage.
On-Road Bikeways		
Add 1.5 bike lane as part of the construction of a new road	$210,000 ($10,000)	Additional cost of design, asphalt, granular, base, markings and signage. Assumes road project pays for curbs, catch basin leads, and road pavement structure. (In brackets shows cost only painting and signage required without additional pavement)
Retrofit existing road with bike lanes (re-stripe lanes incl. road diet and lane narrowing)	$ 30,000	Repainting only (include removal of existing lines and turn lane arrows, repainting of line markings, addition of bike lane symbol ever 200m and bike lane signs ever 300m)
Retrofit an existing road with shared use bikeways	$10,000	Assumes bicycle and double chevron every 75m and “Share the road” signs every 300m
Retrofit and existing road with bike priority treatments	$13,000*	*Cost of bike priority streets can range from low to high depending on range of priority treatments. This estimate assumes same elements as retrofit shared use bikeways and bike detection at major intersections.
Add 1.5m paved shoulder when an existing route is scheduled for resurfacing (with adequate base)	$80,000	Additional cost of design, asphalt, granular, base, markings and signage. Assumes adequate base already exists in granular shoulder (i.e. no additional width of depth required)
Add 1.5m paved shoulder when an existing route is scheduled for resurfacing (without adequate base)	$200,000	Additional cost of design, asphalt, granular, base, markings and signage. Assumes adequate base does not exists (i.e. no additional width of depth required)

Note that none of the unit costs shown in Exhibit 12.17 include the cost to acquire property. It is assumed that most proposed facilities in the Walkway Infill Program, Urban Bike Network and Rural Bike Strategy will be accommodated within the existing public right-of-way.

12.5.1 Walkway Infill Program Costs and Phasing

Walkway Infill Program calls for 64.3km of retrofitted sidewalks and 5.6km of multi-use trails. This represents roughly a 20% growth in the sidewalk network; there are currently 321km of sidewalks in Sarnia. This growth of the walking network will provide more transportation choices by opening up parts to the city previously inaccessible, unsafe or uncomfortable to pedestrians (including areas serviced by transit).

The total cost to implement Walkway Infill Program is $17.7M. However, it is assumed that $2.1M will be recuperated from developer fees for sidewalks in new development areas. Exhibit 12.18 shows the cost estimate to implement the Walkway Infill Program for the current list of candidate projects. Note that the list of projects will evolve as other candidate locations (e.g. sidewalks on local roads) are requested and new walkways are constructed.

Exhibit 12.18 - Walkway Infill Program Cost Estimate

Infill Walkway	Sidewalks (km)	Multi-Use Trail (km)	Paved Shoulder (km)	Estimated Costs in 2013 Dollars ($)
No sidewalk on both sides				**$ 6.98 M**
Arterial (18)	11.9	3.5	3.7	$ 4.20M
Collector (13)	13.7	-	-	$ 2.78M
No sidewalk on one side				**$8.50 M**
Arterial road (11)	10.3	-	-	$ 3.70M
Collector road (30)	17.7	0.1	-	$ 4.80M
Other				**$ 2.22 M**
Walkway upgrade (2)	-	0.4	-	$ 0.12 M
Future walkway* (5)	10.7	1.8	-	$ 2.10M
Total Walkway	**64.3**	**5.6**	**3.7**	**$17.7M**

To implement the Walkway Infill Program, it is recommended that the City:

1. Create an annual fund that is designated solely for implementing the sidewalk infill projects identified in the Walkway Infill Program;
2. Conduct an internal review and recommend an appropriate fund allotment for the Walkway Infill Program Fund based on the implementation options discussed herein;
3. Continue to use the existing Streetscape Improvements Fund to implement crossing treatments and intersection improvements;
4. Initiate the Walkway Infill Program by first implementing the proposed multi-use trail along Confederation Road, from Finch Drive to Upper Canada Drive, to connect as described in Section 12.2.32;

5. Apply the priority framework tool to identify priority for funding and implementation of the sidewalk infill and crossing improvement projects identified in the Walkway Infill Program; and
6. Recuperate the cost of building new sidewalks in new development areas through developer fees

There are several options to allot funding for the Walkway Infill Program. An annual fund of $780,000 would be required to implement the current list of candidate projects within the 20-year horizon of this plan. However, this amount would represent roughly 35% of the 2013 Capital Infrastructure budget ($2.3M). Thus, the total cost of the program dictates that its implementation will likely occur over a longer term.

A more reasonable goal is to build sidewalks on at least one side of the road for all arterial and collector roads in urban areas within the 20-year horizon. This approach would require a budget of $350,000 per year.

Another approach is to use the Streetscape Improvement budget (currently $300,000) as the annual fund for the Walkway Infill Program. This is the approach taken in the past to fund sidewalk requests by residents. However, there remain several difficulties with this approach. First, the number of requests for sidewalks in the past is not near the scale of projects proposed in the Walkway Infill Program. Second, it may be difficult to prioritize projects from the Walkway Infill Program compared to other projects that may typically be paid for by this fund (i.e. crossing improvements, street beautification, benches, garbage bins, transit shelters etc.). The priority framework is structured to compare with other Walkway Infill projects, but not other non-linear projects. If this approach is taken, the City is encouraged to increase the Streetscape Improvement budget and earmark a portion specifically for Walkway Infill projects.

Another approach is to set the annual fund to a fixed portion of the Capital Infrastructure budget. Similar to road and transit projects, this plan recognizes the role of walking and other active transportation in the transportation system. The funding structure should recognize this role and reflect it accordingly. Mode share for walking can be used, for example, as the fixed portion of Capital Infrastructure funding. Between 5% and 7% of this 2013 budget is roughly $135,000 per year.

Given the underinvestment for walkways in the past, an increased budget is recommended to draw closer to an equitable level of investment as for other transportation infrastructure. At minimum, the City is encouraged to double the fixed amount (to $270,000 per year) for the first 10 years of the plan. Note that this approach is least preferred. This level of funding is equivalent to 1.0km of retrofitted sidewalks for 10 years and half that rate afterwards. At that rate the anticipated timeframe would be over 10 decades to deliver the program.

Other cost-sharing opportunities may arise to fund Walkway Infill projects. For example, it may be opportune to build sidewalks during other sewer and water projects where the adjacent boulevard is already being excavated. However, a

stable, long-term funding source is needed to implement the Walkway Infill Program. The Federal Gas Tax is another potential funding source for the program, and is a long-term infrastructure priority that contributes to cleaner air, water and reducing greenhouse gas emissions.

Implementation of the bike network differs for the Urban Bike Network and the Rural Cycling Strategy. Each of these items is discussed separately below.

12.5.2 Urban Bike Network Implementation Costs and Phasing

In urban areas, the Urban Bike Network provides a total of 72.5km of bikeways throughout the city. The existing portion of this network (24.4km) include the Howard Watson Trail, the Vidal Street bike lanes, the Wellington Street boulevard trail and the Waterfront Trail on Old Lakeshore Road in Bright's Grove. Costs to implement the remaining Urban Bike Network are as follows (see Exhibit 12.19 for more details):

- $943,000 for on-road bikeways (35.8km), to be implemented as separate capital road projects for each route;
- $660,000 for a multi-use trail on Confederation Street (3.0km), to be implemented through the Walkway Infill Program; and
- $625,000 for future bike routes in new development areas (7.9km), to be implemented as area is developed with opportunities to recuperate costs through development fees.

These costs bring the total value of the Urban Bike Network to $2.11M.

Exhibit 12.19 - Cost Estimate for the Urban Bike Network

Bikeway	Length	Unit Cost ($ per km)	Estimated Costs in 2013 Dollars ($)
Core Routes			
Existing Multi-Use Trail	18.7	-	-
Existing Bike Lanes	2.7	-	-
Proposed Bike Lanes	17.5	30,000	530,000
Subtotal	**38.8**		**530,000-**
Connector Routes			
Existing Boulevard Multi-Use Trail	3.1	-	-
Proposed Bike Lanes	3.6	30,000	109,000
Proposed Bike Priority Streets	9.3	13,000	121,000
Proposed Boulevard Multi-Use Trail*	3.0	220,000	660,000*
Proposed Shared Use	5.3	10,000	53,000
Subtotal	**24.4**		**943,000**

Enhanced Routes			
Proposed Shared Use	1.4	10,000	14,000
Subtotal	**1.4**		**14,000**
Cost for On-Road Bikeways	**33.9**		**827,000**
Cost for Off-road Bikeway (to be implemented through Walkway Infill Program*)	**23.4**		**660,000***
Total Cost for Urban Bike Network In Established Communities *	**57.3**		**1.49 M***
Future Bike Routes(in New Development Areas)**			
Proposed Bike Lane^	5.3	10,000***	53,000
Proposed Multi-use trails (alignment under study)	2.6	220,000	572,000
Total Cost for Future Bike Routes in New Development Areas**	**7.9**		**625,000****

*Cost to implement proposed new multi-use trails included as part of the Walkway Infill Program
**Shown separately; assumes potential to recuperate some costs in new development areas
***Assumes planned roadways will have sufficient right-of-way for 1.5m bike lanes and general travel lanes

Note that the Urban Bike Network was designed to develop an adequate city-wide bike routes in urban Sarnia within a reasonable timeframe. Therefore, the network is geared towards a selection of bike routes that can be implemented at a relatively lower cost. An additional 18.5km of long-term routes are identified in the Urban Bike Network. These include Christina Street, Michigan Avenue, Maxwell Street, Murphy Road, Finch Drive and Campbell Street. These routes are identified for long-term implementation for several reasons:

- The routes are less critical in connecting to the high activity centres compared to other routes in the Urban Bike Network; and
- The provision of bikeways on these routes will require a more significant investment in the bike network (i.e. route cannot be implemented in a reasonable timeframe at a relatively low cost)

No costs are yet associated with these routes. It is anticipated that implementation of these routes is beyond the timeframe of this plan. The City is encouraged to investigate options to develop these routes if other opportunities become available. The routes are identified to protect the corridor for a potential

bikeway in future planning activities (i.e. a separate pedestrian, trails or cycling plan or an update to the Transportation Master Plan).

To implement the Urban Bike Network, it is recommended that the City:

1. Pursue the installation of proposed bikeways for Core Routes within 5 to 10 years in the following order of priority:
    - Proposed bike lanes on Cathcart Boulevard
    - Proposed trail crossing improvements on Howard Watson Trail at (in order of priority): Exmouth Street, Wellington Road, Michigan Line/Blackwell Road, Modeland Road, and London Road (see Appendix G)
    - Proposed bike lanes (road diet) on Colborne Road
    - Proposed bike lanes (road diet) on Vidal Street and Brock Street
2. Pursue the installation of boulevard multi-use trails on Confederation Street in co-ordination with the Walkway Infill Program;
3. Pursue the installation of shared use markings and signage along the Front Street Enhanced Route within 5 years;
4. Pursue the installation proposed bikeways for Connector Routes in tandem with Core Routes in the following priority:
    - Upgrade proposed bike priority streets and shared use bikeways with shared use pavement markings and signage
    - Retrofit proposed bike lanes
    - Upgrade proposed bike priority streets with bike detections at major intersections
5. In new development areas, incorporate proposed bike lanes and boulevard multi-use trails into the design and construction of roads within new development areas; and
6. Continue to monitor public response to and use of bike priority streets and consider the use of higher intensity treatments based on road conditions (see Sections 12.3.1 and 12.4.3).

Note that the installation of boulevard multi-use trails on Confederation Street will be subject to the priority framework in the Walkway Infill Program. Confederation Street is an arterial road with no walkways on either side where the trail is proposed. Therefore, this connection is a very high priority for the

Walkway Infill Program and the Urban Bike Network, especially the portion between Finch Drive and Upper Canada Drive. Its implementation should be pursued accordingly.

12.5.3 Rural Bike Network Implementation Costs and Phasing

In rural areas, the Rural Cycling Strategy designates 42.5km of paved shoulders throughout the city. There are: 6km of existing paved shoulders; 20.1km of paved shoulders proposed on City roads and 17.4km on County roads. Existing paved shoulder are located on London Line west of Telfer Road (approximately 5km) and Lakeshore Road between Modeland Road and Murphy Road (approximately 1km).

Costs to implement the Rural Cycling Strategy will range between $3.4M and $8.5M depending on the roadway conditions (Exhibit 12.17 shows the unit costs for paved shoulders). However, note that the cost for paved shoulders on County roads will be the responsibility of Lambton County. The total costs for paved shoulder on City roads will range between $1.6M to $4.1M.

To implement the Rural Cycling Strategy, it is recommended that the City:

1. Incorporate the provision for paved shoulders into the costs for rural road rehabilitation projects; and

2. Adjust the delivery schedule for the Rural Roads Rehabilitation Program accordingly to maintain the existing annual expenditure for the fund.

Note: According to the Municipal Engineers Association Municipal Class Environmental Assessment process (amended 2011), adding bike lanes within a road right-of-way is a Schedule A+ pre-approved project. An Environmental Assessment is not required to add bike lanes unless the project is part of a road undertaking that does require a Schedule ‘B’ or ‘C’ Environmental Assessment. In terms of consultation, for a Schedule ‘A+’ undertaking the process only requires the public to be notified prior to construction.

12.6 Summary of Active Transportation Recommendations

This final section contains a summary of recommendations that comprise the active transportation strategy. First listed are recommended practices and policy updates to improve the Walking Network, followed by those to promote development the Bike Network. Next are other supporting initiatives for the education and promotion of active transportation in Sarnia. Lastly, the recommendations for implementation are presented.

The active transportation strategy recommends the following six categories of action items:

1. To improve the walking environment, it is recommended that the City:

i. Pursue the construction of sidewalks where missing along pedestrian corridors according to the Walkway Infill Program discussed in Section 12.2.2;

ii. Pursue the installation of crossing treatments and intersection improvements to facilitate pedestrian movement across major streets as identified in the Walkway Infill Program;

iii. Develop the prioritization framework (discussed in Section 12.2.3) to direct the implementation of the Walkway Infill Program;

iv. Consider endorsing a Pedestrian Charter that recognizes the beneficial roles of walking in Sarnia and affirms the City's commitment to improving the walking environment; and

v. Revise the sidewalk policy and other related policies to encourage improvement of the walking environment as discussed in Sections 12.2.1 and 12.4.2.

2. To develop the bike network, it is recommended that the City:

i. In existing urban areas, pursue the installation of the proposed bikeway along Core Routes, Connector Routes and Enhanced Routes as identified in the Urban Bike Network presented in Section 12.3.2;

ii. In new development areas, construct proposed bikeways along Future Bike Routes as identified in the Urban Bike Network;

iii. In urban areas and subject to the available opportunity such as road widening or reconstruction: support the installation of bikeways along Long-term Bike Routes as identified in the Urban Bike Network;

iv. Encourage the County of Lambton to update the Lambton County Trail System to include Lakeshore Road, from Modeland Road to Mandaumin Road;

v. In rural areas during road reconstruction, pursue the installation of 1.5m paved shoulders along all City roads along the Lambton County Regional Trail; and

vi. In rural areas, encourage the County of Lambton to installed paved shoulders on all County Roads along the Lambton County Regional Trail.

3. To support the education and promotion of active transportation in Sarnia, it is recommended that the City:

i. Support and encourage on-going outreach activities that promote active transportation through continued partnership with the Bluewater Trails Committee:

- Bluewater Trails Map and list of bike routes
- Trail Etiquette and Safe Cycling Education
- Liaison with Lambton County Active Transportation Committee and Lambton County Regional Trail Committee
- Bike Security Area – Bike Rack Loan Program

ii. Consider other opportunities to further development programs for the education and promotion of active transportation in Sarnia through potential partnerships (as discussed in Section 12.4.1) with agencies such as:

- Lambton County, the Lambton County Regional Trail Committee;
- Sarnia Transit and the Sarnia Transit Advisory Committee;
- Bluewater Health;
- Community Health Services, Lambton County;
- Sarnia Police Services;
- Sarnia Lambton Economic Partnership; and
- Tourism Sarnia – Lambton
- Lambton College
- Local schools and Green Communities Canada

4. To implement the Walkway Infill Program, it is recommended that the City:

i. Create an annual fund as designated solely for implementing the sidewalk infill projects identified in the Walkway Infill Program;

ii. Conduct an internal review and recommend an appropriate fund allotment for the Walkway Infill Program Fund based on the implementation options discussed in Section 12.5.1;

iii. Continue to use the existing Streetscape Improvements Fund to implement crossing treatments and intersection improvements;

iv. Initiate the Walkway Infill Program by first implementing the proposed multi-use trail along Confederation Road, from Finch Drive to Upper Canada Drive, to connect as described in Section 12.2.3;

v. Apply the priority framework tool to identify priority for funding and implementation of the sidewalk infill and crossing improvement projects identified in the Walkway Infill Program; and

vi. Recuperate the cost of building new sidewalks in new development areas through developer fees

5. To implement the Urban Bike Network, It is recommended that the City:

i. Pursue the installation of proposed bikeways for Core Routes within 5 to 10 years in the following order of priority:
   - Proposed bike lanes on Cathcart Boulevard
   - Proposed trail crossing improvements on Howard Watson Trail at (in order of priority): Exmouth Street, Wellington Road, Michigan Line/Blackwell Road, Modeland Road, and London Road
   - Proposed bike lanes (road diet) on Colborne Road
   - Proposed bike lanes (road diet) on Vidal Street and Brock Street

ii. Pursue the installation of boulevard multi-use trails on Confederation Street in co-ordination with the Walkway Infill Program;

iii. Pursue the installation of shared use markings and signage along the Front Street Enhanced Route within 5 years;

iv. Pursue the installation proposed bikeways for Connector Routes in tandem with Core Routes in the following priority:
   - Upgrade proposed bike priority streets with shared use pavement markings and signage
   - Upgrade proposed bike priority streets with bike detections at major intersections

v. In new development areas, incorporate proposed bike lanes and boulevard multi-use trails into the design and construction of roads within new development areas; and

vi. Continue to monitor public response to and use of bike priority streets and consider the use of higher intensity treatments based on road conditions (see Section 12.3.1).

6. To implement the Rural Cycling Strategy, it is recommended that the City:

i. Incorporate the provision for paved shoulders into the costs for rural road rehabilitation projects; and

ii. Adjust the delivery schedule for the Rural Roads Rehabilitation Program accordingly to maintain the existing annual expenditure for the fund.

13. TRANSPORTATION MASTER PLAN IMPLEMENTATION

13.1 Use of the Transportation Master Plan

The TMP is the overarching strategic document that provides a framework for how the City of Sarnia will strategically address its future transportation needs over the next 20 years. It does not address specific actions at specific locations that will be the subject of further planning, engineering and environmental assessment investigations. Instead, it describes, anticipates and plans for the strategic movement of people and goods in a transportation system based on the principles of "Complete Streets".

The TMP is also not a provincially legislated document, and therefore has no statutory authority. That authority is provided through the City's Official Plan by incorporating the main policy directions of the TMP. The primary purpose of the TMP is to guide the City's transportation-related decision making. It also provides the need and justification for transportation infrastructure projects that require approval under the Municipal Class EA process, thereby satisfying Phases 1 and 2 of that process with problem or opportunity identification and evaluation of alternative planning solutions.

The TMP also provides the public with clear identification of the role and function of streets within the City, how these streets are intended to operate and how they relate to and impact on the land uses that they serve. This is why the road classification system used in the Official Plan is important.

In addition, the TMP is not just a plan of infrastructure actions. It also provides the policy framework on which to make concrete operational decisions for the City.

13.2 Transportation Master Plan Review and Updates

The City's TMP is not intended to be a static document. It must be regularly reviewed to ensure it meets the transportation needs of the City. Changing community expectations or growth and development patterns can necessitate a review of the Plan's primary recommendations, for example involving roadway and intersection capacity enhancements or adjustments. This should be done as follows:

- Update the City's capital projects planning to include the roadway network, transit and active transportation projects recommended in the TMP;
- Prepare an annual staff report to City Council on the 'State of the Transportation System", reporting on local transportation conditions, behaviours, needs and trends

with joint input from all involved city departments and advisory groups; and

- To address transportation issues on an annual and consistent basis, this "State of the Transportation System" report should document:

  1) Results of specific traffic count updates;
  2) New trends and technologies in traffic operations and management;
  3) Downtown parking supply and demand;
  4) Public and private sector TDM initiatives (i.e. carpooling, preferential parking, transit service delivery, flexible work hours, cycling facilities);
  5) Status of related County initiatives involving County Roads in the City;
  6) Status of provincial initiatives, policies and funding programs; and
  7) Any need to review, amend or update components of the TMP.

The TMP requires regular updating to remain relevant and effective in dealing with the City's local transportation needs. Therefore, it is further recommended that the Plan undergo a full review at the next five year mandatory review of the Official Plan, and every five years thereafter in association with future statutory assessments of the Official Plan.

13.3 Funding Opportunities

The TMP development included a review of potential federal and provincial funding opportunities to meet the master plan implementation work plan. The following summarizes the basic alternative funding sources for transportation infrastructure:

- Province of Ontario Programs;
- Federal Programs; and
- Municipal Development Charges.

Other alternative infrastructure funding mechanisms for the City to consider where and when required include:

User Pay – User fees are now commonly used for municipal services such as libraries, swimming pools, arenas, etc. This is done to help manage the demand for infrastructure and provide more sustainable alternatives. Most user fees are calculated based on a "utility model" that uses the principle that the price of a product (i.e. library services) should reflect the actual costs of producing the product.

The advantages of user pay programs is that it requires strong management of the infrastructure assets that are being charged and can provide opportunities for accessing private sector capital markets (i.e. toll highways, transit systems). The main disadvantages of user pay programs is that there can be social equity issues (some can afford to pay for the service while others cannot), and it is often difficult for political decision-makers to justify and support the user charges compared to the social needs.

User pay is already used in the City of Sarnia transportation system in the form of parking charges and transit rates. To expect that there would be political and public support to extend user pay to other forms of transportation such as toll roads, congestion pricing and even bicycle licensing, enough to generate sufficient funds to support infrastructure development, is not considered viable within the 20 year timeframe of the TMP.

Transfer Payments – Transfer payments from one order of government to another can include unconditional block transfers, grants and flexible transfer payments. They can also include permanent dedicated revenue flows such as the 2% of the gasoline tax in Ontario that is directed to public transit.

One advantage of transfer payments is that it is a widely used form of financing infrastructure in Canada, for example the Canada Strategic Infrastructure Fund. The disadvantages include potential social inequities for people who pay for the transfer but do not use the related service (i.e. gas tax when you do not use transit), and there may be no predictability in longer term funding.

Bonds – All three levels of government in Canada can issue and sell bonds for infrastructure. Municipal bonds in Canada are uncommon because bonds issued by a Municipal Finance Authority are usually fully guaranteed by the province, and so are considered provincial bonds rather than municipal bonds. The potential use of municipal bonds is also limited by the bond rating of smaller municipalities, and so are not considered a viable funding alternative for City of Sarnia infrastructure funding.

Trust Funds – This is termed “earmarked taxation” where a percentage of municipal tax revenue is dedicated to a specific investment area, for example municipal roads. The trust fund must be used for its intended purpose (i.e. to fund road construction). In the USA trust funds provide for most of the federal funding for highways and transit projects.

One of the main challenges with using trust funds for infrastructure funding is to ensure that funded project are equally distributed across the community so that no one area or areas benefit while the entire community pays taxes.

Tax Increment Financing – Through tax increment financing, municipalities can reinvest property tax revenues to meet community economic development objectives involving housing development, job creation and core revitalization.

As applied in Ontario, tax increment financing is based on municipal grants and loans that can be given under the Planning Act community improvement provisions. For example, Tax Increment Financing is used by some cities to provide funding for community improvements. By calculating a grant or loan on the higher property tax that is generated from development (the tax increment), municipalities can offer eligible developers financing incentives that will put lands and buildings that might not otherwise be developed back into productive use. Such redevelopment can often involve road improvements.

Advantages of Tax Increment Financing include its focus on infrastructure investment as part of community revitalization, and the higher tax generation potential that comes from such revitalization. However, it has only a very limited application in Canada, is not suitable for large scale infrastructure projects and can create risks and liabilities for the municipality in the future if anticipated revenue increases do not materialize.

Public-Private Partnerships (P3s) – P3s are financing arrangements that increase involvement of the private sector in public service delivery, and transfer some risk and reward to the public sector. Ontario examples include the Highway 407 ETR and the York Region Transit VIVA service. Private sector involvement can range from minimal such as garbage collection services, to comprehensive through the designing, building, owning, operating and financing infrastructure. Within these two extremes are various levels of public and private sector involvement that are typically suited to specific projects.

The advantages of P3s include the opportunities for more construction and/or operational efficiencies and risk is transferred to the private sector. One main disadvantage can include strong public and political opposition to P3s. In the context of the City of Sarnia, no opportunities for P3s to implement required transportation system developments have been identified.

Focused Advertising – Some municipalities allow the private sector to advertise on public infrastructure. Two common examples include advertising of public transit buses and at stops and stations, and on public golf courses. The same approach can be applied to bikeway and trail systems where private advertising opportunities are offered at strategic system locations.

Cash-in-lieu of Parking – On a site-specific basis, municipal councils can, at their discretion, enter into an agreement with a landowner to provide for an exemption from providing the required parking or a reduction in the

parking requirement specified in the Zoning Bylaw. This agreement provides for the owner to make one or more payments of money to the City as consideration for the granting of the exemption or reduction, and sets the basis on which such payment is calculated. In Ontario, cash-in-lieu of parking funds must be saved in a parking reserve fund and reinvested into the supply and management of public parking. Cash-in-lieu of parking is available for implementation in the City of Sarnia through the updated Official Plan and associated Zoning Bylaw.

13.4 Implementation through the Official Plan

The City of Sarnia Official Plan (OP) adopted on June 30, 2014 is a statutory planning document which is required by provincial legislation. According to OP Section 6.4: Transportation System:

"The city structure is connected locally, regionally and internationally by the City's transportation system, the viability of which is essential to supporting the travel needs of all residents, visitors and workers over the long-term. For the City to develop in an efficient manner, land use and transportation policies must be mutually supportive. The City's transportation system consists of the following elements:

a) road network;

b) transit system;

c) active transportation (human-powered transportation); and

d) rail network

Air and marine services also form part of the transportation system. These elements are concentrated within particular areas thus air service is included in the airport, and port facilities in the employment areas and parks and open space policies."

Elements of this TMP will be implemented by being incorporated into OP policy dealing with the city's road network shown on OP Map 4, parking facilities, transit and Active Transportation.