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TOWN OF SMITHS FALLS

Transportation Master Plan

Draft

August 2026 – 24-8444

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1.0 Introduction

1.1 Background

As part of the Smiths Falls Strategic Plan 2023-2026, Smiths Falls Council identified their vision, guiding principles, priorities, and goals to set a clear path forward over the next four years. The 'Transportation Networks' goal is:

"To enable improved mobility by examining existing transportation networks both within Town and beyond in a way that supports employment and accessibility"

To achieve this goal, eight initiatives were identified, including the initiative to "Develop a Transportation Master Plan (TMP)".

Significant work was done through the 2021 Active Transportation (AT) Plan to promote sustainable transportation and Complete Streets in Smiths Falls, including the identification of networks, policies, and programs for cycling and walking. This TMP will integrate those past recommendations with the networks and policies required to support other modes of transportation and with the growth plans identified through the Official Plan update.

According to Statistics Canada, the Town's population was 8,780 in 2016 and 9,254 in 2021, representing a 5.4% population increase over the 5-year period. The Town's current population and employment forecasts, identified in Smiths Fall's Land Needs Analysis, now reflect a planning horizon of 2046. The population growth currently forecast for the 2046 horizon year is 13,100, representing a 42% increase over the 2021 population figure.

The basic transportation issues and needs facing Smiths Falls to 2046 are similar to those in other medium-sized Canadian towns. They include responding to growth, funding constraints, auto-dominated travel, core area revitalization, cost-effective transit operation, and maximizing the capacity of the existing road network. In the context of eastern Ontario, Smiths Falls has growth potential that requires plans that will effectively serve growing transportation demands.

1.2 Study Objectives

The path to a successful Transportation Master Plan (TMP) is to focus on user experience with the intent of highlighting investment opportunities, policies, and programs where multimodal travel becomes as easy and convenient as driving – expanding the person-capacity of corridors versus automobile capacity of corridors. Our team recognizes that Smiths Falls has opted to grow differently in the future and the TMP will help facilitate this growth by providing the networks and policy tools needed.

The following study objectives were set by the Town for this inaugural TMP:

1. Ensure an inclusive and accessible/barrier free environment for all users regardless of age, physical ability and financial means;
2. Develop a truly multi-modal network that emphasizes sustainable travel modes in an effort to reduce pollution, enhance quality of life through active living, and reduce dependency on the automobile;
3. Improve road safety, especially to the most vulnerable groups;
4. Improve connectivity within the Town and overcome barriers between communicates and amenities;
5. Maintain satisfactory mobility levels considering the Town's future growth; and
6. Implement the Plan in a fiscally sustainable and accountable manner.

Other objectives, constraints and limitations that influenced the development of this TMP include:

- **Strive for a "made for Smiths Falls" Master Plan** reflecting the unique characteristics of Smiths Falls and its context while still learning from successes in other similar-sized towns.
- **Coordinate TMP Preparation with the Town's concurrent Official Plan (OP) update** in terms of growth forecasting, consultation activities, and planning of cost efficiencies in the development of new transportation infrastructure and policy.
- **A Complete Streets philosophy** has been applied to this TMP so that streets are planned, built, and maintained for all users.

1.3 Study Approach

The approach used in this TMP was organized into four (4) distinct project phases:

- **Phase 1: Foundations** – Set the stage for the Town of Smiths Falls transportation system.
- **Phase 2: Strategic Directions** – Create a blueprint for a strategic approach to planning and developing a multi-modal transportation network.
- **Phase 3: Integrated Network Priorities** – Create an integrated multi-modal transportation network that recognizes the demands and pressures from all modes and the limitations of the available Rights-of-Way.
- **Phase 4: Implementation Plan** – Bring the elements of the TMP together and develop a practical approach to implement and monitor the TMP transportation network and guide the Town forward to the 2046 horizon year.

Our approach and methodology were designed to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) process (October 2000, as amended in 2007, 2011, 2015, and 2023) and follows Master Planning Process Approach #1. The integration of technical and consultation activities is a core element of the MCEA process.

There are five phases under the MCEA process:

1. Identify the problem or opportunity
2. Identify the alternative solutions
3. Examine the alternative designs for the preferred solution
4. Prepare the Environmental Study Report
5. Implementation

There were various opportunities for the public to provide feedback for the Smiths Falls TMP, as well as the associated new Official Plan (OP), to meet the consultation requirements. The Smiths Falls TMP and OP consultation included public meetings and a public open house.

1.4 Consultation and Engagement

The engagement process was designed to provide opportunities for the public, stakeholders, and Indigenous communities to voice concerns and feedback to help create a TMP that is informed and inclusive. The consultation for the TMP is mandatory under the MCEA process in accordance with the master planning process for MCEAs. In order to meet consultation requirements, various opportunities for public and stakeholder engagement were available. The consultation presented key information for the public and stakeholders to provide meaningful feedback for the TMP. The feedback collected was used to shape the direction of the TMP.

The formal public consultation program for the two projects (TMP and OP) was, and will be, integrated due to the parallel nature of the two studies. The specific stakeholder and public consultation sessions that were conducted as part of the TMP are as follows:

- Public Meeting #1: World Café Event – October 10, 2024;
- Notice of Study Commencement – July 4, 2025;
- Public Meeting #2: Public Open House – September 10, 2025;
- Public Meeting #3: Public Meeting – August 25, 2026; and
- Notice of Study Completion – TBD.

The notices, presentation material, and public comments for the aforementioned consultation events are included in **Appendix A**.

In addition to the public consultation sessions, the Town of Smiths Fall's Council was, and will be, kept informed of the study progress and findings through staff reports and findings. These contact points included/will include the following:

- TMP Summary and Update, Report 2025-051 – Committee of the Whole May 26, 2025; and
- TMP Update Presentation of Recommended Plan, TBD; prior to the 30-day Public Review.

1.4.1 Public Meeting #1 – World Café Event

The World Café Event was a well-attended in-person event that was hosted at the Smiths Falls Youth Arena on October 10th, 2024 from 5:00 pm to 7:00 pm. The purpose of the public meeting was to inform the public about the new Official Plan and Transportation Master Plan and the project timelines. It was also an opportunity to involve the public to help us learn more about the issues, concerns and opportunities for future growth and development in Smiths Falls. The event included a presentation, a question-and-answer session, and a World Café.

A World Café is a collection of topics at specific tables to generate discussion between participants about things that matter to them in their community. Each table included a large paper pad and various maps for participants to engage collaboratively. The World Café activity solicited feedback on five key themes related to the new Official Plan and Transportation Master Plan: Transportation, Housing, Community Spaces, Environment and Climate Change, and Downtown Revitalization. The summary from the World Café is available separately from the Town.

1.4.2 Public Meeting #2 – Public Open House

The public open house was an in-person drop-in event that was hosted at the Smiths Falls Town Hall (in Council Chambers) on September 10th, 2025, from 5:00 pm to 7:00 pm. This open house was held during Phase 1 of the MCEA process to present and receive feedback on the identified problem and opportunity statement.

More than 20 members of the public attended with many providing feedback and sharing their transportation perspectives. The key feedback is summarized below:

- The intersection of Cornelia Street and Union Street is difficult to cross as a pedestrian; and
- More sidewalks need to be a priority:
  - Union Street (west side), from the Via Rail train station to Cornelia Street.
  - Cornelia Street (south side), from Union Street to Rideau Avenue.
- More cycling infrastructure.

1.4.3 Public Meeting #3 – Public Meeting

The public meeting was held on Tuesday August 25th, 2026, at 5:00 pm in Council Chambers at Smiths Falls Town Hall. This public meeting was held during Phase 2 of the MCEA process to present and receive feedback on the preferred alternative solutions, and to consider the draft New Official Plan.

2.0 Background Information and Development Policy Framework

The Town of Smiths Falls is a single tier municipality geographically located within Lanark County. Therefore, this Transportation Master Plan will refer to, build on, and be subject to guidance from the following existing strategic policy documents:

- Provincial Planning Statement (2024);
- Town of Smiths Falls Strategic Plan 2023-2026;
- Town of Smiths Falls Official Plan 2034 (2014) and update;
- Town of Smiths Falls Active Transportation Plan (2021);
- Town of Smiths Falls Downtown Revitalization and Waterfront Integration Master Plan (2013);
- Town of Smiths Falls Canal District Master Plan (2024);
- Town of Smiths Falls Asset Management Plan: Core Assets (2022);
- Town of Smiths Falls Long-Term Financial Planning Forecast 2021-2030;
- Lanark County Transportation Master Plan (2010); and
- Lanark County Climate Action Plan (2023).

The aforementioned policy framework documents are briefly described below.

2.1 Provincial Planning Statement

The Provincial Planning Statement (PPS) (2024) provides policy direction on matters of provincial interest related to land use planning and development and includes policy directives for **Transportation Systems**. A Transportation System consists of multimodal facilities, corridors and rights-of-way that provide safe and energy efficient ways to facilitate the movement of people and goods.

Specific sections within the PPS pertaining to the transportation network include:

"Transportation and Infrastructure Corridor" identifies the need to protect corridors, rights-of-way, and major goods movement facilities used for transportation and transit purposes; and

"Energy Conservation, Air Quality and Climate Change" promotes active transportation and transit within different land uses and encourages compact, transit supportive and complete communities to reduce greenhouse gas emissions.

2.2 Town of Smiths Falls Strategic Plan 2023-2026

The Town of Smiths Falls Strategic Plan 2023-2026 was created by council with input from senior staff and members of the public. The Plan identifies goals for: Transportation Networks, Housing, Infrastructure Renewal, Waterfront & Downtown, New Business Attraction, and Parks, Trails & Recreation.

Smiths Falls 'Transportation Networks' goal is:

> "To enabling improved mobility by examining existing transportation networks both within Town and beyond in a way that supports employment and accessibility"

Eight initiatives are identified to achieve this goal. The follow initiatives are relevant to the development of the Smiths Falls Transportation Master Plan:

1. Implement the Active Transportation Plan, connect pedestrian and cycling networks including the Beckwith Street bike lanes to regional cycling infrastructure.
2. Develop a Transportation Master Plan.
3. Evaluate options for improved mobility within Town and beyond.

2.3 Town of Smiths Falls Official Plan 2034 and Update

The Town of Smiths Falls Official Plan 2034[1] serves as a comprehensive, policy-led planning framework designed to facilitate appropriate development while maintaining a strong focus on protecting provincial resources and promoting public health and safety. The Official Plan aligns land use with municipal objectives outlined in Strategic Plans and Master Plans.

This Official Plan provides a vision for the future growth within the Town and a policy framework for regulating the development and use of land until the year 2034. The Plan accounts for a population of approximately 10,100, the creation of up to 250 new jobs, and the establishment of up to 517 new dwelling units.

The Plan promotes job growth through the redevelopment of Targeted Growth Areas, brownfield sites, and the waterfront while also supporting industrial expansion. Additionally, the Plan addresses a diversity of housing needs and integrates phasing policies to prioritize development in Targeted Growth Areas and existing underutilized lots over new greenfield developments.

Section 6.10 – Transportation Network Designations (TR) of the Official Plan focuses on the town's street typologies (Arterial, Collector, Main Street, Residential (Local), and Private Roads) and multi-modal goals and polices.

The Town's existing and future transportation network are shown on Schedule 'B' - Transportation Network.

[1] The Town of Smiths Falls is currently undertaking an update to the Official Plan.

The following displays the Town's street typologies and their minimum right-of-way:

- Arterial: ≥ 26 m
- Collector: 20 – 26 m
- Residential: ≥ 20 m

Although the Official Plan is simultaneously being updated at the time this report was prepared, the following transportation goals and policies are in effect and still relevant to the development of the Smiths Falls Transportation Master Plan:

Goal TR-1 – Balanced Transportation System

Complete and maintain a transportation system that supports the mobility needs of bicyclists and pedestrians while also providing for the safe and efficient movement of automobiles, buses, and trucks.

Key policies include:

TR-1.1 Accommodate and encourage use of non-automobile transportation modes to achieve Smiths Falls' goals and reduce vehicle trip generation

TR-1.2 Consider impacts on overall mobility and all travel modes when evaluating transportation impacts of new developments or infrastructure projects.

TR-1.3 Design, construct, operate, and maintain public streets to enable safe, comfortable, and attractive access and travel for motorists and for pedestrians and bicyclists of all ages, abilities, and preferences.

TR-1.5 Consider options for using waterways as part of the Town's transportation network.

Goal TR-2 – Walking and Bicycling

Improve walking and bicycling facilities to be more convenient, comfortable, and safe, so that they become primary transportation modes in Smiths Falls.

Key policies include:

TR-2.1 Coordinate the planning and implementation of Town wide bicycle and pedestrian facilities and supporting infrastructure. Give priority to bicycle and pedestrian safety and access improvements at street crossings.

TR-2.2 Provide a continuous pedestrian and bicycle system to enhance connectivity throughout the Town by completing missing segments

TR-2.9 Identify funding sources for regular maintenance and capital upgrades to bicycle and pedestrian facilities as part of the Town's operation budget, and prioritize routine street maintenance for streets with bike facilities.

Goal TR-3 – Passenger Rail Service

Provide maximum opportunities for upgrading passenger rail service for faster and more frequent trains, while making this improved service a positive asset to Smiths Falls that is attractive, accessible, and safe.

Key policies include:

TR-3.1 Support the development of amenities and land use and development types and intensities that increase daily ridership on Via Rail and provide positive fiscal, economic, and environmental benefits to the community.

Goal TR-4 – Vehicular Circulation

Maintain the Town's street network to promote the safe and efficient movement of automobile and truck traffic while also providing for the safe and efficient movement of bicyclists and pedestrians.

Key policies include:

TR-4.1 Develop and maintain a roadway network that categorizes streets according to function and type, considers the surrounding land use context, and incorporates the concept of "complete streets".

TR-4.3 In recognition of the unique position of the Downtown as the centre for financial, business, institutional and cultural activities, development within the Downtown is exempted from traffic mitigation requirements.

Goal TR-5 – Goods Movement

Provide for safe and efficient movement of goods to support commerce and industry.

Key policies include:

TR-5.1 Minimize potential conflicts between trucks and pedestrian, bicycle, and vehicular access and circulation on streets with truck travel.

TR-5.2 Maintain primary freight routes that provide for direct access for goods movement to industrial areas.

TR-5.3 Encourage through truck traffic to use arterials, and collectors, and encourage trucks having an origin or destination in Smiths Falls to use designated truck routes.

2.3.1 Town of Smiths Falls Official Plan Update

On March 17, 2025 staff presented a report to Council on the update to the Official Plan. This included a proposed vision statement and five strategic directions. Noteworthy is the strategic direction for transportation which states:

"The Town of Smiths Falls will develop accessible and efficient travel options aligned to evolving transportation needs and shifting demographics, including linkages within the Town and regionally."

2.4 Town of Smiths Falls Active Transportation Plan

The Town of Smiths Falls Active Transportation Plan (2021) serves as a strategic guide for future decision-making and investment in non-motorized transportation modes. This flexible policy document outlines a connected, implementable network supported by actionable tools and recommendations to achieve the town's active transportation goals.

The Active Transportation Plan identifies the proposed pedestrian and cycling projects by facility type (including sidewalks, multi-use paths, pedestrian crossovers, paved shoulders, bike lanes, cycle tracks, etc.) and identifies their priority phasing based on agency responsibility (i.e., Smiths Falls or Provincial).

Smiths Falls operates as a single-tier government structure such that it assumes all municipal responsibilities that are set out under the Municipal Act and other Provincial legislation. This means that Smiths Falls receives no funding from Lanark County (in which it is geographically situated) for roadway projects on County Roads 4 and 43 that run through the Town. This is regardless of whether the proposed facilities are located within or outside of the pavement edge. In addition, this also applies to the United Counties of Leeds and Grenville that borders Lanark County at the southern Town limit where County Roads 17 and 29 run through Smiths Falls.

The Active Transportation Plan identifies that the Town of Smiths falls is lacking a sidewalk policy. The plan provides some examples from other municipalities but does not make any policy recommendations.

2.5 Town of Smiths Falls Downtown Revitalization and Waterfront Integration Master Plan

Smiths Falls was historically a successful industrial town. As much of the industry has left, Smiths Falls aims to redevelop its downtown with a consistent vision. The Downtown Revitalization and Waterfront Master Plan (2013) sets out the vision and guiding principles for the downtown and waterfront area design. The follow guiding principles are relevant to the development of the Smiths Falls Transportation Master Plan:

- Realize the Potential of Beckwith Street as the Downtown Promenade:
  - Provide a people-friendly environment with amenities, narrow intersection crossings, social spaces, and support for vibrant retail.
  - Provide safe and convenient parking.
- Reconnect with the UNESCO Waterfront Heritage:

    - Enlarge the public interface with the waterfront to ensure all people can easily access the water's edge.
    - Develop the newly proposed pedestrian /cycle trails.
    - Improve vehicular access and parking for residents, tourists and visitors alike.
    - Connect the waterfront with key development sites.
- Waterfront Development Sites:
    - Connect waterfront sites with the downtown and the waterfront through pedestrian and cycling links as well as vehicular connections.
- Reconnect and Strengthen Access to Public Recreation Areas Along the Canal:
    - Strengthen pedestrian connections across and around the Rideau Canal waterway.
    - Develop Victoria Park and surrounding public lands into premier waterfront areas for all people to enjoy.

2.6 Town of Smiths Falls Canal District Master Plan

The Canal District is an underutilized commercial and industrial area located along the Rideau Canal and adjacent to the Downtown Core of Smiths Falls that has been identified as a potential waterfront development. The Canal District Master Plan (2024) outlines a strategy for reuniting Smiths Falls with its historic waterfront.

"The ultimate Master Plan envisions a continuous public waterfront edge, connecting the downtown to the Rideau Canal. It is designed as a destination — a place to walk, cycle and interact with the adjacent businesses and the water's edge. Mid-rise buildings frame pedestrian-oriented streets, creating view corridors that draw people to the water. A central plaza provides opportunity for a public art installation and a farmers market or space for special events and celebrations. The plan includes public access to the waterfront by creating a pedestrian-focused curbless street, framing a waterfront park with marina and mixed-use buildings with commercial uses at the ground floor. An extensive multi-use trail with a trail head, pedestrian bridge, and public parking is conceptualized to connect with existing regional trails and the downtown."

The follow elements are relevant to the development of the Smiths Falls Transportation Master Plan:

Street Design:

- All streets are designed to prioritize pedestrian movement, safety, and enhance the walking experience.
- All streets will carry two lanes of traffic (one in each direction) and accommodate large vehicle turnarounds.
- Market St., Bay St., and Gile St. are proposed with 20-metre ROW (Right-of-Way) widths and will function as boulevards with generous space for landscaping, sidewalks, and street infrastructure.
- Canal St. and a Bay St. (south of Centre St.) are designed with a dual purpose: operating as typical streets or being closed off to vehicular traffic on special occasions to create a seamless public plaza.

2.7 Town of Smiths Falls Asset Management Plan: Core Assets

The Smiths Falls Asset Management Plan (AMP) (2022) details the Town's existing road and bridge assets. The existing roadway classification with Smiths Falls breaks down to; 14.4% Arterial, 14.0% Collector and 71.6% Local, while nearly all existing roads (98.2%) within Smiths Falls are paved. Within the Town there are six (6) vehicular bridges and two (2) pedestrian bridges.
The estimated cost for lifecycle activities and capital for road and bridge assets was estimated to be ~$19,850,000 and ~$6,250,000 respectively, over a period of 11 years (2020 – 2030).

The AMP also includes a technical appendix (Appendix E – Road Classification) that classifies the roads within Smiths Falls Average Annual Daily Traffic (AADT).

2.8 Town of Smiths Falls Long-Term Financial Planning Forecast 2021-2030

The long-term financial planning forecast 2021-2030 breaks down the 10-year capital forecast by year, asset type, and project description. The long-term financial planning forecast indicates that money has been allocated annually roads, bridges, sidewalks and related infrastructure (curbs, signs, street lights and traffic lights) but no specific projects are identified beyond 2023.

2.9 Lanark County Transportation Master Plan

The Lanark Transportation Master Plan (2010) outlines a 20-year strategy to meet the evolving transportation needs of Lanark County. The County of Lanark, a largely rural municipality comprised of eight local municipalities, expects its population to grow from 63,800 in 2006 to 77,300 by 2026. The plan acknowledges that Smiths Falls is not part of Lanark County politically, but it's population and employment influence the transportation network in the County.

The county's 570 km road network was assessed. The rugged terrain presents challenges such as narrow lanes and adjacent wetlands, necessitating proper signage, pavement markings, and roadside barriers to enhance driver safety.

The Plan presents three key strategies: optimizing the existing transportation network, managing transportation demand, expanding/improving the transportation network. Policies are presented for traffic calming, accessibility, noise mitigation, and coordination between the County and local municipalities. No infrastructure projects are recommended within the immediate vicinity of Smiths Falls.

2.10 Lanark County Climate Action Plan

The Lanark County Climate Action Plan (2023) provides an outline of goals aimed at achieving emissions reductions while ensuring the resilience within the county's local communities, including Smiths Falls.

The Climate Action Plan is organised into five (5) themes. Theme 1 – Transportation is particularly relevant to the development of the Smiths Falls Transportation Master Plan.

On-road transportation is responsible for 63.6% of community greenhouse gas emissions in Lanark County. To reduce transportation emissions the plan aims to transition to and promote the use of low carbon transportation through low-carbon fuels, electric vehicles, active transportation, and the reduction of single occupancy vehicle trip by providing transit, carpooling, and ridesharing solutions suitable for rural communities.

3.0 Existing and Planned Conditions

3.1 Road Network

The road network in the Town of Smiths Falls is made up of arterial, collector, and residential (local) streets. This hierarchy of functional street classifications helps to determine the use and purpose of a street, providing direction on the speed, capacity, and typical volumes for that street type. The Town's Official Plan provides guidance on the characterises of each street "typology", which includes the functional street classifications. Characteristics of each functional street classification are detailed in **Table 1**.

Table 1: Functional Street Characteristics

Street Type / Characteristic	Arterial Streets	Collector Streets	Residential (Local) Streets
Function	Regional traffic movement	Connect neighbourhoods (residential streets) to arterial streets	Provide access to property
Access to Abutting Land Use	Limited access	Access allowed on some streets	Access allowed on all streets
Traffic Volume	High volumes	Moderate volumes	Low volumes
Traffic Speed	Higher speeds	Moderate speeds	Low speeds
Road Right-of-Way	26 metres	20 metres for residential collectors 26 metres for industrial / business park collectors	20 metres 18 metres may be permitted on certain cul-de-sacs and crescents

The Town's Official Plan also identifies a Main Street typology. This typology is not hierarchical in nature and can apply to any of the functional street classifications. Main Streets are roadways that play an important commercial and social role for the local neighbourhood area, supporting retail and service activities that serve the local neighbourhood residents and providing an urban streetscape for social community gathering and recreational activities. Main Street locations are envisioned to have increased density of commercial and residential development.

All streets within Smiths Falls are under the jurisdiction of the Town, with the exception of the two Rideau Canal swing bridges (Abbott Street and Old Slys) that are owned and operated by Parks Canada.

The existing and planned street network in the Town of Smiths Falls is displayed in **Figure 1**. An illustration of the existing number of lanes on arterial and collector streets is included in **Figure 2**. Road widths (curb to curb pavement widths) are displayed in **Figure 3**. Existing intersection control and lane arrangements at arterial street intersections (arterial-arterial and arterial-collector intersections) are displayed in **Figure 4.**

As illustrated in **Figure 1**, Schedule B of the Smiths Falls Official Plan proposes enhancements to the town's transportation network. A new collector road is planned to run north south, connecting Rideau Road to Lorne Street. Additionally, several existing roads, including Lorne Street, Rideau Road, Broadview Avenue West, Staples Boulevard, Pearl Street, and Ferrara Drive between Harold Street and Staples Boulevard, are planned to be upgraded to collector roads. It is important to note that while Schedule B indicates a connection on Ferrara Drive between Staples Boulevard and Lombard Street, this connection is not part of the planned network at this time.

Figure 1: Existing and Planned Street Network

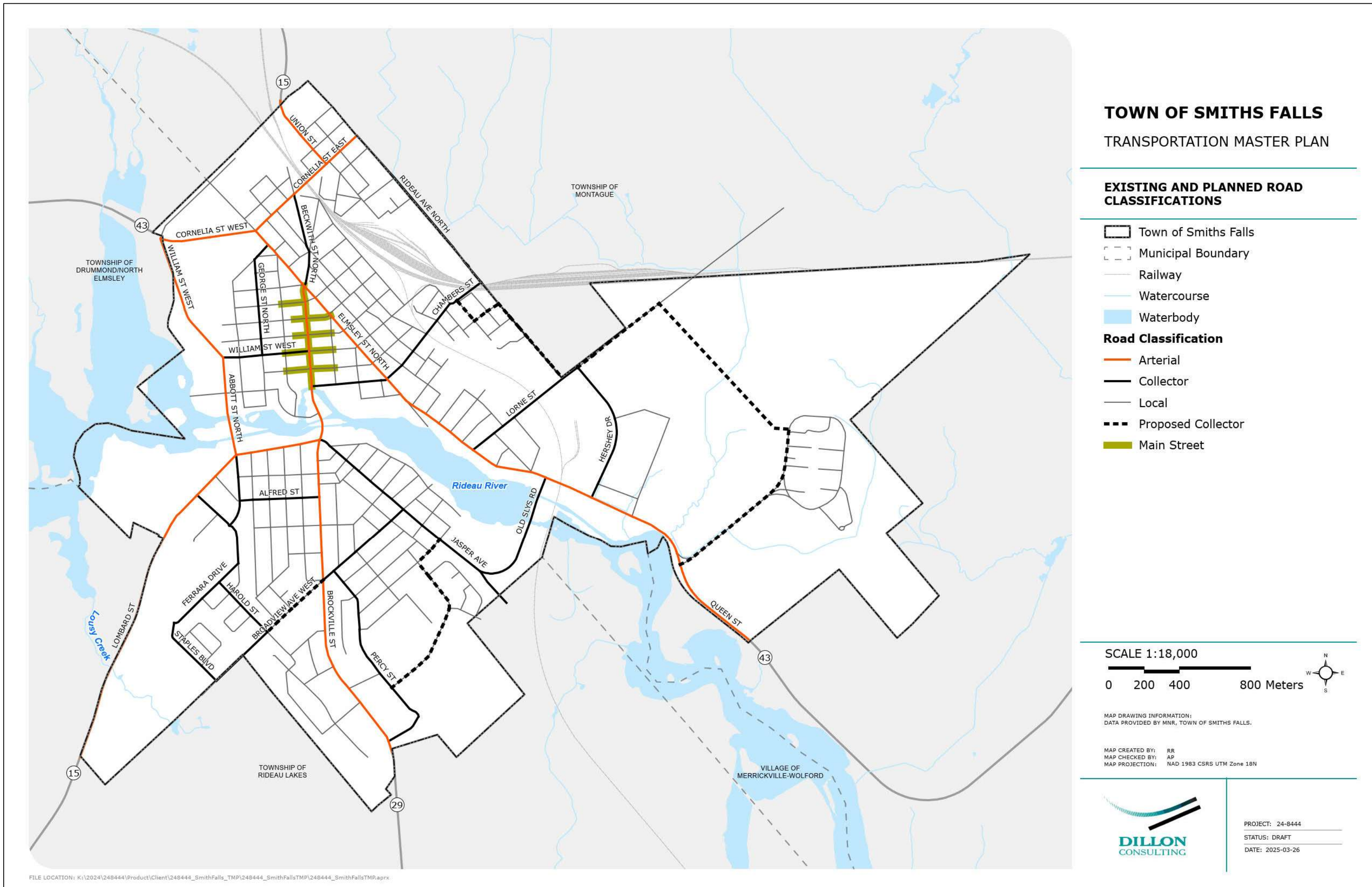

Figure 2: Existing Travel Lanes on Arterial and Collector Streets

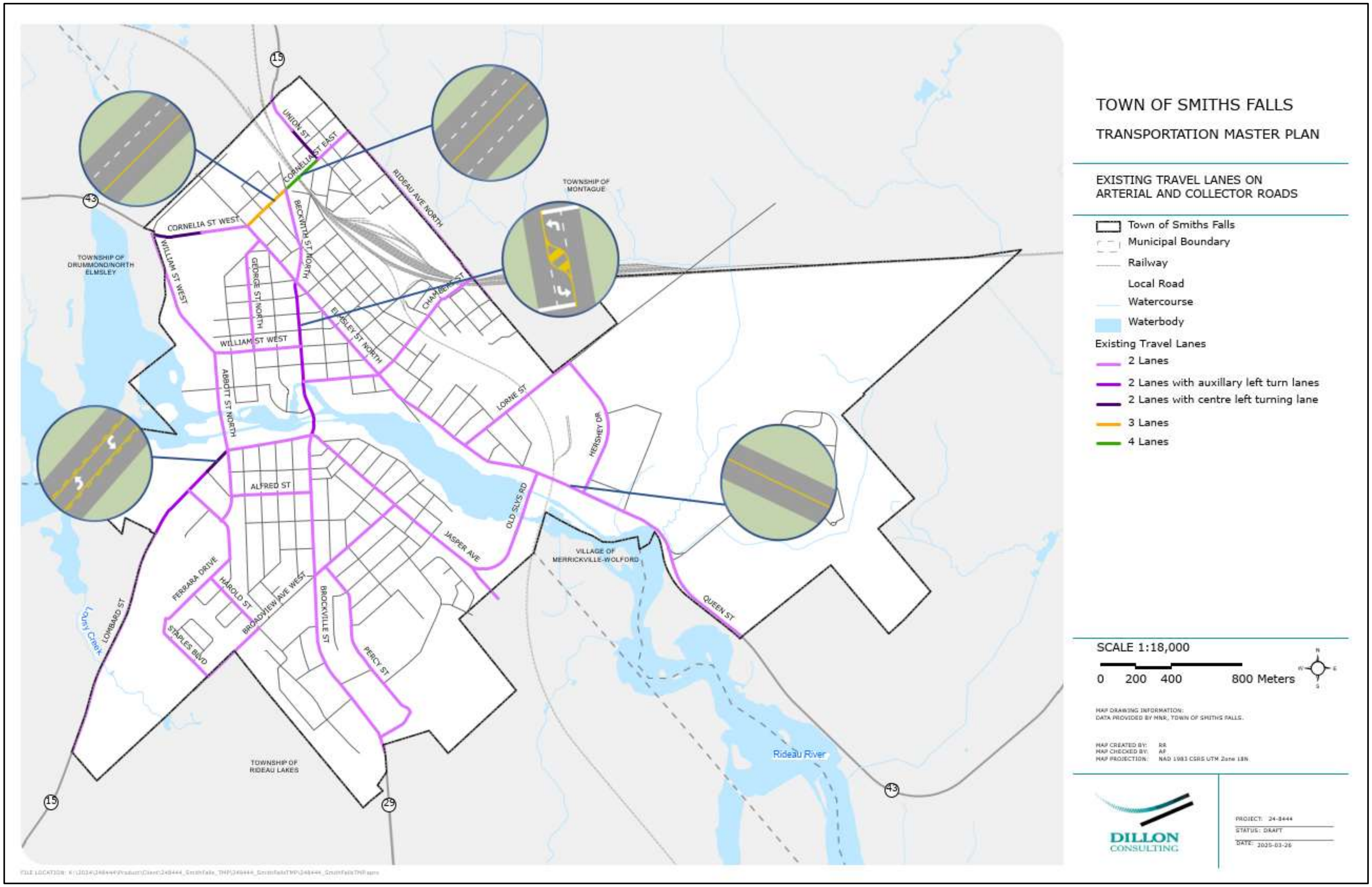

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Figure 3: Existing Road Widths

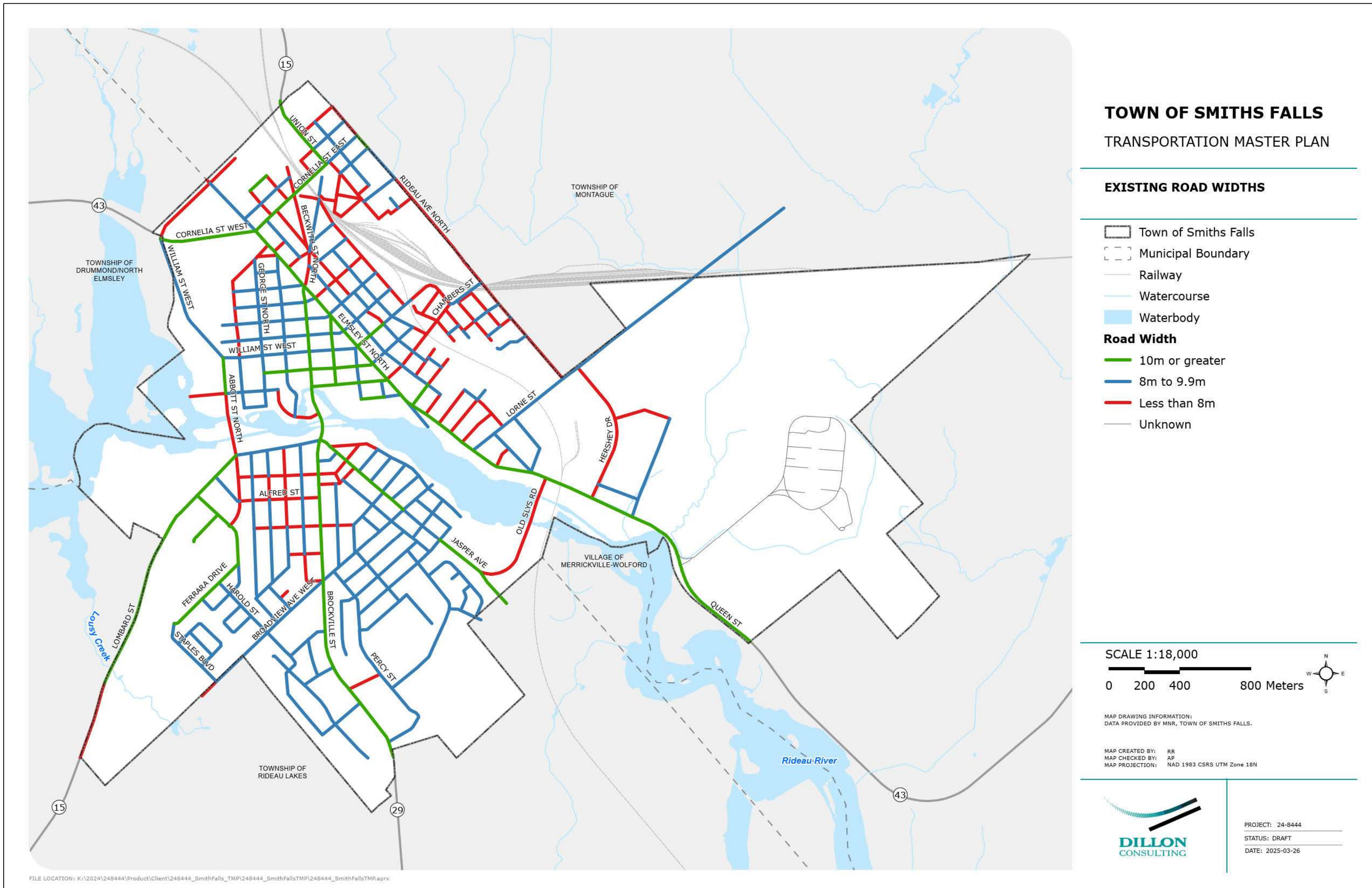
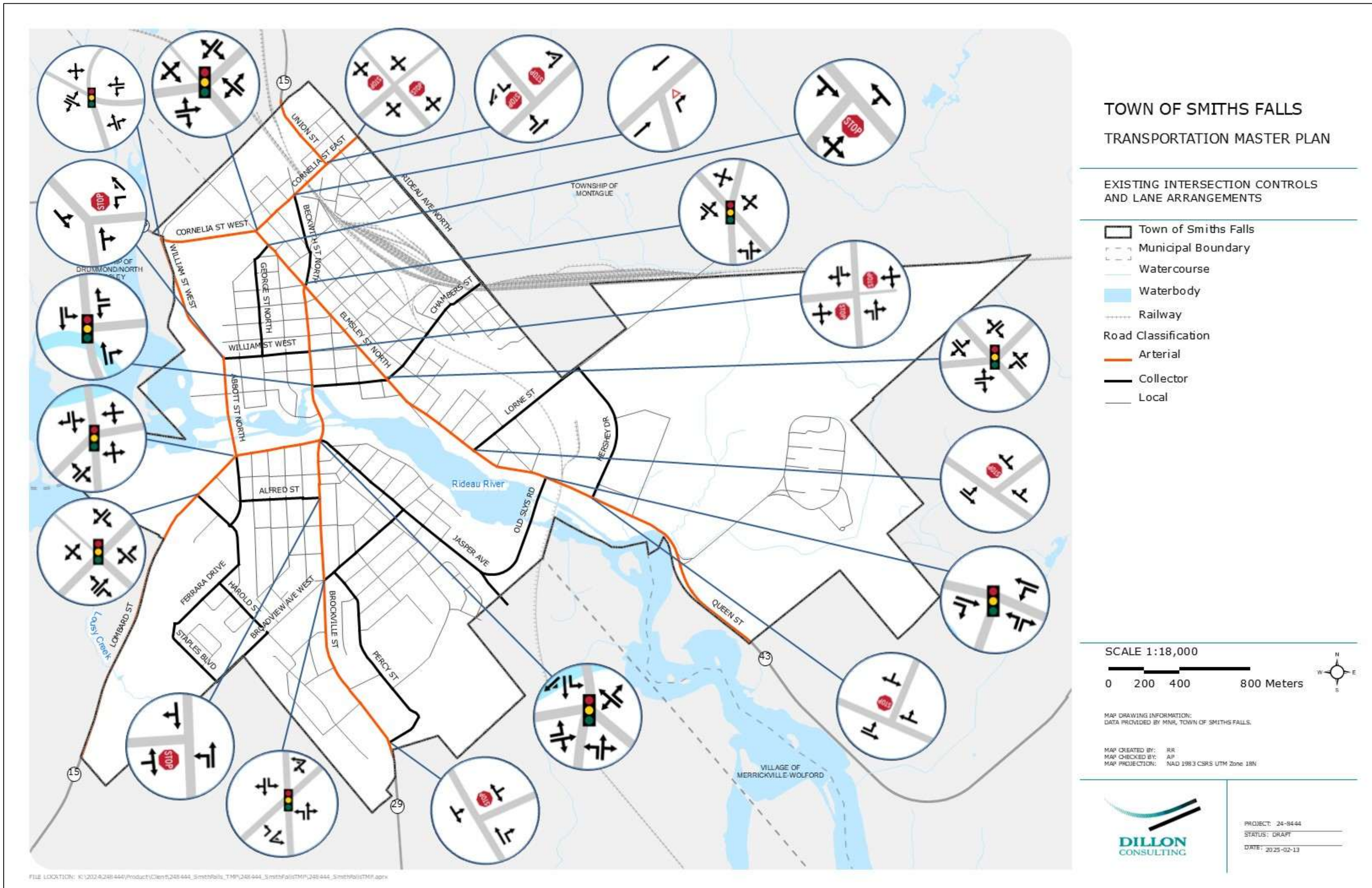


Figure 4: Existing Traffic Control and Lane Configuration at Arterial Street Intersections



3.2 Active Transportation

The Active Transportation (AT) network in the Town of Smiths Falls is made up of both on-road and off-road facilities for both pedestrian and cyclists. These facilities include:

- Off-Road Regional Trails:
  - Cataraqui Trail, Rideau Trail and the Trans Canada Trail.
- Off-Road Local Trails:
  - Multi-use paths with varying surface types.
- On-Road Designated Cycling Facilities:
  - Paved Shoulders.
- On-Road Separated Cycling Facilities:
  - Cycle Tracks.
- Sidewalks.

The Town's AT network also consists of a number of Pedestrian Crossovers (PXO), a roadway crossing where the pedestrian has the right-of-way.

A summary of Smiths Falls Active Transportation infrastructure is detailed in **Table 2**.

Table 2: Active Transportation Infrastructure Summary

Facility	Existing Units: Number / Length
Off-Road Regional Trail	19.8 km*
Multi-use Path (varying surface types)	11.0 km*
Paved Shoulders	2.0 km
Cycle Tracks	0.8 km*
Sidewalks	84.4 km
Pedestrian Crossovers	2 units

** sourced from the 2021 Smiths Falls Active Transportation Master Plan*

The Town of Smiths Falls existing and planned pedestrian and cycling networks are illustrated in **Figure 5** and **Figure 6** respectively. Smiths Falls has a number of planned active transportation facilities. Notably, sidewalks are planned along sections of Union Street and Lorne Street, and buffered paved shoulders are planned along sections of William Street West, Hershey Drive, and Queen Street.

Figure 5: Existing and Planned Pedestrian Network

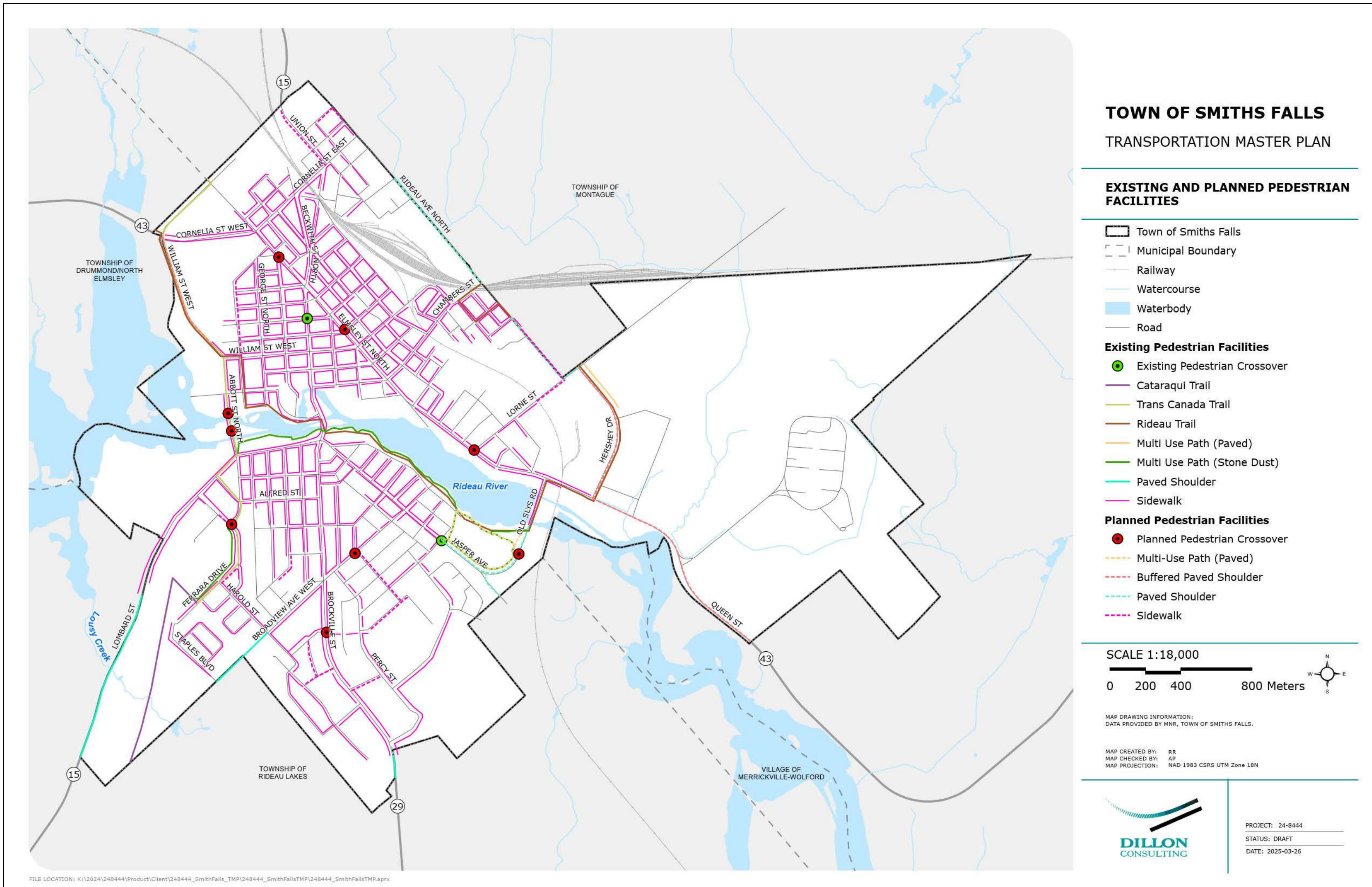
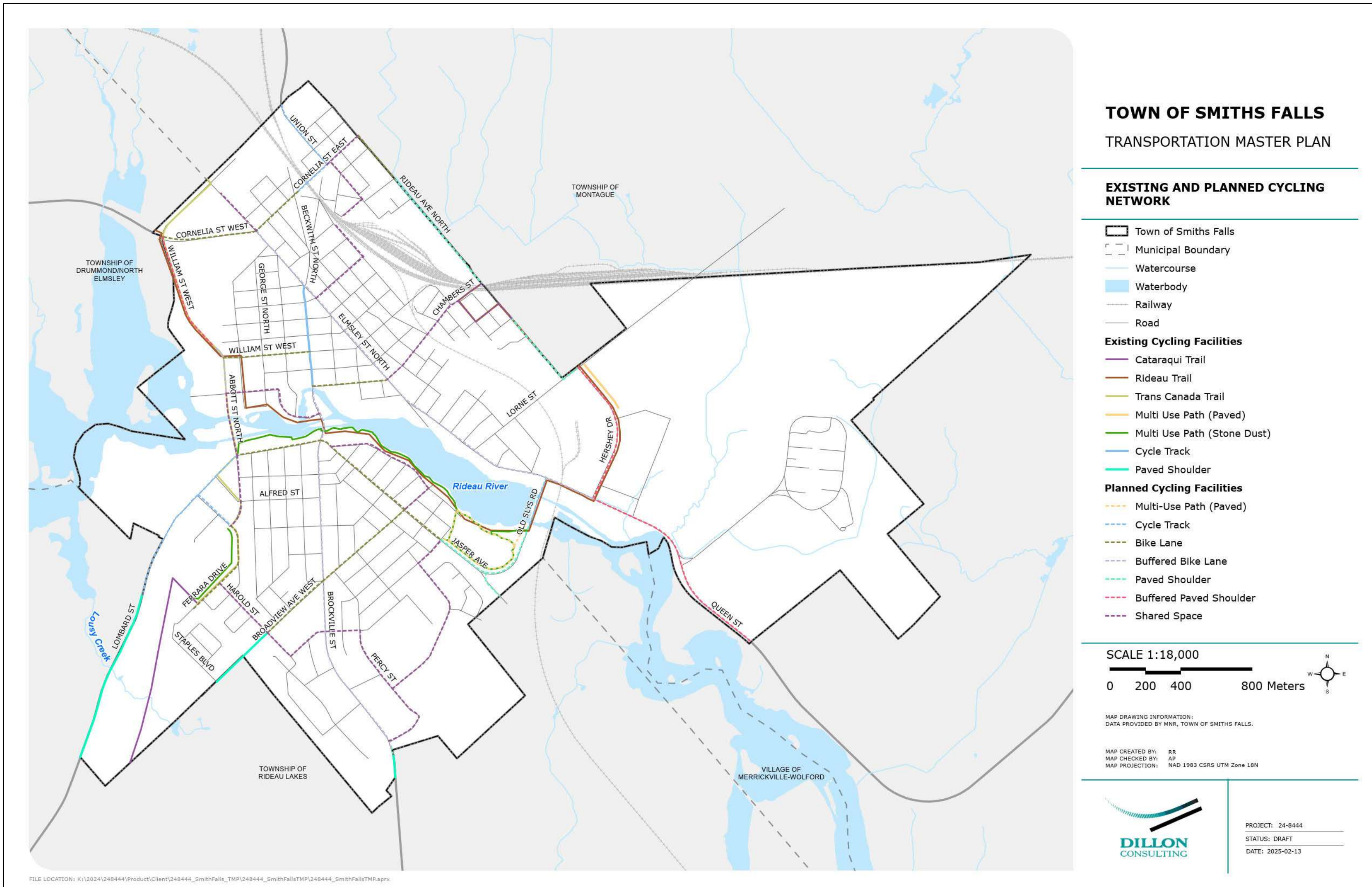


Figure 6: Existing and Planned Cycling Network



3.3 Transit

The Town of Smiths Falls does not currently provide any locally run transit services. A limited intraregional on-demand transit services is provided by Lanark Transportation and an interregional rail service is provided by Via Rail.

Lanark Transportation – a grassroots, not-for-profit association – offers an on-demand service for families, seniors, children, youth, and others living in Lanark County and the Town of Smiths Falls to provide them access to medical appointments, day programs, counseling services, social service appointments, food programs, and non-emergency return transportation from the hospital.

Smiths Falls railway station is served by Via Rail 'corridor' trains that connect regionally to Ottawa and Brockville and provincially / interprovincially to the entire Windsor – Quebec City corridor.

It should be noted that at the time of writing, Lanark County and the Town of Smiths Falls are currently undertaking a Rural Transit Feasibility Study to understand the mobility needs of residents, respond to transit-related challenges and opportunities and ultimately explore the potential of new public transit services.

3.4 Goods Movement

The movement of commercial goods and other freight within and through the Town of Smiths Falls is a key component of maintaining the economic health of the Town. The on-road movement of these goods predominantly utilises the Town's arterial streets however the town does not currently have any identified truck routes or truck restrictions. As a result, large trucks are permitted to travel on any/all streets within Smiths Falls including using residential streets as shortcuts or for the purpose of training.

3.5 Travel Patterns

3.5.1 Mode Choice

The daily traveller mode choice in Smiths Falls has remained relatively stable over the past half-decade (2016 – 2021) according to data collected by Statistics Canada. **Table 3** provides a breakdown of the mode share for each travel mode. The data shows that approximately 85% of commuter trips are made using personal vehicles (Automobile Diver and Automobile Passenger), while nearly 13% of commuter trips are made by active modes (Cycling and Walking).

Table 3: Smiths Falls Travel Mode Share

Mode/Year	2016	2021	Difference
Automobile Driver	74.6%	75.8%	↑ 1.2%
Automobile Passenger	9.5%	9.6%	↑ 0.1%

Mode/Year	2016	2021	Difference
Transit	0.5%	0.3%	↓ 0.2%
Cycling/ Walking	12.9%	12.8%	↓ 0.1%
Other	2.5%	1.5%	↓ 1.0%

Source: Statistics Canada, 2016 & 2021 Census Population Data.

3.5.2 Population

Population data from the 2016 and 2021 Statistics Canada Census were used to identify population trends within the Town of Smiths Falls. A comparison of Smiths Falls population in 2016 and 2021 is presented in **Table 4**.

Table 4: Smiths Falls Population

Location	2016	2021	Difference	% Change
Smiths Falls, Town	8,780	9,254	474	↑ 5.4%

Source: Statistics Canada, 2016 & 2021 Census Population Data.

Overall, the population in Smiths Falls increased by 5.4% from 2016 to 2021 for a total population of 9,254 in 2021.

3.5.3 Primary Trip Markets

'Place of Work' data from the 2016 and 2021 Statistics Canada Census were used to identify regional travel patterns from and within the Town of Smiths Falls. A comparison of average daily commuter travel volumes in 2016 and 2021 is presented in **Table 5**. In general, patterns have remained generally stable from 2016 to 2021.

Table 5: Destinations for Daily Trips Originating in Smiths Falls

Place of Work	2016	2021	Difference
Smiths Falls	1,520	1,560	↑ 40
Ottawa	440	375	↓ 65
Perth	270	165	↓ 105
Merrickville - Wolford	85	75	↓ 10
Carleton Place	85	70	↓ 15
Brockville	60	50	↓ 10
Other	365	240	↓ 125
Total	**2,825**	**2,535**	**↓ 290**

Source: Statistics Canada, 2016 & 2021 Census Population Data.

Approximately 62% of all commuter trips in 2021 were internal to Smiths Falls, while 15% of commuter trips were destined to Ottawa. It should also be noted that while the population of Smiths Falls increased from 2016 to 2021, the total number of commuters decreased during the same time period. These inverse trends align with the overall increase in working from home as a result of the COVID-19 pandemic.

3.6 Performance Assessment

3.6.1 Traffic Volumes and Travel Demands

The existing PM Peak Hour volumes were provided by the Town of Smiths Falls. **Table 6** summarizes the characteristics of each of the traffic counts.

Table 6: Traffic Count Characteristics

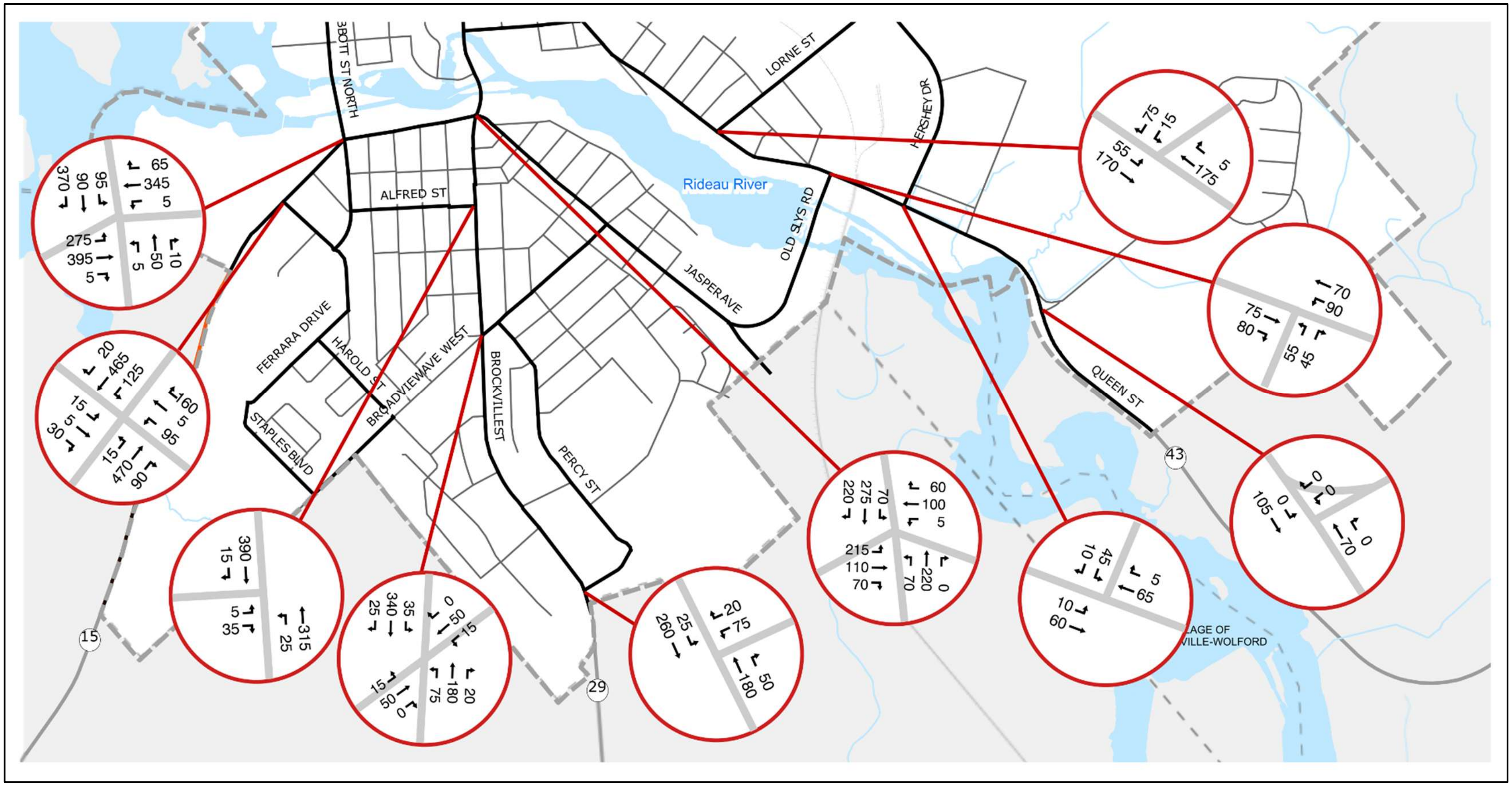
Count Location	Count Type	Date
Lombard Street & Abbott Street	TMC	January 9th, 2025
William Street West & Cornelia Street West	TMC	January 14th, 2025
Cornelia Street West & Elmsley Street North	TMC	January 15th, 2025
Cornelia Street East & Union Street	TMC	January 16th, 2025
Elmsley Street North & Beckwith Street	TMC	January 23rd, 2025
Brockville Street & Lombard Street/Jasper Avenue	TMC	January 22nd, 2025
Chambers Street & Beckwith Street	TMC	January 28th, 2025
Ferrara Drive & Lombard Street	TMC	January 29th, 2025
Elmsley Street South & Chambers Street	TMC	January 30th, 2025
Old Slys Road & Queen Street	TMC	February 3rd, 2025
Broadview Avenue & Brockville Street	TMC	February 5th, 2025
Beckwith Street & William Street West	TMC	February 10th, 2025
Beckwith Street & Cornelia Street	TMC	April 15th, 2025
Cornelia Street & Rideau Avenue North	TMC	March 5th, 2025
Elmsley Street North & Lansdowne Street	TMC	March 6th, 2025
Queen Street & Lorne Street	TMC	February 24th, 2025
Queen Street & Hershey Drive	TMC	February 19th, 2025
Brockville Street & Alfred Street	TMC	February 25th, 2025
Brockville Street & Van Horne	TMC	February 20th, 2025
Abbott Street North & William Street West	TMC	February 6th, 2025

Notes: TMC = Turning Movement Count

Figure 7 and **Figure 8** displays the existing PM peak hour traffic volumes at the arterial street intersections within the Town of Smiths Falls, rounded to the nearest 5 vehicles. The peak hour counts were balanced wherever deemed appropriate.

Figure 7: Existing Traffic Volumes – PM Peak Hour (North)

Figure 8: Existing Traffic Volumes – PM Peak Hour (South)



3.6.2 Link Level of Service and Capacity Analysis

Traffic conditions on arterial roads are assessed by their Volume-to-Capacity (V/C) ratio and the associated Level of Service (LOS). Volume-to-Capacity ratio is defined as the ratio traffic volume on a road segment and the capacity or number of vehicles that the road segment can carry. LOS is a qualitative measure that describes the operating conditions within an intersection, and the perception of those conditions (congestion and delay) experienced by road users by assigning a value between A and F. These values are described in **Table 7** below.

A capacity analysis was completed using existing travel demands to identify existing capacity constraints.

The preliminary assessment of Smiths Falls arterial roads was completed based upon the industry accepted planning capacity of 700 vehicles per hour per lane for arterial roads in an urban condition. For road segments with a centre left turn lane, a planning capacity of 850 vehicle per lane was used (turn lane not counted as a traveling lane).

Table 7 displays the thresholds for V/C ratios and the LOS with a general description of the corresponding traffic condition.

Table 7: Volume-to-Capacity (V/C) Ratios and Level of Service (LOS) Thresholds

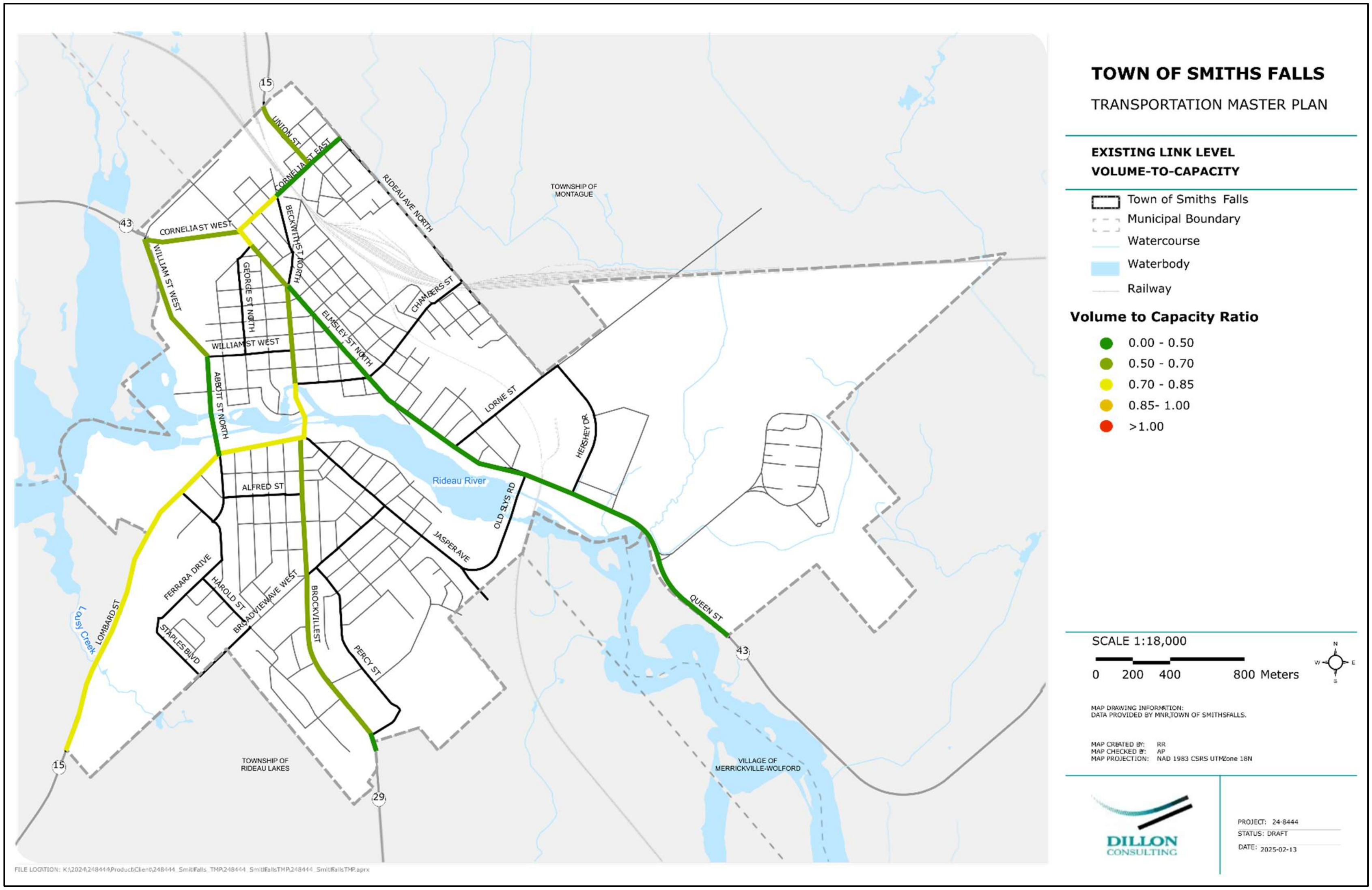
V/C Ratio	Level of Service	General Traffic Condition
0.00 – 0.25	A	Excellent to Good
0.25 – 0.50	B	Excellent to Good
0.50 – 0.70	C	Excellent to Good
0.70 – 0.85	D	Fair
0.85 – 1.00	E	Poor – Mitigation and Monitoring Required
>1.00	F	Failure – Significant Mitigation Required

Significant delays (unstable traffic flow and longer travel times) occur when traffic volume exceeds the capacity of the road (V/C ratio over 1.0), and significant mitigation is required. Moderate delays (unreliable travel times due to traffic volume approaching the capacity of the road) are seen when the V/C is between 0.85 and 1.0. Under these conditions minor mitigation is required and the situation should be monitored. It is generally accepted that the goal of most communities is to maintain LOS (A to D) on their road networks, address LOS E conditions on their roads and avoid any LOS F conditions in the long term through capacity enhancements.

The Town of Smiths Fall's existing V/C ratios during the PM peak hour is shown in **Figure 9**.

Based on the above analysis, no arterial roads are currently experiencing existing peak period delays.

Figure 9: Existing Conditions – Volume to Capacity Ratios (Links)



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3.6.3 Intersection Level of Service and Capacity Analysis

For intersections, Level of service (LOS) and capacity analysis was completed using Trafficware's Synchro 11 software, which employs the 2000 Highway Capacity Manual (HCM 2000) methodology. Signal timings were optimized where actual signal timings were not provided.

At all study area intersections, the volume-to-capacity (v/c) ratio, average vehicular delay, and level of service was noted for each movement. **Table 8** displays the LOS criteria for signalized and unsignalized intersections using the Highway Capacity Manual 2000 (HCM2000) methodology along with a general description of the corresponding traffic condition.

Table 8: Highway Capacity Manual (2000) Intersection Level of Service Criteria

Level of Service	Average Control Delay (second / vehicle)		General Traffic Condition
	Signalized Intersection	Unsignalized Intersection	
A	≤ 10	≤ 10	Excellent to Good
B	>10 and ≤ 20	> 10 and ≤ 15	Excellent to Good
C	> 20 and ≤ 35	> 15 and ≤ 25	Excellent to Good
D	> 35 and ≤ 55	> 25 and ≤ 35	Fair
E	> 55 and ≤ 80	> 35 and ≤ 50	Poor – Mitigation and Monitoring Required
F	> 80	> 50	Failure – Significant Mitigation Required

It is generally accepted that the goal of most communities is to maintain LOS A to D at their intersections, addressing and/or monitoring LOS E conditions and avoiding any LOS F conditions in the long term through intersection control upgrades and/or capacity enhancements.

At each intersection, critical movements were identified. Critical movements are defined as:

- Any through movements or shared through/turning movements operating at a v/c ratio of 0.85 or greater;
- Any exclusive movements operating at a v/c ratio exceeding 0.95; and

- Any turning movement where the calculated 95th percentile queue exceeds the available storage length.

Table 9 and **Table 10** display the results of the LOS and capacity analysis for signalized and unsignalized arterial street intersections within Smiths Falls. LOS, capacity, and delay are only given for the stop-controlled movements at unsignalized intersections. The detailed Synchro operations reports for existing conditions are compiled in **Appendix B.**

Table 9: Existing Conditions – Levels of Service and Capacities (Signalized Intersections)

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay *(s/veh)*	Queue Length *(95th %tile)*
William Street West & Cornelia Street	Eastbound left	0.01	A	8.2	1.6
	Eastbound through	0.29	B	10.2	20.8
	Eastbound right	0.09	A	8.7	6.9
	Westbound left	0.50	B	14.2	27.8
	Westbound through/right	0.37	B	11.0	26.5
	Northbound left/through	0.43	B	12.5	24.3
	Northbound right	0.12	A	8.9	7.8
	Southbound left/through/right	0.11	A	8.8	8.9
	Overall	**0.47**	**B**	**11.0**	
Elmsley Street North & Cornelia Street	Eastbound left/through	0.33	B	10.7	25.8
	Eastbound right	0.12	A	8.9	7.8
	Westbound left	0.64	B	17.8	44.5
	WB through/right	0.41	B	11.5	32.7
	Northbound left/through	0.46	B	14.5	28.7
	Northbound right	0.04	A	9.6	5.0
	Southbound left/through/right	0.17	B	10.5	13.5
	Overall	**0.55**	**B**	**12.7**	
Elmsley Street & Beckwith Street	Eastbound left	0.27	C	15.8	16.7
	Eastbound through/right	0.33	C	20.5	29.7
	Westbound left/through/right	0.20	A	22.2	13.3
	Northbound left/through/right	0.33	A	9.6	13.0
	Southbound left/through	0.30	B	8.7	20.3
	Southbound right	0.24	B	10.5	10.9
	Overall	**0.33**	**B**	**10.0**	
Chambers Street & Beckwith Street	Westbound left	0.39	B	10.7	23.3
	Westbound right	0.03	A	7.9	3.9
	Northbound through	0.66	B	16.2	49.3
	Northbound right	0.13	A	9.1	8.0
	Southbound left	0.10	B	10.4	3.8
	Southbound through	0.62	B	16.4	47.4
	Overall	**0.52**	**B**	**13.9**	
Chambers Street & Elmsley Street	Eastbound left/through	0.21	A	7.6	9.1
	Eastbound right	0.03	A	4.8	1.9
	Westbound left	0.06	A	8.5	4.5
	Westbound through/right	0.16	A	9.2	11.7
	Northbound left	0.15	A	8.3	8.3
	Northbound through/ right	0.31	A	9.3	20.7
	Southbound left	0.09	A	8.3	3.3
	Southbound through/right	0.30	B	10.0	18.6
	Overall	**0.26**	**A**	**8.8**	

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay (s/veh)	Queue Length (95th %tile)
Ferrara Drive & Lombard Street	Eastbound left	0.08	A	9.1	3.5
	Eastbound through	0.73	B	18.0	71.0
	Eastbound right	0.07	A	8.5	5.9
	Westbound left	0.62	C	23.5	29.1
	Westbound through/right	0.75	B	18.9	74.7
	Northbound left/through	0.21	A	9.8	12.8
	Northbound right	0.12	A	8.9	7.8
	Southbound left/through/right	0.06	A	8.5	5.4
	Overall	**0.48**	**B**	**16.3**	
Lombard Street & Abbott Street	Eastbound left	0.69	B	19.3	59.2
	Eastbound through/right	0.47	B	10.7	46.6
	Westbound left/ through/right	0.49	B	11.0	47.5
	Northbound left/through/right	0.11	B	14.6	11.8
	Southbound left/through	0.43	B	18.8	33.0
	Southbound right	0.27	B	16.4	15.8
	Overall	**0.59**	**B**	**14.4**	
Brockville Street & Lombard Street / Jasper Avenue	Eastbound left	0.55	C	27.5	46.7
	Eastbound through/right	0.39	C	24.1	33.3
	Westbound left/through	0.26	C	22.1	24.0
	Westbound right	0.04	B	19.7	5.0
	Northbound left	0.35	C	23.8	18.9
	Northbound through/right	0.47	C	23.3	44.4
	Southbound left	0.29	C	21.8	18.0
	Southbound through	0.58	C	25.9	56.1
	Southbound right	0.16	B	19.2	14.2
	Overall	**0.47**	**C**	**23.6**	
Old Slys Road & Queen Street	Eastbound left	0.09	A	8.7	7.7
	Eastbound right	0.03	A	8.3	4.2
	Northbound left	0.20	A	9.7	11.9
	Northbound through	0.11	A	8.8	9.1
	SB through	0.12	A	9.1	9.8
	SB right	0.06	B	11.2	5.3
	Overall	**0.14**	**A**	**9.5**	
Broadview Avenue & Brockville Street	Eastbound left	0.03	A	8.3	3.2
	Eastbound through	0.08	A	8.6	7.1
	Westbound left/through	0.11	A	8.8	8.6
	Westbound right	0.00	A	8.1	0.0
	Northbound left	0.27	B	11.2	11.5
	Northbound through/right	0.30	B	10.3	21.5
	Southbound left	0.09	A	8.8	5.8
	Southbound through/right	0.56	B	13.8	42.1
	Overall	**0.33**	**B**	**11.6**	

Based on the above signalized arterial street intersection analysis, all of the signalized arterial street intersection movements within the Town of Smiths Falls are operating at LOS C or better, with minimal delay.

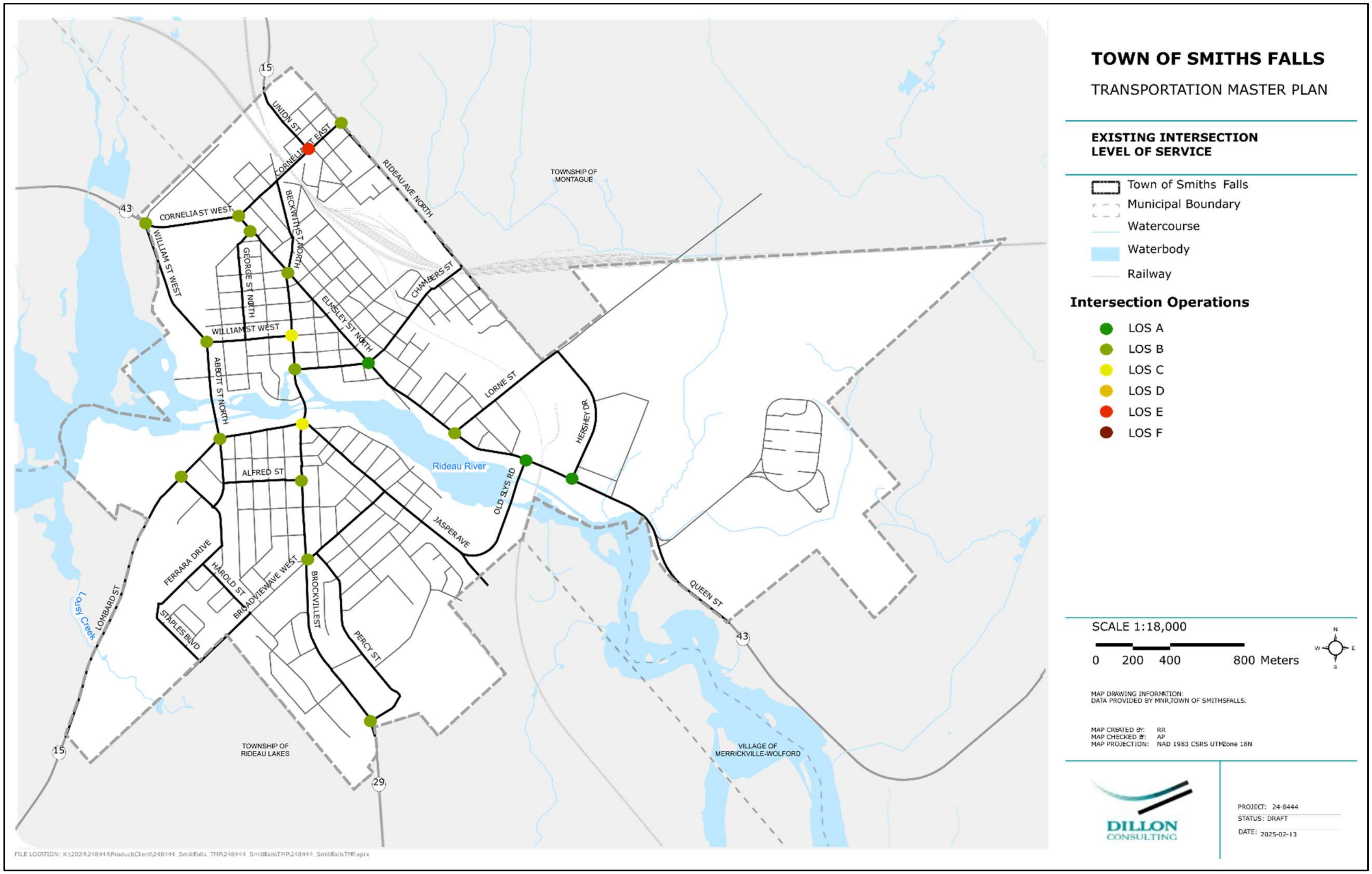
Table 10: Existing Conditions – Levels of Service and Capacities (Unsignalized Intersections)

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay *(s/veh)*	Queue Length *(95th %tile)*
Cornelia Street & Union Street	Southbound approach	0.62	E	42.7	-
Cornelia Street & Rideau Avenue North	Northbound approach Southbound approach	0.12 0.05	B B	11.2 11.7	3.0 1.1
Elmsley Street & Lansdowne Street East	Eastbound approach	0.12	B	14.5	2.9
Abbott Street & William Street West	Westbound approach	0.15	B	13.7	3.9
William Street & Beckwith Street	Eastbound approach Westbound approach	0.08 0.12	B C	14.3 16.5	1.9 3.1
Queen Street & Lorne Street	Westbound approach	0.13	B	10.4	3.3
Brockville Street & Alfred Street	Eastbound approach	0.07	B	11.6	1.8
Hershey Drive & Queen Street	Westbound approach	0.07	A	9.5	1.7
Percy Street & Brockville Street	Westbound approach	0.19	B	13.1	5.3

Based on the above unsignalized arterial street intersection analysis, the intersection of Cornelia Street and Union Street is experiencing a LOS E at the southbound approach. This intersection has been identified by the Town as a likely candidate for signalization due to its unconventional configuration/ operation. Based on the existing delays at the southbound approach and its unconventional configuration/ operation, it is recommended that the existing stop-controlled intersection be upgraded to a signalized intersection.

All remaining unsignalized intersections within Smiths Falls are operating at LOS C or better, with minimal delay. The existing intersection operations are illustrated in **Figure 10.**

Figure 10: Existing Conditions – Overall Intersection Operations



4.0 Vision and Goals

4.1 Opportunity Statement

Smiths Falls is a growing and vibrant community in Eastern Ontario. The appeal of the Smiths Falls small-town charm, combined with its regional offerings (health care, education, recreation, shopping and dining services) and its proximity to Ottawa and Kingston has resulted in recent increases in residential and commercial development, and these increases are expected to continue int the future. The 2021 population and employment are projected to increase by approximately 38% and 34% respectively by 2046[2]. The forecast growth within Smiths Falls will result in increased travel on area roadways to accommodate commuter needs, general area mobility and the movement of goods and services within and through the Town.

The TMP is being developed to serve as the road map to support and accommodate future transportation needs and mobility through the identification of infrastructure upgrades and improvements. Master Planning initiatives represent key opportunities to ensure the Town continues to evolve as an attractive residential, employment and tourist destination by managing future transportation demand and creating a vibrant setting that encourages the use of all modes of travel.

The development of a TMP is a proactive approach for the Town to plan for a future that embraces, maintains and improves the health and quality of life for current and future generations. In accordance with the transportation policies outlined in the Smiths Falls Active Transportation Plan and the Official Plan (being carried out concurrently with the TMP), the TMP will seek to create a more connected, integrated network and review options for improvements for all modes of travel within the Town.

4.2 Goals and Objectives

The primary goal of the TMP is to develop a long-range transportation strategy that allows the Town's transportation network to meet its future growth needs while making all modes as convenient and accessible as driving, by expanding the person-capacity of corridors versus automobile capacity of corridors. Key objectives that will assist in meeting the overall goal include:

1. Assess the current and planned road network to ensure future plans address and accommodate expected increases in traffic volumes, i.e., where traffic demand is expected to approach or exceed capacity;
2. Using a Complete Streets philosophy, develop a truly multi-modal network that emphasizes sustainable travel modes in an effort to reduce pollution, improve safety, enhance quality of life through active living, and reduce dependency on the automobile;
3. Improve connectivity within the Town and overcome barriers between communities and amenities;

[2] The Town of Smiths Falls Population, Housing and Employment Projections – Land Needs Analysis. June 2023.

4. Identify a prioritized list of infrastructure and capital upgrades; and
5. Implement the TMP in a fiscally sustainable and accountable manner.

4.3 Vison

Smiths Falls TMP goals and objectives are consolidated into a vision statement. The vision statement for the TMP is presented below, which represents the desired transportation future in Smiths Falls. This vision statement was used to steer the direction of the various recommendations in the TMP.

"Mobility in Smiths Falls will be safe, sustainable, and balanced, where multimodal accessibility enhances quality of life and supports growth, all while preserving Smiths Falls character and ensuring fiscal responsibility."

5.0 Planning for Growth

5.1 Population and Employment Forecast

The Town of Smiths Falls Land Needs Analysis[3] identifies growth forecasts for Smiths Falls with a projected residential population of 13,100 persons and an employment level of 7,100 jobs by 2046. Population and employment growth forecasts are summarized in **Table 11**.

Table 11: Smiths Falls Population and Employment

Year	Population (Persons)	Employment (Jobs)
2021	9,500	5,300
2046	13,100	7,100
Growth	**3,600**	**1,800**
	38%	**34%**

The population and employment forecasts for Smiths Falls indicate steady growth in the period from 2021 to 2046. The population and employment are expected to grow by approximately 38% and 34% respectively during this 25-year period.

The Land Needs Analysis and the Smiths Falls Boundary Expansion Technical Brief[4] identify that approximately 1,620 residential units will be required by 2046 to accommodate the population growth. Town staff have noted that approximately 480 units identified in the analysis have already been constructed[5]. Of the remaining 1,140 residential units to be constructed, 105 will be located at the Maple Ridge development, 160 will be located at Bellamy Farms, 520 will be located within the boundary expansion area, and 355 will be distributed throughout the Town. The locations of the planned residential developments are shown in **Figure 11.**

Of the 1,800 new jobs, 420 will be located in the new employment lands located within the Boundary Expansion area. The remaining jobs will be distributed throughout Smiths Falls with 25% of the employees coming from the new planned residential areas, and the remaining 75% coming from throughout Smiths Falls. The locations of the planned employment are shown in **Figure 11.**

[3] The Town of Smiths Falls Population, Housing and Employment Projections – Land Needs Analysis. June 2023.
[4] Smiths Falls Boundary Expansion Technical Brief. March 2025.
[5] As of July 2025.

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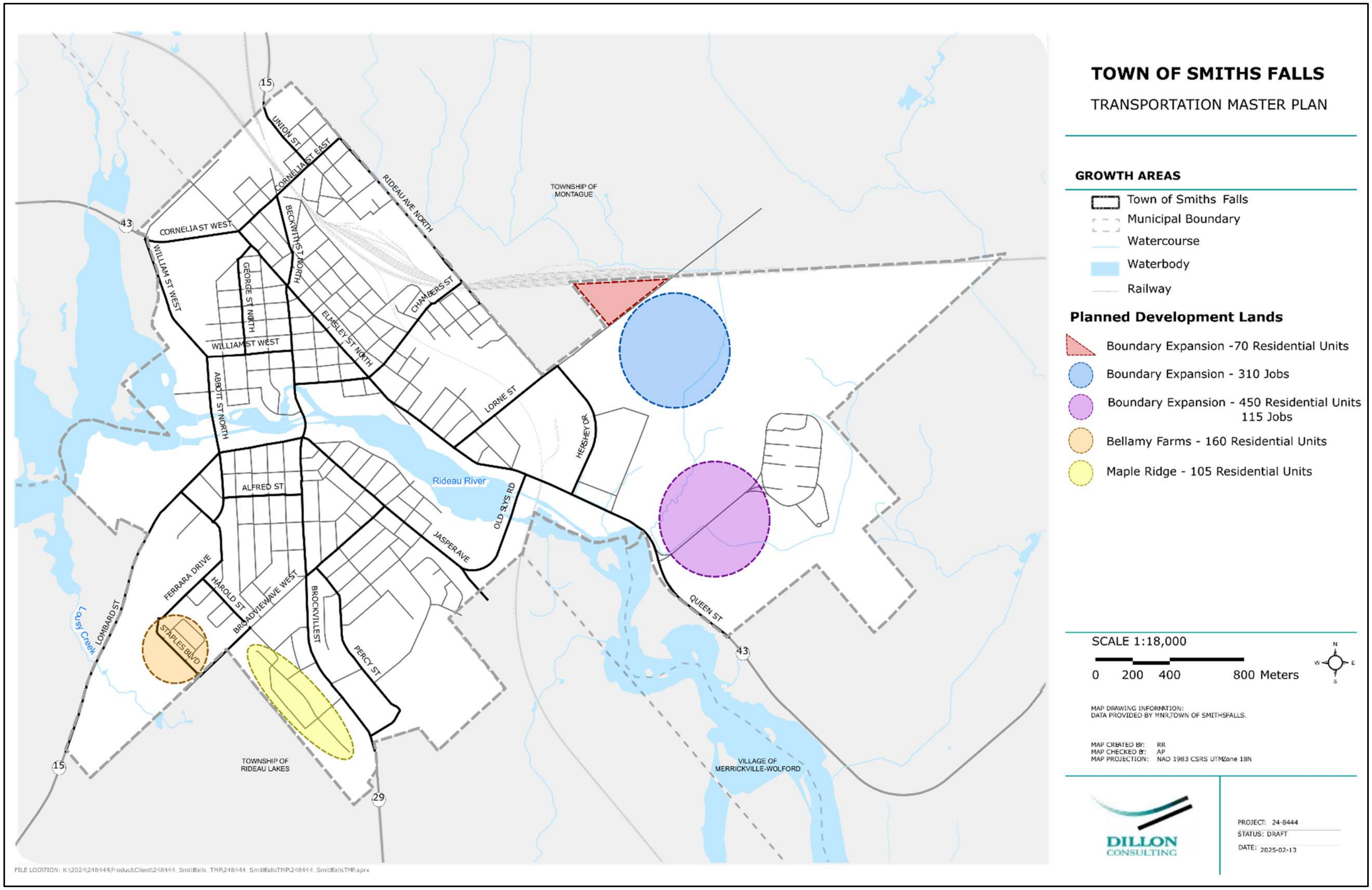
Figure 11: Planned Development Areas



5.2 Mode Share Targets

With significant development planned for Smiths Falls, attitudes towards mobility, the increasing influence of technology on commuting patterns, and the potential for shared-mobility services, are likely to create shifts in transportation mode choices within the Town. These changes in priorities and expectations are guiding increased investment in active transportation infrastructure, which aims to increase the proportion of walking and cycling. The potential for a future public transit service and the introduction of ridesharing options will also result in a shift away from the use of the single occupant vehicle.

To reflect these changing attitudes, mode share targets were targeted for the 2046 horizon year. They will serve as quantifiable goals when identifying, assessing and recommending transportation improvements in Smiths Falls. Mode shares from Statistics Canada Commuting Data (2021) were used as a baseline and future targets were identified based on anticipated mode shifts and transportation priorities, keeping in mind that travel in Smiths Falls will likely remain predominantly vehicle centric.

The mode share targets for Smiths Falls in 2046 are summarized in **Table 12**.

Table 12: Existing and Target Commuter Mode Shares

Year	Auto (Driver)	Auto (Passenger)	Walk	Cycle	Transit	Other
Existing (2021)	76%	10%	12%	<1%	0%	2%
Target (2046)	68%	11%	13%	4%	2%	2%

5.3 Road Classifications

The road classification system establishes a hierarchical structure of roadway types according to their physical and functional characteristics and the type of service they are intended to provide. As previously discussed in **Section 2.3**, the Smiths Falls Official Plan classifies all municipal roadways as arterial, collector, or residential (local) roads.

Road classifications also provide an opportunity and guidance to the municipality and residents to consider other factors relating to road operations such as:

- **Development Impacts** – changes to roadway classification due to future street connections or development.
- **Future Road Linkages** – recommend specific locations where future street linkages should be developed based on the Official Plan.

- **Complete Streets** – provides an opportunity to incorporate complete streets principles, where applicable, in alignment with corresponding policies and guidelines proposed in the Official Plan, to ensure that all users are considered in the design of new streets and roadway retrofit projects.

5.3.1 Recommended Complete Streets Standard Cross-Sections

The recommended complete streets standard cross-sections for arterial, collector, and residential (local) roads have been provided in **Appendix C**. The cross-sections represent the optimal form for each road type that reflects the complete street's philosophy.

It will be to the discretion of the municipality how future roads will be constructed, they may use the standard cross-sections presented herein directly or as a guide to develop a custom solution. However, it is the responsibility of the municipality to ensure the appropriate studies are completed that demonstrate the proposed design is safe and afforded all due considerations expected of the corridor before permitting any deviations to the recommended standard cross-sections (such as equity, a complete street, accessibility etc.). Highlights of the standard cross-sections are summarized in **Table 13**.

Table 13: Complete Streets Cross-Section Summary

Road Class	Sub Class	Right-of-Way	Highlights
Residential (Local) 2-Lanes	Urban - Residential	20 m	• Typical residential road design that can be enhanced for cyclists with pavement markings and signage, and traffic calming measures. • 3.0 m travel lanes, 2.5 m parking lane with periodic bump-outs, and sidewalks on both sides.
Collector 2-Lanes	Urban - Residential	26 m	• 3.5 m travel lanes, 2.5 m parking lane with periodic bump-outs, cycle tracks or buffered bike lanes and sidewalk on both sides.
		20 m	• 3.5 m travel lanes, 2.5 m parking lane with periodic bump-outs, separated multi-use pathway on one side, and sidewalk on one side.
	Rural - Industrial	26 m	• 3.5 m travel lanes, 2.0 m paved shoulders, and separated multi-use pathway on one side.
Arterial 2-Lanes	Urban - Residential	26 m	• 4.0 m travel lanes with separated multi-use pathway on one side, and sidewalk on one side. • Ample boulevard/ green space for landscaping and street furniture.
	Urban - Commercial		• 4.0 m travel lanes with separated multi-use pathways on both sides. • Ample boulevard/ green space for landscaping and street furniture.
Arterial 3-lanes	Urban - Residential	26 m	• 3.3 m travel lanes, 3.0 m centre turn lane, with separated multi-use pathway on both sides. • Ample boulevard/ green space for landscaping and street furniture.

6.0 Transportation Needs Identification

6.1 Traffic Demand

Future traffic demands associated with planned residential and employment growth for the 2046 horizon year were estimated using the ITE trip generation rates. These trips were distributed and assigned to the road network based on existing traffic distribution and the expected synergies between planned generators (e.g. residential to employment). The future (2046) traffic volumes as assigned to the network are summarized, and the results used to analyze traffic operations in Smiths Falls.

This process for estimating auto travel demand is described in further detail in subsequent sections.

6.1.1 Methodology and Approach

The 2046 traffic demand forecasts were developed using a typical traffic forecasting methodology. The steps taken include:

Step 1: Existing Traffic Demand
The foundation of the projections is based on existing turning movement counts, grounding the projections in reality.

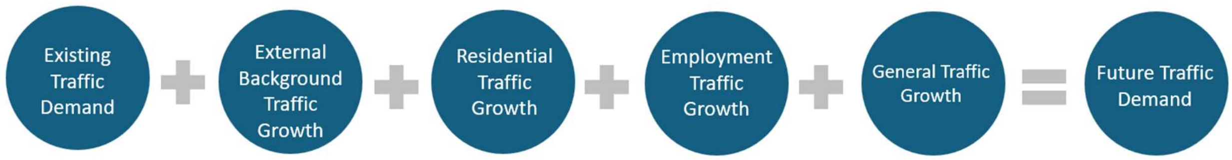
Step 2: Add in External Background Traffic Growth
A 0.5% annual growth rate was applied to the existing traffic volumes on arterial roads in the network to account for the increase in vehicle volumes from trips passing through Smiths Falls. These are external to external trips and are not related to any growth in Smiths Falls.

Step 3: Add in Residential Traffic Growth (with known locations)
Traffic generated by the 785 new residential units with known locations was calculated. Guided by Statistics Canada data, trips were distributed with 40% originating from or destined to areas outside Smiths Falls, while the remaining 60% were allocated within the town.

Step 4: Add in Employment Traffic Growth (with known locations)
Traffic generated by the 420 jobs in the new employment lands in the boundary expansion area was calculated. To prevent double counting, trips associated with the new residential areas were excluded.

Step 5: Add in General Development Growth
To consider the growth of 1,380 jobs and 355 residential units located throughout the Town in currently unknown locations, a general growth rate was applied. A 0.75% annual growth in vehicle volumes was calculated to reflect this development related growth.

Step 6: Sum the Above Values to Estimate Future Traffic Demand (2046)



6.1.1.1 Trip Generation

Future trip generation forecasts were derived from development forecast data provided in the Smiths Falls Land Needs Analysis. This data provides estimates on the number of units and type of residential developments anticipated developments within Smiths Falls, as well as the number of new jobs, which sector they will likely belong to, and the number of jobs anticipated on the new employment lands.

Vehicular trip generation for both housing and employment growth was calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. The trip generation rates were chosen based on the employment types identified in the Land Needs Analysis. Given the general nature of these estimates, the most broadly applicable ITE rates were utilized. Detailed trip generation calculations are provided in **Appendix D**.

6.1.1.2 Trip Distribution

The distribution of trips was determined using data from the "2021 Census Place of Work Data" sourced from the Statistics Canada website, complemented by professional judgment regarding the developed areas of Smiths Falls. This data facilitated the creation of an origin-destination matrix, illustrating travel patterns both within Smiths Falls and extending beyond its boundaries. These travel patterns were then used to calculate trip distribution factors, which were applied to the trip generation figures for the new residential and employment areas to estimate the PM peak hour traffic volume growth. The trip distribution methodology is detailed in **Appendix D**.

6.1.1.3 Trip Assignment

Future PM peak hour trips were manually assigned to the Smiths Falls Road network based on a review of the most direct, and time-efficient route available between the various zones. This assignment considered the projected growth in population and employment, ensuring that the transportation network can accommodate increased travel demand efficiently. Trip assignment is illustrated in **Appendix D**.

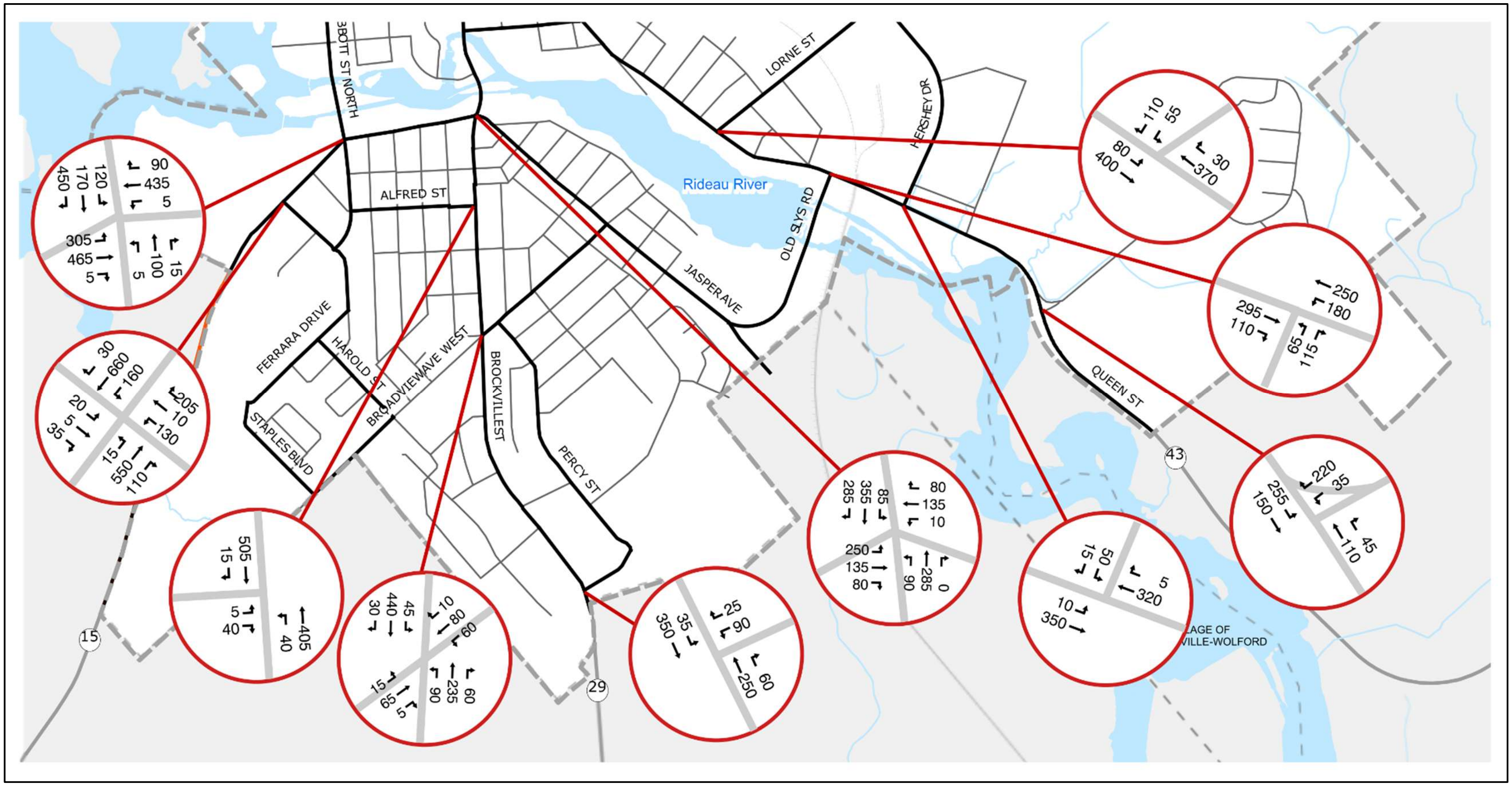
6.2 Road Network Performance

6.2.1 Traffic Volumes and Travel Demands

The projected 2046 PM peak hour traffic volumes are illustrated in **Figure 12** and **Figure 13** at the arterial street intersections within the Town of Smiths Falls, rounded to the nearest 5 vehicles. The peak hour counts were balanced where appropriate.

Figure 12: 2046 Traffic Volumes – PM Peak Hour (North)

Figure 13: 2046 Traffic Volumes – PM Peak Hour (South)



6.2.2 Link Level Capacity Analysis

A capacity analysis was completed using forecast future traffic demands to identify capacity constraints and any roadway improvements required to support the planned population and employment growth.

The capacity analysis of the arterial roads was completed based upon the industry accepted planning capacities of:

- 700 vehicles per hour per lane for arterial roads in an urban condition; and
- 850 vehicles per hour per lane for arterial roads in an urban condition with left turn lanes or a centre two lane left turn lane.

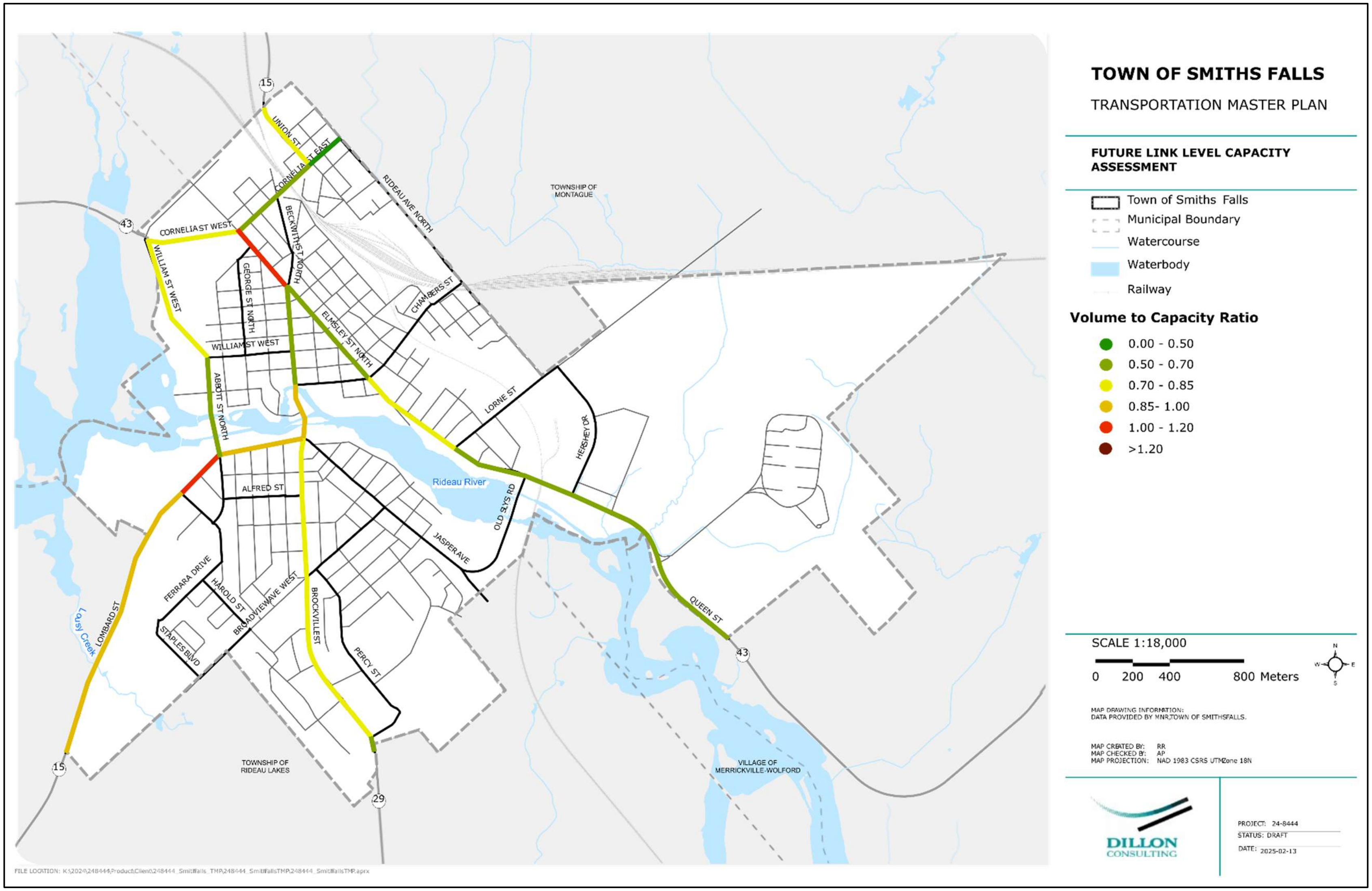
Section 3.6.2, displays the link level thresholds for peak hour V/C ratios and the LOS with a general description of the corresponding traffic condition. Typically, a peak hour V/C ratio of 0.85 (or higher) suggests that the corridor is experiencing some form of congestion and that some form of mitigation is required. However, when it comes to network and corridor level planning decisions (i.e., building additional roads or adding vehicle lanes to accommodate future traffic growth) should be determined using the 'peak period' analysis period. This ensures that roadways are fully utilized for the duration of the peak period (typically 2.5 to 3 hours) before new roadway capacity is considered. However, given that most traffic engineering calculation methods are based on the peak hour volume, a modified peak hour V/C ratio of 1.20 should be used in the calculations. The modified peak hour V/C ratio represents the excess roadway capacity in the shoulders of the peak hour. Therefore, when it comes to identifying future infrastructure requirements such as building additional roads or adding vehicle lanes to accommodate future traffic growth, a peak hour V/C ratio of 1.20 is considered to be more appropriate[6].

Results of the PM peak hour link level capacity analysis are identified in **Figure 14**. The following corridors are anticipated to exceed a peak hour V/C ratio of 0.85 by 2046.

- **Elmsley Street** – Between Cornelia Street and Beckwith Street is expected to operate at capacity (V/C Ratio = 1.07) in the southbound direction during the PM peak hour.
- **Lombard Street** – From the Ferrara Drive to Abbott Street is anticipated to operate at capacity (V/C Ratio = 1.04) in the westbound direction and near capacity (V/C Ratio = 0.91) in the eastbound direction. From the west boundary to Ferrara Drive and from Abbott Street to Beckwith Street, the westbound direction is expected to be nearing capacity (V/C Ratio = 0.97 and 0.85 respectively).
- **Beckwith Street** – Between Chambers Street and Lombard Street is anticipated to be nearing capacity (V/C Ratio = 0.86) in the southbound direction during the PM Peak hour.

[6] City of Ottawa, Sizing Roadway Infrastructure for the Urban Environment, 2016.

Figure 14: 2046 Conditions – Volume to Capacity Ratios (Links)



As a result of the forecasted peak hour V/C ratios being greater than 0.85 but less than 1.20 by 2046, monitoring and mitigation of these links are required, however adding additional vehicle lanes (i.e., road widening) is not anticipated.

6.2.3 Intersection Level of Service and Capacity Analysis

Intersections were analysed using the methodology described in **Section 3.6.3**. It is generally accepted that the goal of most communities is to maintain LOS A to D at their intersections, addressing and/or monitoring LOS E conditions and avoiding any LOS F conditions in the long term through intersection control upgrades and/or capacity enhancements.

At each intersection, critical movements were identified. Critical movements are defined as:

- Any through movements or shared through/turning movements operating at a v/c ratio of 0.85 or greater;
- Any exclusive movements operating at a v/c ratio exceeding 0.95; and
- Any turning movement where the calculated 95th percentile queue exceeds the available storage length.

Table 14 and **Table 15** display the results of the LOS and capacity analysis for signalized and unsignalized arterial street intersections within Smiths Falls. LOS, capacity, and delay are only given for the stop-controlled movements at unsignalized intersections. The detailed Synchro operations report for 2046 conditions are compiled in **Appendix E.**

Table 14: 2046 Conditions – Levels of Service and Capacities (Signalized Intersections)

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay *(s/veh)*	Queue Length *(95th %tile)*
William Street West & Cornelia Street	Eastbound left	0.01	A	8.0	1.7
	Eastbound through	0.30	B	10.2	26.9
	Eastbound right	0.11	A	8.6	7.4
	Westbound left	0.67	B	18.4	52.3
	Westbound through/right	0.43	B	11.5	38.8
	Northbound left/through	0.56	B	18.4	39.7
	Northbound right	0.16	B	12.1	11.0
	Southbound left/through/right	0.15	B	12.0	12.9
	Overall	**0.62**	**B**	**13.5**	

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay *(s/veh)*	Queue Length *(95th %tile)*
Elmsley Street North & Cornelia Street	Eastbound left/through	0.66	C	22.6	46.9
	Eastbound right	0.16	B	16.5	12.8
	Westbound left	0.96	D	45.2	75.1
	WB through/right	0.48	B	10.3	44.6
	Northbound left/through	0.83	C	33.7	77.3
	Northbound right	0.08	B	12.2	8.8
	Southbound left/through/right	0.37	B	15.3	33.3
	Overall	**0.97**	**C**	**24.6**	
Elmsley Street & Beckwith Street	Eastbound left	0.40	B	14.9	17.7
	Eastbound through/right	0.58	B	17.0	30.5
	Westbound left/through/right	0.39	B	14.7	19.3
	Northbound left/through/right	0.53	A	9.4	48.1
	Southbound left/through	0.45	A	8.1	42.0
	Southbound right	0.31	A	7.0	11.4
	Overall	**0.55**	**B**	**10.5**	
Chambers Street & Beckwith Street	Westbound left	0.52	B	16.1	37.0
	Westbound right	0.04	B	10.5	5.1
	Northbound through	0.72	B	16.9	69.9
	Northbound right	0.16	A	8.5	8.4
	Southbound left	0.14	A	8.9	5.6
	Southbound through	0.69	B	16.0	61.6
	Overall	**0.63**	**B**	**14.9**	
Chambers Street & Elmsley Street	Eastbound left/through	0.25	B	14.7	20.5
	Eastbound right	0.04	B	12.8	6.1
	Westbound left	0.09	B	13.2	7.0
	Westbound through/right	0.22	B	14.4	18.5
	Northbound left	0.24	A	9.2	11.5
	Northbound through/ right	0.50	B	10.8	45.9
	Southbound left	0.11	A	7.6	6.1
	Southbound through/right	0.53	B	11.4	49.9
	Overall	**0.42**	**B**	**11.7**	
Ferrara Drive & Lombard Street	Eastbound left	0.07	A	7.1	3.2
	Eastbound through	0.62	B	12.6	69.4
	Eastbound right	0.08	A	6.8	5.6
	Westbound left	0.58	B	17.0	32.8
	Westbound through/right	0.73	B	15.3	88.7
	Northbound left/through	0.40	B	19.5	27.0
	Northbound right	0.15	B	15.7	12.4
	Southbound left/through/right	0.09	B	15.1	9.2
	Overall	**0.61**	**B**	**14.4**	

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay (s/veh)	Queue Length (95th %tile)
Lombard Street & Abbott Street	Eastbound left	0.78	C	25.5	48.3
	Eastbound through/right	0.49	B	10.9	62.3
	Westbound left/ through/right	0.85	C	33.8	138.0
	Northbound left/through/right	0.25	C	22.7	27.1
	Southbound left/through	0.75	D	37.4	80.3
	Southbound right	0.53	B	19.9	59.1
	Overall	**0.81**	**C**	**24.7**	
Brockville Street & Lombard Street / Jasper Avenue	Eastbound left	0.59	B	15.9	34.2
	Eastbound through/right	0.28	B	10.2	18.5
	Westbound left/through	0.23	A	9.7	16.7
	Westbound right	0.06	A	8.5	5.5
	Northbound left	0.31	B	14.7	14.9
	Northbound through/right	0.44	B	14.3	35.3
	Southbound left	0.24	B	10.5	12.0
	Southbound through	0.55	B	13.4	41.1
	Southbound right	0.21	A	9.6	10.4
	Overall	**0.57**	**B**	**12.3**	
Old Slys Road & Queen Street	Eastbound left	0.14	B	15.5	13.3
	Eastbound right	0.08	B	15.1	9.4
	Northbound left	0.38	B	10.0	23.7
	Northbound through	0.28	A	8.2	26.2
	Southbound through	0.34	A	8.6	31.1
	Southbound right	0.08	A	6.8	5.6
	Overall	**0.29**	**A**	**9.7**	
Broadview Avenue & Brockville Street	Eastbound left	0.03	A	8.3	3.2
	Eastbound through	0.10	A	8.7	8.7
	Westbound left/through	0.25	A	10.0	16.6
	Westbound Right	0.01	A	8.1	0.8
	Northbound left	0.45	B	16.3	16.2
	Northbound through/right	0.44	B	11.8	30.8
	Southbound left	0.13	B	14.8	7.6
	Southbound through/right	0.72	C	22.7	69.4
	Overall	**0.48**	**B**	**16.3**	

Based on the above signalized arterial street intersection analysis, all of the signalized arterial street intersections within the Town of Smiths Falls are operating at an overall LOS C or better. However, the following movements are deemed critical as they are expected to experience peak hour volume to capacity ratios at or above desired levels and/or have a calculated 95th percentile queue that exceeds the available storage length:

- Elmsley Street North & Cornelia Street – Westbound left (V/C Ratio = 0.96);
- Lombard Street & Abbott Street – Westbound approach (V/C Ratio = 0.85); and
- Lombard Street & Abbott Street – Southbound right (95th percentile queue length – 59.1 m – exceed storage length).

Table 15: 2046 Conditions – Levels of Service and Capacities (Unsignalized Intersections)

Intersection	Movement	PM			
		V/C Ratio	LOS	Delay *(s/veh)*	Queue Length *(95th %tile)*
Cornelia Street & Rideau Avenue North	Northbound approach Southbound approach	0.14 0.06	B B	11.9 12.5	3.8 1.5
Union Street & Cornelia Street	Southbound approach	0.52	F	52.3	16.6
Elmsley Street & Lansdowne Street East	Eastbound approach	0.23	D	26.7	6.5
Abbott Street & William Street West	Westbound approach	0.27	C	18.7	8.0
William Street & Beckwith Street	Eastbound approach Westbound approach	0.15 0.31	C D	21.4 31.9	3.9 9.6
Queen Street & Lorne Street	Westbound approach	0.44	C	20.3	16.4
Brockville Street & Alfred Street	Eastbound approach	0.10	B	13.5	2.6
Hershey Drive & Queen Street	Westbound approach	0.17	C	15.2	4.5
Percy Street & Brockville Street	Westbound approach	0.29	C	16.8	9.1
Rideau Regional Road & Queen Street	Westbound approach	0.26	B	11.5	7.7

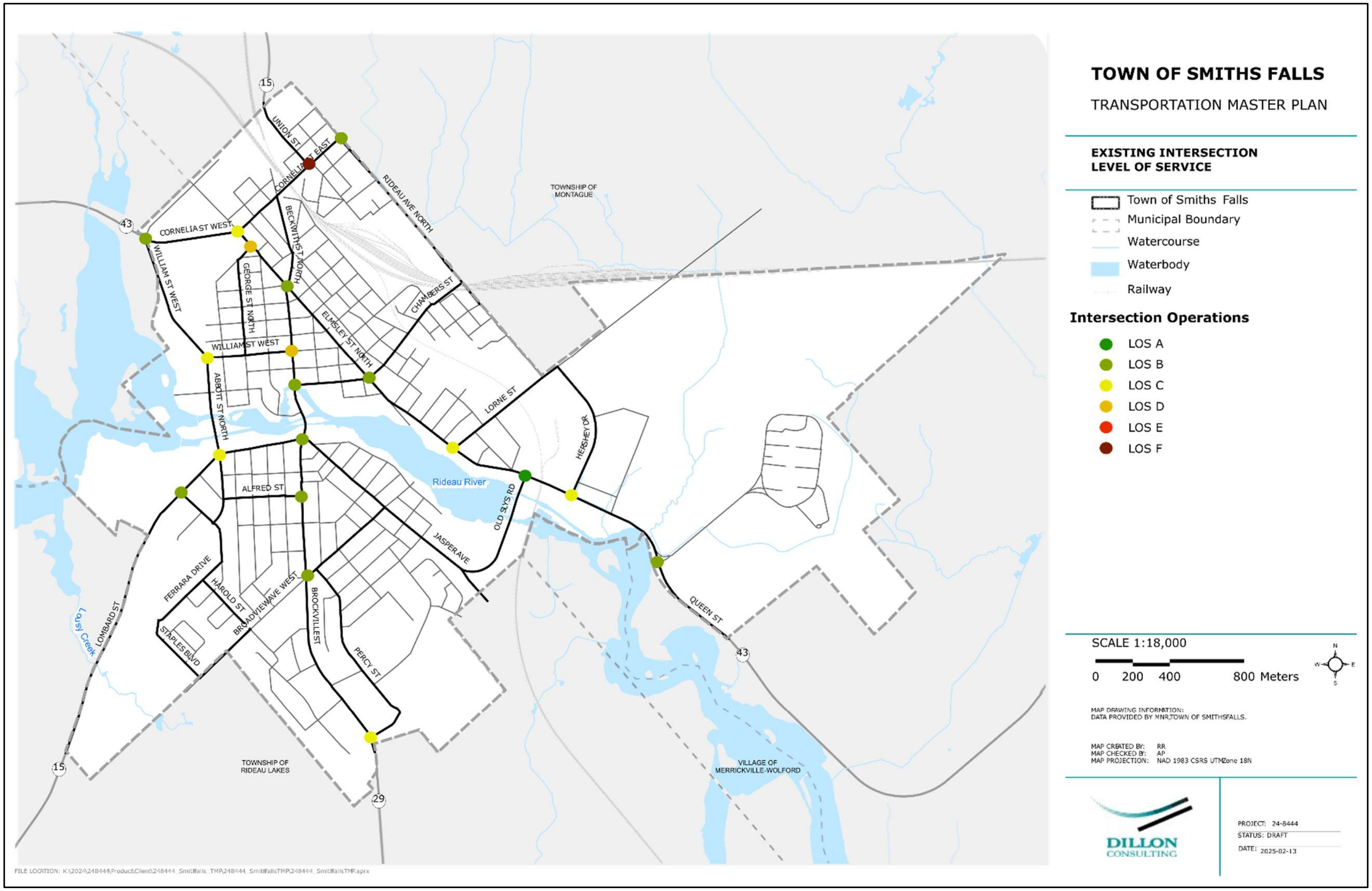
Based on the above unsignalized arterial street intersection analysis, the intersection of Cornelia Street and Union Street is expected to operate poorly. This intersection has been identified by the Town as a likely candidate for signalization due to its unconventional configuration/ operation. As previously identified in the Existing and Planned Conditions Section, existing delays at the southbound approach and its unconventional configuration/ operation, it is recommended that the existing stop-controlled intersection be upgraded to a signalized intersection. The requirement for traffic signal control was assessed using 'Justification 1 – Minimum Vehicle Volume' from the Ontario Traffic Manual (OTM) signal warrant guidelines[7]. The analysis indicates that signals are currently warranted at the intersection of Cornelia Street and Union Street. The signal warrant analysis worksheets can be found in **Appendix F.**

All remaining unsignalized intersections within Smiths Falls are operating at LOS D or better.

The 2046 overall intersection operations are illustrated in **Figure 15.**

[7] Ontario Traffic Manual Book 12 – Traffic Signals, March 2012.

Figure 15: 2046 Conditions – Overall Intersection Operations



6.3 Active Transportation Network

Planned active transportation improvements were identified in the Smiths Falls Active Transportation Plan. The feasibility of implementing the proposed on-street facilities has been assessed based on the available Right of Way (ROW) widths and the existing road network configuration.

Arterial Roads:
The preferred right of way (ideal cross section width) for arterial roads is 26 meters, although few existing arterial roads meet this specification. In cases where the right of way is less than 26 metres, cycling facilities can still be accommodated, however width reductions and trade-offs will be required.

Collector Roads:
The preferred right of way for collector roads ranges between 20 meters (residential collectors) and 26 meters (industrial / business park collectors). A 20-meter right of way can generally accommodate active transportation facilities, but trade-offs may be necessary.

The proposed facilities and their respective ROW widths are summarized in **Table 16**. The table breaks down the proposed facilities into 4 categories:

Preferred Width: The existing ROW meets or exceeds the preferred width. The proposed AT facilities will fit within the available ROW.

Proposed Facilities Will Fit: Existing ROW is less than the preferred width, however, the proposed AT facilities fit within the existing ROW. A reduction in the ideal boulevard/green space is required. A minimum boulevard/green space width of 2m (1m per side) is provided to accommodate utility poles and signage. Additional elements such as sidewalks or parking lanes, that are not currently a part of the cross section, may not fit.

Requires Minor Adjustment: The proposed AT facilities can fit within the existing ROW, however tradeoff and/or width reductions to infrastructure are necessary. A minimum boulevard/green space width of 2m (1m per side) to accommodate utility poles and signage cannot be provided over the entire segment, typically, where turn lanes are located.

Requires Significant Adjustment: The proposed AT facilities do not fit within the available ROW, necessitating either a change in facility type or acquisition of additional property.

Table 16 and **Figure 16** provide a summary of the planned on-road Active Transportation facilities (identified in the Smiths Falls Active Transportation Plan) and an assessment of the required concessions to cross-section elements to fit within the available right-of-way. The following active transportation improvements will require adjustments to their planned cross-section elements:

- Old Slys Road from Rideau River bridge to Queen Street
- Cornelia Street from Beckwith Street to Union Street
- Lombard Street from Abbott Street to Alfred Street
- Lombard Street from Abbott Street to Brockville Street/ Beckwith Street
- Cornelia Street from William Street to Elmsley Street
- Cornelia Street from Elmsley Street to Beckwith Street
- Brockville Street from Town Boundary to Lombard Street
- Beckwith Street from Lombard Street to Chambers Street
- Elmsley Street/ Queen Street from Cornelia Street to Old Slys Road

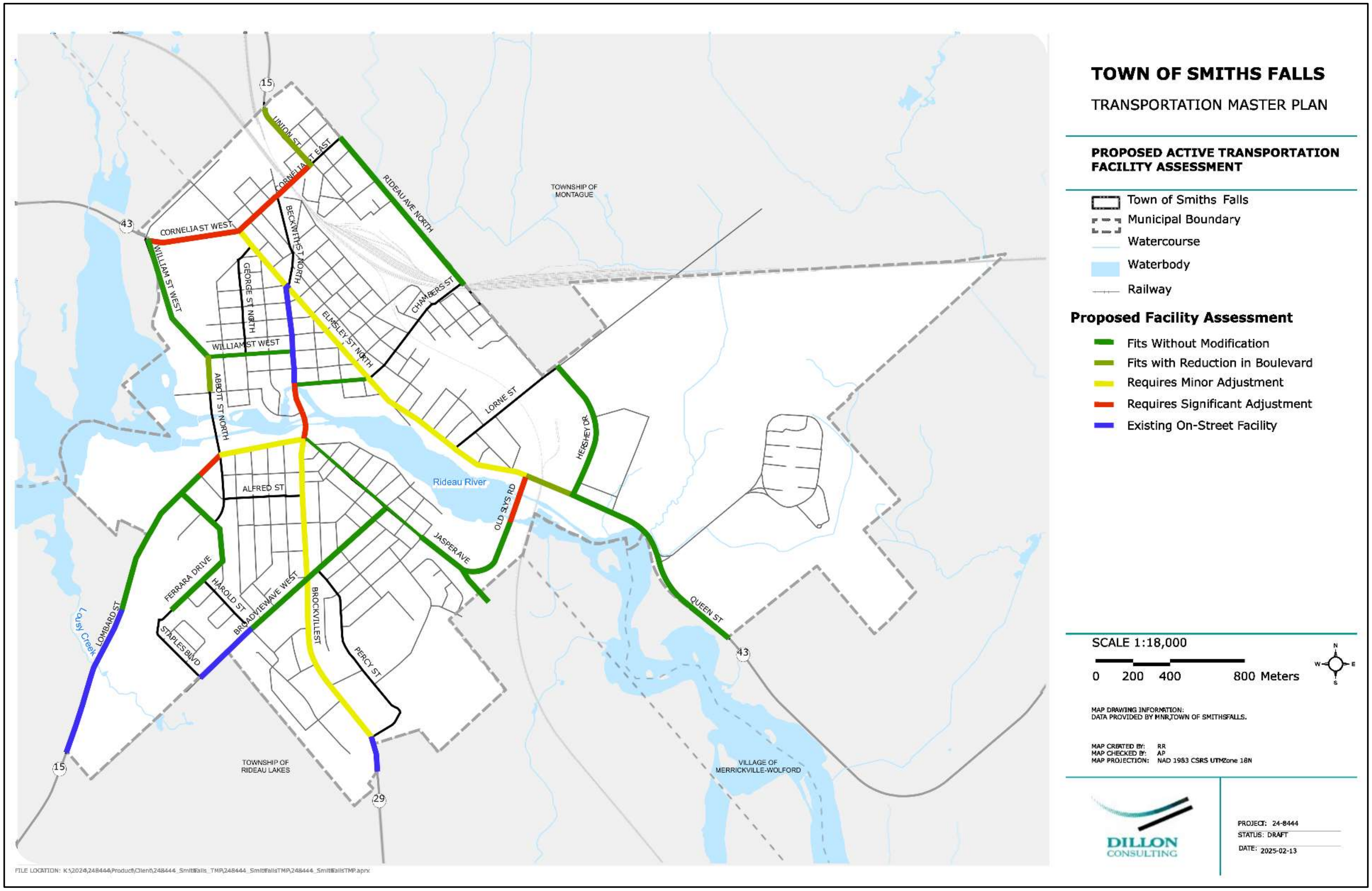
Table 16: Planned Active Transportation Improvements

Road Segment	Classification & Cross Section Type	Length	Existing Cross Section Elements	Planned AT Facility Type & Required Width	Preferred ROW	Available ROW	Assessment & Concession
William Street from Cornelia Street to Abbott Street	Arterial (Rural)	775m	2 travel lanes, gravel shoulders	Buffered paved shoulders (no additional space required)	26m	15.24m	Facilities will fit
Hershey Drive from Queen Street to Lorne Street	Collector (Rural)	820m	2 travel lanes, gravel shoulders	Buffered paved shoulders (no additional space required)	20m	20.11m	Preferred width
Queen Street from Hershey Drive to Town Boundary	Arterial (Rural)	1,250m	2 travel lanes, gravel shoulders	Buffered paved shoulders (no additional space required)	26m	15.24m	Facilities will fit
Union Street from Cornelia Street to Town Boundary	Arterial (Urban)	450m	2 travel lanes, centre turn lane, 1 sidewalk	Cycle tracks (3m)	26m	20.11m	Facilities will fit
Rideau Avenue from Chambers Street to Stephen Street	Collector (Rural)	750m	2 travel lanes, gravel shoulders	Paved shoulders (no additional space required)	20m	18.29m	Facilities will fit
Jasper Avenue from Vincent Street to Town boundary	Collector (Rural)	520m	2 travel lanes, gravel shoulders	Paved shoulders (no additional space required)	20m	15.24m	Facilities will fit
Old Slys Road from Jasper Avenue to Rideau River bridge.	Collector (Rural)	265m	2 travel lanes, gravel shoulders	Paved shoulders (no additional space required)	20m	20.11m	Preferred width
Old Slys Road from Rideau River bridge to Queen Street	Collector (Bridge)	440m	2 travel lanes, intermittent sidewalk, gravel shoulder	Cycle Tracks (3m)	20m	15.24m	Requires significant adjustment
Cornelia Street from Beckwith Street to Union Street	Arterial (Urban)	230m	4 travel lanes, sidewalks	Cycle Tracks (3m)	26m	20.11m	Requires significant adjustment
Lombard Street from Abbott Street to Alfred Street	Arterial (Urban)	160m	2 travel lanes, centre turn lane, sidewalks	Cycle Tracks (3m)	26m	18.29m	Requires significant adjustment

Road Segment	Classification & Cross Section Type	Length	Existing Cross Section Elements	Planned AT Facility Type & Required Width	Preferred ROW	Available ROW	Assessment & Concession
Lombard Street from Alfred Street to Valley Butcher Shop	Arterial (Urban)	1,000m	4 travel lanes, sidewalks	Cycle Tracks (3m)	26m	26.2m	Preferred width
Ferrara Drive from Abbott Street to Lombard Street	Collector (Urban)	250m	4 travel lanes, 1 sidewalk	Cycle Tracks (3m)	20m	26.00m	Preferred width
Ferrara Drive from Abbott Street to Bellamy Drive	Collector (Urban)	560m	2 travel lanes, sidewalks	Bike Lanes (3m)	20m	26.00m	Preferred width
Lombard Street from Abbott Street to Brockville Street/ Beckwith Street	Arterial (Urban)	480m	2 travel lanes, sidewalks	Bike Lanes (3m)	26m	15.24m	Requires minor adjustment
Broadview Avenue from Harold Street to Jasper Avenue	Collector (Urban)	1,030m	2 travel lanes, 1 sidewalk	Bike Lanes (3m)	20m	20.11m	Preferred width
Jasper Avenue from Abbott Street to Vincent Street	Collector (Urban)	1,090m	2 travel lanes, sidewalks	Bike Lanes (3m)	20m	20.11m	Preferred width
Cornelia Street from William Street to Elmsley Street	Arterial (Urban)	520m	2 travel lanes, centre turning lane, sidewalks	Bike Lanes (3m)	26m	15.24m	Requires significant adjustment
Cornelia Street from Elmsley Street to Beckwith Street	Arterial (Urban)	300m	4 travel lanes, sidewalks	Bike Lanes (3m)	26m	20.11	Requires significant adjustment
William Street from Abbott Street to Beckwith Street	Collector (Urban)	475m	2 travel lanes, sidewalks	Bike Lanes (3m)	20m	20.11m	Preferred width
Chambers Street from Beckwith Street to Elmsley Street	Collector (Urban)	420m	2 travel lanes, 2 parking lanes, sidewalks	Bike Lanes (3m)	20m	20.11m	Preferred width
Abbott Street from William Street to Strathcona Street	Arterial (Urban)	230m	2 travel lanes, 1 sidewalk	Buffered Bike Lanes (4m)	26m	20.11m	Facilities will fit

Road Segment	Classification & Cross Section Type	Length	Existing Cross Section Elements	Planned AT Facility Type & Required Width	Preferred ROW	Available ROW	Assessment & Concession
Brockville Street from Town Boundary to Lombard Street	Arterial (Urban)	1,900m	2 travel lanes, sidewalks	Buffered Bike Lanes (4m)	26m	20.11m	Requires minor adjustment
Beckwith Street from Lombard Street to Chambers Street	Arterial (Bridge)	295m	4 travel lanes, sidewalks	Buffered Bike Lanes (4m)	26m	20.11m	Requires significant adjustment
Elmsley Street/ Queen Street from Cornelia Street to Old Slys Road	Arterial (Urban)	2,190m	2 travel lanes, sidewalks	Buffered Bike Lanes (4m)	26m	20.11m	Requires minor adjustment

Figure 16: Proposed On-Street Active Transportation Facility Assessment



7.0 Problem Identification

Identification of the problem or opportunity is Phase 1 of the Municipal Class EA process. This was done in the TMP by carrying out an assessment of future transportation requirements based primarily on transportation deficiencies and needs identified in **Sections 6.2** above, and areas with planned development identified and described previously in **Section 5.0**. Identified needs were compiled and arranged into four categories: strategic capacity, local improvements, connectivity, and active transportation, described below.

- **Strategic Capacity:** Is there enough lane capacity to meet future needs?
- **Local Improvements:** Are there intersections that create local bottlenecks?
- **Connectivity:** Will new development areas be well connected to the existing transportation network?
- **Active Transportation:** Can the proposed active transportation facilities be accommodated within the existing ROW?

7.1 Problem and Opportunity Statement

Based on the Vision of the TMP, community needs, and network constraints (as identified in the preceding sections of this report), the following problems and opportunities have been identified:

Problems:

1. Future (2046) capacity constraints on portions of Elmsley Street, Lombard Street, and Beckwith Street.
2. Intersection level operational concerns at; Union St & Cornelia St, Elmsley Street North & Cornelia Street, Lombard Street & Abbott Street, and Beckwith Street/ Montague Street/ Ogden Avenue/ Mylne Street.
3. Connectivity issues related to existing and planned developments.
4. ROW concerns relating to the implementation of active transportation facilities on portions of Cornelia Street, Lombard Street, Elmsley Street, Queen Street, Old Slys Road, Beckwith Street and Brockville Street.

Opportunities:

1. Transportation Demand Management (TDM) – Manage travel demand (e.g., cost; travel behaviour, including mode choice; and land use, density and location).
2. Transportation Systems Management (TSM) – Manage the transportation infrastructure to optimize efficiency and safety for all modes (i.e., provide space and operating environment for all modes).
3. Infrastructure Enhancements – Increase the supply of transportation infrastructure (i.e., expand existing and add new facilities).

8.0 Alternative Solutions

Phase 2 of the Municipal Class EA process is the identification of alternative solutions to address the problems identified. An assessment was undertaken to develop potential solutions that may resolve the transportation issues identified in **Section 7.0**. In accordance with the TMP's Vision, for mobility in Smiths Falls to be safe, sustainable, and balanced, solutions that may reduce motor vehicle volumes and/or promote Active Transportation were considered first. The transportation solutions being considered are outlined in the following sections.

8.1 'Do Nothing'

The base case for any alternative is the 'Do Nothing' scenario. This quantifies the comparison of potential solutions to forecasted conditions if no change were to be implemented by the 2046 horizon year.

The 'Do Nothing' scenario is not generally considered a viable alternative for addressing future transportation needs. It offers some environmental and cost-saving benefits compared to other alternative solutions, but a road network with unaddressed transportation issues does not support community growth or character. It may also create negative environmental impacts related to traffic congestion, social impacts related to noise and shortcutting on residential streets, and safety concerns.

8.2 Alternative Transportation Strategies

8.2.1 Transportation Demand Management

Transportation Demand Management (TDM) is a strategic approach to transportation policies, programs, services and products that influence how, why, when, and where people travel to create a more sustainable transportation network. The objectives are to encourage individuals to:

- utilize alternate modes of transportation (walk, cycle, take transit or carpool instead of driving alone);
- travel less (telework, link several purposes in one trip); or
- change trip times or routes (choose off-peak hours or less congested roads).

Commonly used TDM measures include:

- Implement an integrated network of active transportation facilities and supporting policies and programs to promote active modes;
- Improve public transit service options to promote transit as a preferred travel mode;
- Hold promotion campaigns to encourage alternative modes of transportation such as active transportation modes and carpooling as a choice;
- Create incentive programs to encourage residents to use alternate modes;

- Offer ridesharing options;
- Work with local employers to encourage flexible work hours and working from home; and
- Encourage mixed land-use development to shorten commuter trips.

Despite their range of benefits, TDM measures alone are not likely to create a reduction in traffic volumes significant enough to resolve the capacity issues in Smiths Falls. They also do not necessarily address other transportation needs such as connectivity or localized issues. The Town should consider implementing TDM measures for their livability and environmental benefits, but the measures alone are not considered a solution to identified transportation issues.

8.2.2 Transportation System Management

Transportation Systems Management (TSM) is a set of techniques used to increase the capacity / improve the performance of a piece of transportation infrastructure, while maximizing the safety and mobility of people and goods without increasing its physical size.

In the context of the Smiths Falls TMP this would include re-allocating / providing space and amenities within transportation corridors to safely separate and control active modes of transportation, as well as implementing operational improvements along corridors to optimize efficiency. Examples of transportation system management include: providing auxiliary lanes at key intersections, signalizing intersections to improve flow, coordinating traffic signal control along a corridor during critical time periods to benefit peak flows, or compromising on the presence and/or width of certain cross section elements in order to accommodate a cycling facility.

8.2.3 Infrastructure Enhancements

Infrastructure Enhancements would address travel demands on the Town's road network by enhancing the carrying capacity of the network through strategic road widenings and the addition of new arterial or collector roads. The main benefit of this strategy would be the ability to maintain an acceptable and efficient automobile Level-of-Service on Smiths Falls roads over the next 20 years.

8.3 Problem Area Alternatives

8.3.1 Strategic Capacity

8.3.1.1 SC-1 Elmsley Street - Cornelia Street to Beckwith Street

Problem

Elmsley Street between Cornelia Street and Beckwith Street is forecast to experience significant growth in traffic, partially as a result of the developments planned for the Boundary Expansion area. During the PM peak hour, southbound vehicle trips are anticipated to exceed capacity by 7% (V/C ratio of 1.07).

This will result in long queues and delays. The northbound traffic volumes on Elmsley Street are not forecast to exceed capacity, but some sections come very close to reaching capacity.

Alternatives

Alternative 1 - Do Nothing: Maintain the existing lane and intersection configuration along the corridor.

Alternative 2 - Transportation Demand Management: Construct the planned cycling facilities (buffered bike lanes) along Elmsley Street. Dedicate cycling space would provide an excellent opportunity for increased cycling mode share in the Elmsley Street corridor.

Implement town wide policies and programs to promote active modes:

- Create incentive programs to encourage residents to use alternate modes;
- Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.

Alternative 3 - **Transportation System Management**: Elmsley Street between Cornelia Street and Beckwith Street is an attractive road for travel as it connects to Downtown and is one of only two major north south roads in the north end of the Town. With signalized intersections at Cornelia Street and Beckwith Street very little more than can be done from a TSM perspective. The best TSM option is to prohibit peak period, peak direction (AM – northbound and PM – southbound) left turns from Elmsley Street onto local streets where left turn storage is not provided. This would include prohibiting left turns from Elmsley Street, onto Cameron Street and Mylne Street during the PM peak period, and onto Maple Avenue, Cowan Street and Lansdowne Street during the AM peak period.

Alternative 4 - Infrastructure Enhancement: Elmsley Street between Cornelia Street and Beckwith Street currently provides a two-lane cross section. Widening Elmsley Street (to four lanes) would provide the additional road capacity to accommodate the forecasted vehicle volumes.

8.3.1.2 SC-2 Lombard Street - Town Boundary to Brockville Street/ Beckwith Street

Problem

Lombard Street between the Town Boundary and Beckwith Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach and/or exceed capacity. During the PM peak hour, southbound/ westbound vehicle trips are anticipated to exceed capacity by 4% (V/C ratio of 1.04) between Abbott Street & Ferrara Drive. The rest of the corridor, from the Town Boundary to Ferrara Drive and Abbott Street to Beckwith Street, is expected to be approaching capacity (V/C ratios ranging from 0.85 to 0.97) in the southbound/ westbound direction. This will result in long queues and delay. The northbound/ eastbound traffic volumes on Lombard Street are not forecast to exceed capacity, but some sections are approaching capacity (V/C ratios ranging from 0.80 to 0.91).

Alternatives

Alternative 1 - Do Nothing: Maintain existing lane and intersection configuration along the corridor.

Alternative 2 - Transportation Demand Management: Construct the planned cycling facilities along Lombard Street:

- Uni-Directional Cycle Tracks – Valley Custom Cutting to Abbott Street.
- Conventional Bike Lines - Abbott Street to Brockville Street/ Beckwith Street.

Dedicate cycling space would provide an excellent opportunity for increased cycling mode share in the Lombard Street corridor.

Implement town wide policies and programs to promote active modes:

- Create incentive programs to encourage residents to use alternate modes.
- Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.

Alternative 3 - Transportation System Management: As an arterial roadway, Lombard Street is one of the main thoroughfares through Smiths Falls, while also providing local access to Smiths Falls big box retailers. As such, Lombard Street serves multiple functions. The following TSM options could be considered to maximize the efficiency of the existing roadway:

- Access management – review the number and proximity of access points/ driveways.
- Traffic signal coordination.
- Prohibit left turns where dedicated left turn lane (with storage) is not provided.

Alternative 4: Infrastructure Enhancement: Lombard Street currently provides a three-lane cross section over the majority of the road segment. Widening Lombard Street to provide additional travel lanes would create additional capacity to relieve concerns.

Alternative 5: Infrastructure Enhancement: Connecting the end of Ferrara Drive to Lombard Street will provide a southern connection to Lombard Street. The additional collector road will provide some redundancy in the network and will reduce demand on sections of Lombard Street.

8.3.1.3 SC-3 Beckwith Street - Chambers Street to Lombard Street

Problem

Beckwith Street between Chambers Street and Lombard Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach capacity. During the PM peak hour, southbound vehicle trips are anticipated to approach capacity (V/C ratio of 0.86). This will result in moderate delays at the only fixed crossing of the Rideau River in Smiths Falls. The northbound traffic volumes on Beckwith Street are forecast to operate within capacity.

Alternatives

Alternative 1 - Do Nothing: Maintain existing lane and intersection configuration along the corridor.

Alternative 2 - Transportation Demand Management: Construct the planned cycling facilities (buffered bike lanes) along Beckwith Street, connecting to the recently constructed cycle tracks constructed as part of the Beckwith revitalization project. Dedicate cycling space would provide an excellent opportunity for increased cycling mode share in the Beckwith Street corridor.

Implement town wide policies and programs to promote active modes:

- Create incentive programs to encourage residents to use alternate modes; and
- Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.

Alternative 3 - Transportation System Management: Beckwith Street is an Arterial Roadway that is the main north/south thoroughfares through Smiths Falls. Beckwith Street between Chambers Street and Lombard Street is a collection of bridges over the Rideau River. With signalized intersections at Chambers Street and Lombard Street there is very little more that can be done from a TSM perspective. The following TSM options could be considered to maximize the efficiency of the existing roadway:

- Traffic signal coordination at Chambers Street and Lombard Street; and
- Completely close the intersection of Canal Street and Beckwith Street or eliminate the northbound left from Beckwith Street to Canal Street and leave the intersection as a right-in right-out (RIRO) only.

Alternative 4: Infrastructure Enhancement: Beckwith Street between Chambers Street and Lombard Street currently provides a two-lane cross section with very generous left and right turn lanes. Widening Beckwith Street (to four lanes) would provide the additional road capacity to accommodate the forecasted vehicles volumes.

8.3.2 Localized Improvement

8.3.2.1 LI-1 Union Street and Cornelia Street

Problem

The southbound approach at the Union Street and Cornelia Street intersection is currently experiencing poor conditions during the PM peak hour; with conditions expected to degrade further by 2046. These conditions result in long delays and queues.

Alternatives

Alternative 1 - Do Nothing: Maintain existing intersection control type (two-way stop) and lane configuration.

Alternative 2 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Maintain the existing lane configuration.

Alternative 3 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Redesign the intersection to convert the channelized right-turn from Cornelia Street to Union Street to a standard right-turn.

8.3.2.2 LI-2 Elmsley Street and Cornelia Street

Problem

The westbound left turn movement at the Elmsley Street and Cornelia Street intersection is anticipated to approach capacity (V/C ratio of 0.96) during the 2046 PM peak hour. These conditions result in long delays and queues.

Alternatives

Alternative 1 - Do Nothing: Maintain existing intersection lane configuration and signal timing.

Alternative 2 - Transportation System Management: Increase capacity of the westbound left movement by modifying the signal timing phases and times to allow for a simultaneous protected westbound left and northbound right.

8.3.2.3 LI-3 Lombard Street and Abbott Street

Problem

The current westbound approach at the Lombard Street and Abbott Street intersection provides a single shared left/through/right lane. This approach is anticipated to approach capacity (V/C ratio of 0.85) during the 2046 PM peak hour. These conditions may cause moderate delays and queuing.

Alternatives

Alternative 1 - Do Nothing: Maintain existing intersection lane configuration and signal timing.

Alternative 2 - Transportation System Management: Prohibit the westbound left during the peak periods. This would increase the capacity of the westbound approach by allowing through and right turning traffic to flow freely.

Alternative 3 - Transportation System Management: Construct a westbound left turn lane. This would increase the capacity of the westbound approach by allowing through and right turning traffic to flow freely.

8.3.2.4 LI-4 Elmsley Street and Lansdowne Street

Problem

The stop controlled eastbound approach at the Elmsley Street and Lansdowne Street intersection provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (26.7 seconds) resulting in a LOS D during the 2046 PM peak hour. A relatively low number volumes (45 vehicles) are expected at the eastbound approach (Lansdowne Street), the problem is a result of the high uncontrolled/ free flow volumes on Elmsley Street.

Alternatives

Alternative 1 - Do Nothing: Maintain the existing intersection configuration and control.

Alternative 2 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Maintain the existing lane configuration.

Alternative 3 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to an all-way stop. Maintain the existing lane configuration.

8.3.2.5 LI-5 William Street and Beckwith Street

Problem

The stop controlled westbound approach at the William Street and Beckwith Street intersection provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (31.9 seconds) resulting in a LOS D during the 2046 PM peak hour. Relatively low volumes (55 vehicles) are expected at the westbound approach (William Street), the problem is a result of the high volumes at the uncontrolled approaches on Beckwith Street.

Alternatives

Alternative 1 - Do Nothing: Maintain the existing intersection configuration and control.

Alternative 2 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Maintain the existing lane configuration.

Alternative 3 - Transportation System Management: Upgrade the existing two-way stop-controlled intersection to an all-way stop. Maintain the existing lane configuration.

8.3.2.6 LI-6 Beckwith Street and Montague Street/ Ogden Avenue/ Mylne Street

Problem

The intersection of Beckwith Street and Montague Street/ Ogden Avenue/ Mylne Street currently operates as a complex five-leg intersection. Stop controls are skewed, with Montague Street, Mylne Street, and Ogden Avenue operating under stop control while Beckwith Street flows freely. The geometry and expansive pavement area create a confusing environment for drivers trying to navigate the right-of-way. Furthermore, the awkward configuration and lengthy crossing distances create an uncomfortable and potentially unsafe environment for pedestrians.

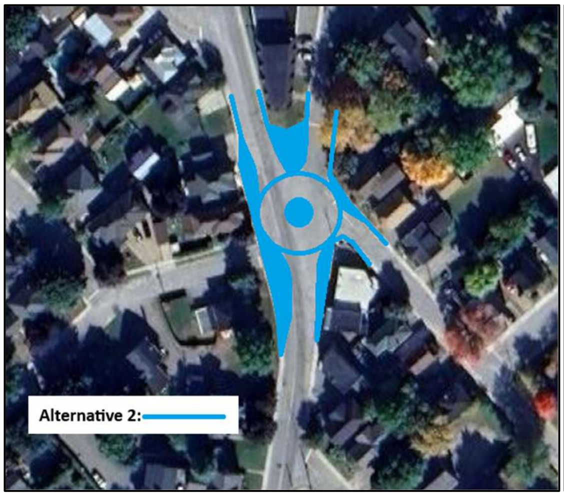
Alternatives

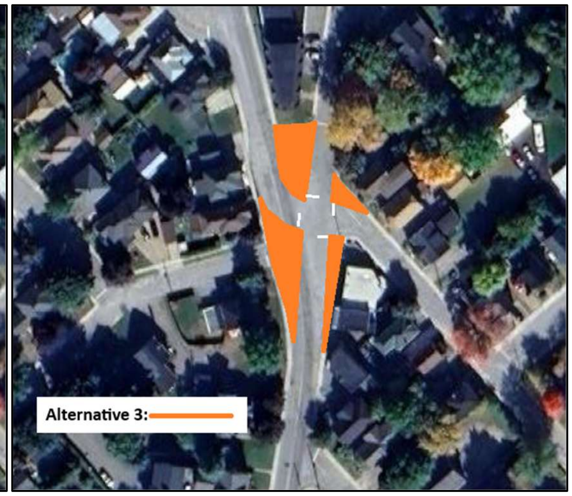
Alternative 1 - Do Nothing: Maintain existing intersection geometry/ lane configuration and control type (two-way stop control – stopping for Montague Street, Mylne Street, and Ogden Avenue).

Alternative 2 – Infrastructure Enhancement: Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to a 4-leg mini roundabout with an inscribed circle diameter of up to 24m. This would include the closure of Mylne Street at Beckwith Street creating a dead-end.

Alternative 3 - Infrastructure Enhancement: Upgrade and reconfigure the intersection of Beckwith Street, Montague Street, and Ogden Avenue to a 4-leg all-way stop with Beckwith Street as the south and west legs, Montague as the north leg, and Ogden Avenue as the east leg. This would include the closure of Mylne Street at Beckwith Street creating a dead-end.

Alternative 4 - Infrastructure Enhancement: Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to create a short road between Beckwith Street and Montague Street. This would create two new two-way stop-controlled intersections, one at Beckwith Street and the new road, and one at Montague Street and the new road. This alternative would also include a southbound channelized right turn lane from Montague Street to Beckwith Street.





8.3.3 Connectivity

8.3.3.1 C-1 Boundary Expansion Area Lands

Problem

Population and employment growth is planned for the Boundary Expansion Area lands in east Smiths Falls. New collector roads are required to connect this area to the existing arterial road network.

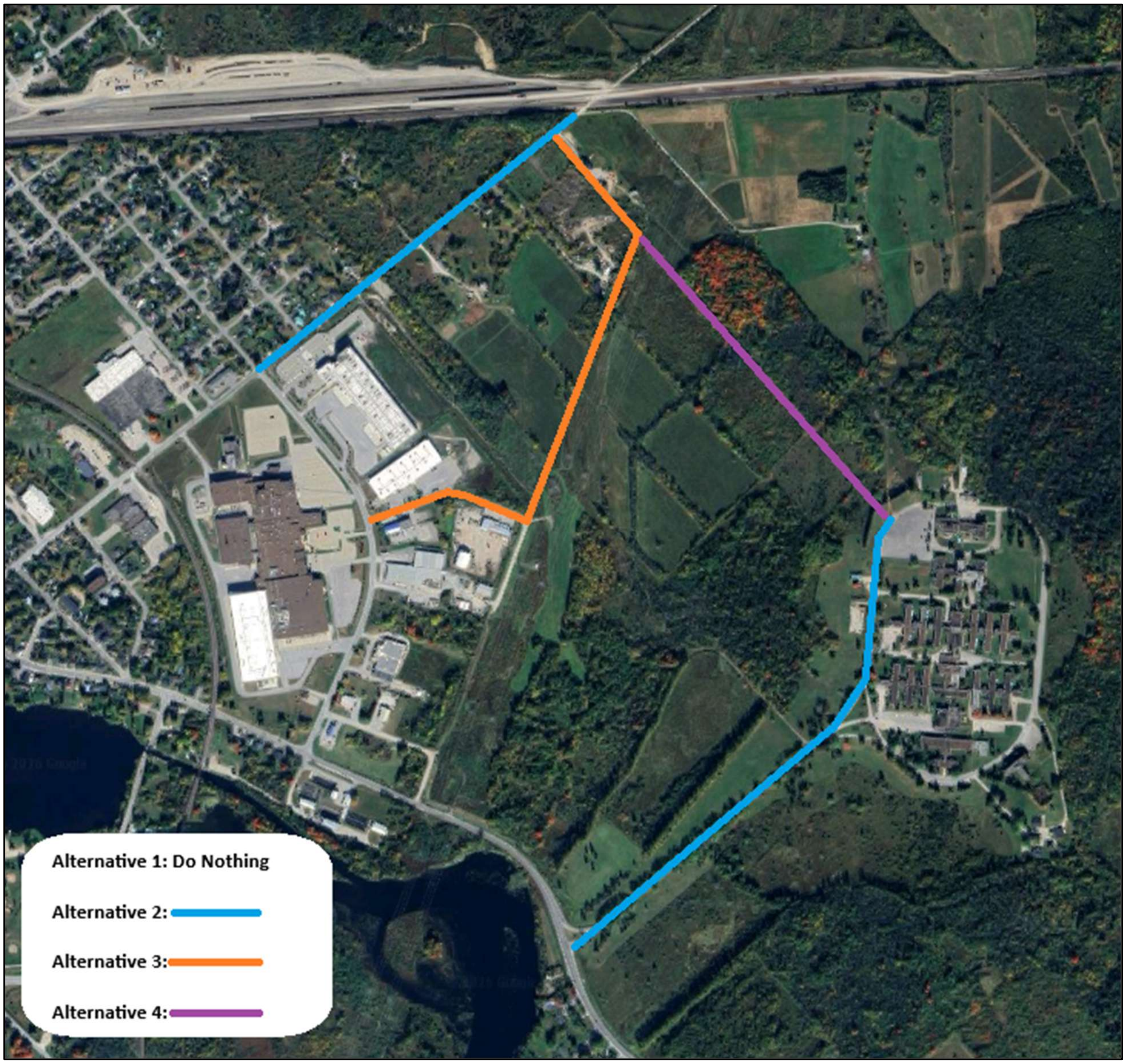
Alternatives

Alternative 1 - Do Nothing: Maintain the existing collector road network in the Boundary Expansion Area lands.

Alternative 2 - Infrastructure Enhancement: Upgrade Lorne Street (east of Hershey Drive) from a local road to a collector road and upgrade Rideau Regional Road (currently private road) to a collector road. These classification upgrades will improve connectivity to the arterial road network.

Alternative 3 - Infrastructure Enhancement: Upgrade Air Care Drive from a local road to a collector road and extend Walker Road (as a collector road) from Air Care Drive to Lorne Street. This classification upgrade and new collector road will improve connectivity to the arterial road network.

Alternative 4 - Infrastructure Enhancement: Construct a new north/south collector road that connects Rideau Regional Road to Lorne Street (via the Walker Road extension). The new collector road will provide north/south capacity within the Boundary Expansion Area lands and will provide options for accessing the arterial road network.



8.3.3.2 C-2 Existing Network Connectivity

Problem

Increased traffic volumes on Smiths Falls collector and arterial road network will continue to increase as a result of the widespread population and employment growth is planned throughout Smiths Falls. Additional network capacity is required (particularly in the east/west direction south of the river) to maintain connectivity for motorists and active users and increase network redundancy.

Alternatives

Alternative 1 - Do Nothing: Maintain existing road network including road classifications.

Alternative 2 - Infrastructure Enhancement: Upgrade Broadview Avenue West (from Harold Street and Brockville Street) from a local road to a collector road. This would involve a full road reconstruction to a collector road cross section once the road has reached the end of its design life. This classification upgrade will eliminate a gap in the collector road network and will improve east/west connectivity to the arterial road network.

Alternative 3 - Infrastructure Enhancement: Upgrade Pearl Street (from Percy Street to Carol Crescent) and Vincent Street from local roads to collector roads. This would involve a full road reconstruction to a collector road cross section once the road has reached the end of its design life. This classification upgrade will improve east/west connectivity in south of Smiths Falls.

Alternative 4 - Infrastructure Enhancement: Extend Ferrara Drive (as a collector road) to connect to Lombard Street. The new collector road will provide an additional connection between the new residential areas in south of Smiths Falls and the retail located on Lombard Street.

8.3.4 Active Transportation

8.3.4.1 AT-1 Old Slys Road - Rideau River bridge to Queen Street

<u>Problem</u>

The existing ROW on Old Slys Road between Rideau River bridge and Queen Street (15.24 m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks / minimum (2 m) boulevard width.

<u>Alternatives</u>

Alternative 1 - Do Nothing: Do not implement the proposed active transportation facilities on Old Slys Road.

Alternative 2 - Transportation System Management: Old Slys Road between Rideau River bridge and Queen Street has a ROW width of 15.24 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

Narrowing the drive lanes from 3.5 m to 3.0 m and implementing 1.5 m bike lanes (rather than the proposed 2.0 m cycle tracks), 1.0 m boulevards (per side) and 1.5 m sidewalks (per side), will maximize the use of the existing ROW.

Where ROW width narrows over the two bridges, the proposed bike lanes will transition to shared facilities.

Bridge widenings should be considered at the time the bridges are scheduled for reconstruction.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 15.25 m to 20 m) so that the proposed cycle tracks can be implemented without compromise. Widen the Rideau River bridges to increase their width to accommodate the proposed cycle tracks over the entire segment.

8.3.4.2 AT-2 Cornelia Street - Beckwith Street to Union Street

Problem

The existing ROW on Cornelia Street between Beckwith Street and Union Street (20.11 m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities on this segment.

Alternative 2 - Transportation System Management: Cornelia Street between Beckwith Street and Union Street has a ROW width of 20.11 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

By implementing a 3.0 m multi-use path (rather than the proposed cycle tracks), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 20.11 m to 26 m) so that the proposed cycle tracks can be implemented without compromise. It should be noted that his segment of Cornelia Street passes under a CP rail corridor, thus increasing the ROW may not be feasible (i.e. property, cost, constructability issues).

8.3.4.3 AT-3 Lombard Street - Alfred Street to Abbott Street

Problem

The existing ROW on Lombard Street between Alfred Street and Abbott Street (18.29 m) does not provide sufficient width to accommodate the existing road network elements and the proposed uni-directional cycle tracks.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Lombard Street between Alfred Street and Abbott Street has a ROW width of 18.29 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

By implementing a 3.0 m multi-use path (rather than the proposed cycle tracks), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 18.29 m to 22 m) so that the proposed uni-directional cycle tracks can be implemented without compromise.

8.3.4.4 AT-4 Lombard Street - Abbott Street to Brockville Street/ Beckwith Street

Problem

The existing ROW on Lombard Street between Abbott Street and Brockville Street (15.24 m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes / minimum (2 m) boulevard width.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Lombard Street between Abbott Street and Brockville Street has a ROW width of 15.24 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

Narrowing the drive lanes to from 4.0 m to 3.5 m and implementing 1.5 m bike lanes, 1.0 m boulevards (per side) and 1.5 m sidewalks (per side), will maximize the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 15.25 m to 18 m) so that the proposed conventional bike lanes can be implemented without compromise.

8.3.4.5 AT-5 Cornelia Street - William Street to Elmsley Street

Problem

The existing ROW on Cornelia Street between William Street and Elmsley Street (15.24 m) does not provide sufficient width to accommodate the existing road network elements (at intersections where existing left turn lanes are provided) and the proposed bike lanes.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Cornelia Street between William Street and Elmsley Street has a ROW width of 15.24 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

By implementing a 3.0 m multi-use path (rather than the proposed 1.5 m bike lanes), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 15.25 m to 19.5 m) so that the proposed bike lanes can be implemented without compromise.

8.3.4.6 AT-6 Cornelia Street - Elmsley Street to Beckwith Street

Problem

The existing ROW on Cornelia Street between Beckwith Street and Elmsley Street (20.11 m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Cornelia Street between Beckwith Street and Elmsley Street has a ROW width of 20.11 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

By implementing a 3.0 m multi-use path (rather than the proposed bike lanes), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 20.11 m to 26 m) so that the proposed bike lanes can be implemented without compromise.

8.3.4.7 AT-7 Brockville Street - Town Boundary to Lombard Street

Problem

The existing ROW on Brockville Street between the town boundary and Lombard Street (20.11 m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Brockville Street between the town boundary and Lombard Street has a ROW width of 20.11 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

By implementing a 3.0 m multi-use path (rather than the proposed 2.0 m buffered bike lanes), one of the existing sidewalks can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands where turn lanes are located to increase the ROW width (from 20.11 m to 20.5 m) so that the proposed buffered bike lanes can be implemented without compromise.

8.3.4.8 AT-8 Beckwith Street - Lombard Street to Chambers Street

Problem

The existing ROW on Beckwith Street between Lombard Street and Chambers Steet (20.11 m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Beckwith Street between Lombard Street and Chambers Street has a ROW width of 20.11 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

Eliminating an existing drive/turn lane and implementing 1.5 m bike lanes (rather than the proposed buffered bike lanes), will maximize the use of the existing ROW.

Bridge widenings should be considered at the time the bridges are scheduled for reconstruction.

Alternative 3 - Infrastructure Enhancement: Widen the three bridges over the Rideau River to increase the ROW width (from 20.11 m to 26 m) to accommodate the proposed buffered bike lanes over the entire segment.

8.3.4.9 AT-9 Elmsley Street/Queen Street - Cornelia Street to Old Slys Road

Problem

The existing ROW on Elmsley Street/Queen Street between Cornelia Street and Old Slys Road (20.11 m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.

Alternatives

Alternative 1 - Do Nothing: Do not implement proposed active transportation facilities.

Alternative 2 - Transportation System Management: Elmsley Street/Queen Street between Cornelia Street and Old Slys Road has a ROW width of 20.11 m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility.

Eliminating the existing on street parking and narrowing the drive lanes to 3.5 m will maximize the use of the existing ROW, creating space for 1.0 m boulevards (per side), 1.5 m sidewalks (per side), and 2 m buffered bike lanes (per side).

Where ROW width narrows over the two bridges, the proposed bike lanes will transition to shared facilities.

Alternative 3 - Infrastructure Enhancement: Acquire additional lands to increase the ROW width (from 20.11 m to 20.5 m) so that the proposed buffered bike lanes can be implemented without compromise.

9.0 Development of Preferred Solution

A list of network problems was developed during the TMP process through the completion of the technical analysis and through discussions with town staff. As part of the alternative solutions, network improvements were identified for each problem area that aimed to resolve the issue identified considering the Vision and Goals of the TMP and feedback received from various stakeholders.

9.1 Evaluation Criteria

The alternative road network improvements were evaluated based on a set of criteria defined for the TMP that may best accommodate the needs of the community and incorporate evaluation criteria for Phase 2 of the MCEA process. Criteria were categorized into four groups: natural environment, social environment, transportation environment, and cost. Road network improvement recommendations were guided by the criteria listed below.

- **Natural Environment**
  - Woodlands and wetlands, Aquatic features, Heritage lands, Noise.
- **Social environment**
  - Impacts to residents and local businesses, Community character.
- **Transportation environment**
  - Transportation level of service, Safety, Land use, Connectivity to key destinations, Support for active modes, Cultural impacts.
- **Cost**
  - Cost effectiveness.

9.1.1 Scoring System

A detailed evaluation using a numeric scoring system (from 1 to 5) was developed and applied to each evaluation criteria for each alternative, where a lower score is better:

- **1 =** Low negative impact / High potential benefit
- **2 =** Minor negative impact / Moderate potential benefit
- **3 =** Moderate negative impact / Some potential benefit
- **4 =** Substantial negative impact / Minor potential benefit
- **5 =** High negative impact / Negligible or no benefit

Each score is informed by location-specific conditions, preliminary technical analysis, alignment with municipal and provincial policy, and order-of-magnitude cost estimates. This quantitative approach allows for a more direct comparison of the alternatives for each unique situation, highlighting the most balanced and effective solution. The results of this evaluation are used to recommend the preferred solution for each issue, as detailed in the following section.

9.2 Evaluation of Alternatives & Preferred Solution

Alternative transportation strategies (Section 8.2) – including Transportation Demand Management (TDM), Transportation System Management (TSM), and Infrastructure Enhancements – were evaluated (where applicable) against each network problem identified. The assessment was based on the defined evaluation criteria (Section 9.1) and scoring system (Section 9.1.1) identified above, and a preferred solution was identified for each. The 'Do Nothing' scenario, representing existing conditions, was used as a baseline for evaluation. The problems and preferred solutions are summarized in **Table 17**. The full analysis tables for all alternative solutions are included in **Appendix G**.

Table 17: Preferred Transportation Improvement Solutions

Problem	Recommended Solution
Strategic Capacity	
SC-1. Elmsley Street - Cornelia Street to Beckwith Street Elmsley Street between Cornelia Street & Beckwith Street is forecast to experience significant growth in traffic, partially as a result of the developments planned for the Boundary Expansion area. During the PM peak hour, southbound vehicle trips are anticipated to exceed capacity by 7% (V/C ratio of 1.07). This will result in long queues and delay. The northbound traffic volumes on Elmsley Street are not forecast to exceed capacity, but some sections come very close to reaching capacity.	• Corridor TDM – provide the planned cycling facilities (buffered bike lanes) along Elmsley Street; • Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure; and • Corridor TSM – prohibit left turns where dedicated left turn lane (with storage) is not provided.
SC-2. Lombard Street - Town Boundary to Brockville Street/ Beckwith Street Lombard Street between the Town Boundary & Beckwith Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach and/or exceed capacity. During the PM peak hour, southbound/ westbound vehicle trips are anticipated to exceed capacity by 4% (V/C ratio of 1.04) between Abbott Street & Ferrara Drive. The rest of the corridor, from the Town Boundary to Ferrara Drive and Abbott Street to Beckwith Street, is	• Corridor TDM – provide the planned cycling facilities (Conventional Bike Lines - Beckwith Street to Abbott Street and Uni-directional Cycle Tracks - Abbott Street to Valley Custom Cutting) along Lombard Street; • Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure; • Corridor TSM – Access management, traffic signal coordination and prohibit left turns where

Problem	Recommended Solution
expected to be approaching capacity (V/C ratios ranging from 0.85 to 0.97) in the southbound/ westbound direction. This will result in long queues and delay. The northbound/ eastbound traffic volumes on Lombard Street are not forecast to exceed capacity, but some sections are approaching capacity (V/C ratios ranging from 0.80 to 0.91).	• dedicated left turn lane (with storage) is not provided; and • Infrastructure Enhancement – provide new collector road connecting Ferrara Drive to Lombard Street.
SC-3. Beckwith Street – Chambers Street to Lombard Street Beckwith Street between Chambers Street and Lombard Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach capacity. During the PM peak hour, southbound vehicle trips are anticipated to approach capacity (V/C ratio of 0.86). This will result in moderate delays at the only fixed crossing of the Rideau River in Smiths Falls. The northbound traffic volumes on Beckwith Street are forecast to operate within capacity.	• Corridor TDM – provide the planned cycling facilities (buffered bike lanes) along Beckwith Street; • Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure; and • Corridor TSM – Turn Restrictions at the intersection of Canal Street and Beckwith Street and traffic signal coordination.
Localized Improvement	
LI-1. Union Street and Cornelia Street The southbound approach is currently experiencing poor conditions during the PM peak hour; with conditions expected to degrade further by 2046. These conditions result in long delays and queues.	• Intersection TSM – Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Redesign the intersection to convert the channelized right-turn from Cornelia Street to Union Street to a standard right-turn.
LI-2. Elmsley Street and Cornelia Street The westbound left turn movement is anticipated to approach capacity (V/C ratio of 0.96) during the 2046 PM peak hour. These conditions result in long delays and queues.	• Intersection TSM – modify the signal timing phases and times to allow for a simultaneous protected westbound left and northbound right.
LI-3. Lombard Street and Abbott Street The current westbound approach provides a single shared left/through/right lane. This approach is anticipated to approach capacity (V/C ratio of 0.85)	• Intersection TSM – Prohibit westbound left turns from Lombard Street onto Abbott Street during the peak periods.

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Problem	Recommended Solution
during the 2046 PM peak hour. These conditions may cause moderate delays and queuing.	
LI-4. Elmsley Street and Lansdowne Street The stop controlled eastbound approach provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (26.7 seconds) resulting in a LOS D during the 2046 PM peak hour. A relatively low number volumes (45 vehicles) are expected at the eastbound approach (Lansdowne Street), the problem is a result of the high uncontrolled/ free flow volumes on Elmsley Street.	• Do Nothing – The existing configuration (two-way stop), with no control on Elmsley Street, causes no delay for the majority of vehicles (1,140). While the delay will be moderate for the eastbound movement, this will impact relatively few vehicles (45). Vehicles can utilize adjacent signalized intersections to avoid delay.
LI-5. William Street and Beckwith Street The stop controlled westbound approach provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (31.9 seconds) resulting in a LOS D during the 2046 PM peak hour. Relatively low volumes (55 vehicles) are expected at the westbound approach (William Street), the problem is a result of the high volumes at the uncontrolled approaches on Beckwith Street.	• Do nothing – The existing configuration (two-way stop), with no control on Beckwith Street, causes no delay for the majority of vehicles (1,010). While the delay will be moderate for the westbound movement, this will impact relatively few vehicles (55). Vehicles can utilize adjacent signalized intersections to avoid delay.
LI-6. Beckwith Street and Montague Street/ Ogden Avenue/ Mylne Street The intersection of Beckwith Street, Montague Street, Mylne Street, and Ogden Avenue currently operates as a complex five-leg intersection. Stop controls are skewed, with Montague Street, Mylne Street, and Ogden Avenue operating under stop control while Beckwith Street flows freely. The geometry and expansive pavement area create a confusing environment for drivers trying to navigate the right-of-way. Furthermore, the awkward configuration and lengthy crossing distances create an uncomfortable and potentially unsafe environment for pedestrians.	• Infrastructure Enhancement– It is recommended that the Town undertake a detailed Intersection Control Study (ICS) for this location. This study will assess precise geometric constraints, evaluate Right-of-Way (ROW) impacts, and provide detailed operational modeling to determine whether a mini roundabout, an all-way stop, or a two-way stop is the optimal long-term solution.
Connectivity	
C-1. Boundary Expansion Lands	• Infrastructure Enhancement – Upgrade Lorne Street (east of Hershey Drive) and Rideau Regional

Problem	Recommended Solution
Population and employment growth is planned for the Boundary Expansion Area lands in east Smiths Falls. New collector roads are required to connect this area to the existing arterial road network.	Road (Queen Street to Rideau Regional Road circle) to collector roads; • Infrastructure Enhancement – Upgrade Air Care Drive to a collector road and construct the Walker Road extension (Air Care Drive to Lorne Street) as a collector road; and • Infrastructure Enhancement – Construct a new north/south collector road that connects Rideau Regional Road circle to the Walker Road extension.
C-2. Existing Network Connectivity Increased traffic volumes on Smiths Falls collector and arterial road network will continue to increase as a result of the widespread population and employment growth is planned throughout Smiths Falls. Additional network capacity is required (particularly in the east/west direction south of the river) to maintain connectivity for motorists and active users, and increase network redundancy.	• Infrastructure Enhancement – Upgrade Broadview Avenue West (from Harold Street and Brockville Street) to a collector road when reconstruction is required; and • Infrastructure Enhancement – Extend Ferrara Drive to connect to Lombard Street.
Active Transportation	
AT-1. Old Slys Road - Rideau River bridge to Queen Street The existing ROW on Old Slys Road between Rideau River bridge and Queen Street (15.24m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks / minimum (2m) boulevard width.	• Corridor TSM – Narrow travel lanes to implement bike lanes. Where ROW width narrows over the bridges, implement shared facilities. Explore bridge widening as an opportunity when bridge reconstruction is required.
AT-2. Cornelia Street - Beckwith Street to Union Street The existing ROW on Cornelia Street between Beckwith Street and Union Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks.	• Corridor TSM – Implement a multi-use path on this segment instead of cycle tracks to reduce required ROW width.

Problem	Recommended Solution
AT-3. Lombard Street - Alfred Street to Abbott Street The existing ROW on Lombard Street between Alfred Street and Abbott Street (18.29m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks.	• Infrastructure Enhancement – Acquire additional lands to increase the right-of-way width and implement the proposed uni-directional cycle tracks.
AT-4. Lombard Street - Abbott Street to Brockville Street/ Beckwith Street The existing ROW on Lombard Street between Abbott Street and Brockville Street (15.24m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes / minimum (2m) boulevard width.	• Corridor TSM – Narrow travel lanes on this segment to create space for the proposed bike lanes.
AT-5. Cornelia Street - William Street to Elmsley Street The existing ROW on Cornelia Street between William Street and Elmsley Street (15.24m) does not provide sufficient width to accommodate the existing road network elements (at intersections where existing left turn lanes are provided) and the proposed bike lanes.	• Corridor TSM – Implement a multi-use path on this segment instead of bike lanes to reduce required ROW width.
AT-6. Cornelia Street - Elmsley Street to Beckwith Street The existing ROW on Cornelia Street between Beckwith Street and Elmsley Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes.	• Corridor TSM – Implement a multi-use path on this segment instead of bike lanes to reduce required ROW width.
AT-7. Brockville Street - Town Boundary to Lombard Street The existing ROW on Brockville Street between the town boundary and Lombard Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.	• Corridor TSM – Implement a multi-use path on this segment instead of buffered bike lanes to reduce required ROW width.
AT-8. Beckwith Street - Lombard Street to Chambers Street	• Corridor TSM – Eliminate an existing drive/turn lane and implement bike lanes on this segment instead of buffered bike lanes to maximize the use of the existing curb-to-curb space.

Problem	Recommended Solution
The existing ROW on Beckwith Street between Lombard Street and Chambers Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.	
AT-9. Elmsley Street/Queen Street - Cornelia Street to Old Slys Road The existing ROW on Elmsley Street/Queen Street between Cornelia Street and Old Slys Road (20.11m) does not provide sufficient width to accommodate the existing road network elements (at intersections where existing left turn lanes are provided) and the proposed buffered bike lanes.	• Corridor TSM – Narrow travel lanes on this segment to create space for the proposed buffered bike lanes.

Appendix A

Consultation and Engagement Supporting Documents

SMITHS FALLS
RISE AT THE FALLS

MEDIA RELEASE

FOR IMMEDIATE RELEASE

September 20, 2024

Town Launches Official Plan Update Project

Smiths Falls, ON – The Town has begun work on its new Official Plan, which will set the stage for planning the growth and evolution of our community for the next 25 years. The Official Plan will determine where the Town focuses key initiatives such as new housing developments, business parks, road, water and sewer infrastructure, trails, bike lanes, parks, and community centres. As a part of this project, the Town is also undertaking its first Transportation Master Plan.

“The Town has changed a lot since Council adopted the current Official Plan in 2014. With over 700 new residential units approved since 2019 and a very different employment base, Council wants to ensure that we are planning for a high quality of life for all of our residents, and we can plan ahead for where future growth is going to occur, what it will look like and how it will be serviced”, stated Mayor Shawn Pankow.

The Town is hosting a World Café format open house session on October 10, 2024, from 5 PM – 7 PM upstairs at the Youth Arena. The Open House will be focused on five key themes (transportation, downtown revitalization, housing needs, community places and spaces, and sustainability) that Council has identified and will give residents the opportunity to provide input to staff and consultants.

The Town has retained Dillon Consulting Limited to conduct this project. Dillon Consulting is no stranger to the Town of Smiths Falls having completed the Land Needs Study, the Community Improvement Plan, and helped to re-write the Property Standards and Yard By-laws.

“The first open house will set the direction for what the Official Plan will look at. Holding discussions centred around these themes will help staff, Council and the consultant team focus on made-in-Smiths Falls approach and solutions to topics that are so important in our community. We really look forward to exploring this,” added Karl Grenke, Manager of Development Services.

Official Plan updates can be found on the project page of the Town’s website. For further information on the October open house, please contact Marie Elmsley at melmsley@smithsfalls.ca.

Included photo: Open House Invitation – October 10, 2024

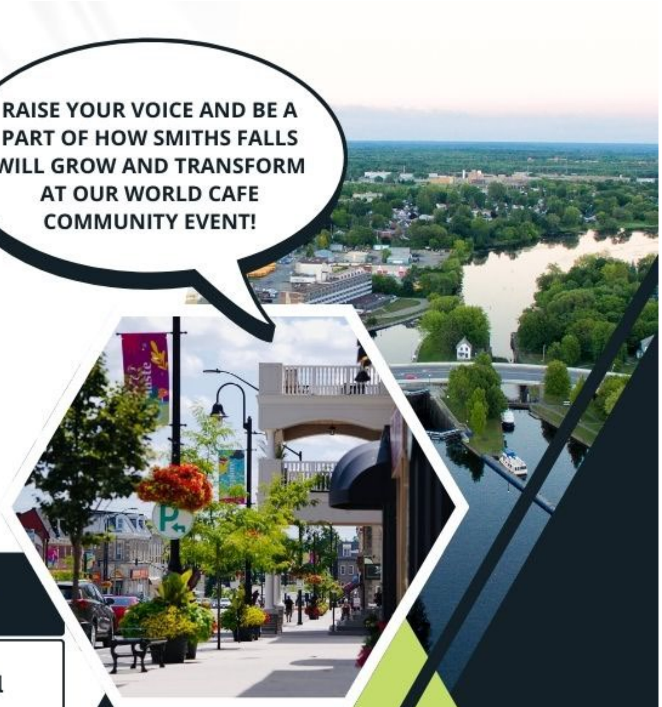
-30-

Media Contact
Joanne Plontz
Communications and Marketing Coordinator
77 Beckwith Street N, Box 695
Smiths Falls, ON K7A 2B8
613-283-4124 ext. 1122
Communications@smithsfalls.ca

NEW OFFICIAL PLAN

Open House

RAISE YOUR VOICE AND BE A PART OF HOW SMITHS FALLS WILL GROW AND TRANSFORM AT OUR WORLD CAFE COMMUNITY EVENT!



October 10, 2024	5 PM - 7 PM
Smiths Falls Youth Arena	Upstairs Hall

More Information
smithsfalls.ca/opupdates

SMITHS FALLS
RISE AT THE FALLS

WHAT WE HEARD ENGAGEMENT SUMMARY

Introduction

The Town of Smiths Falls is embarking on an exciting journey to create a new Official Plan and Transportation Master Plan that will shape the future of our community for years to come. As we begin this important process, we want to ensure that the voices of residents, business owners, and community stakeholders are at the heart of our decision-making. Public input is essential to developing a plan that reflects the needs, aspirations, and priorities of everyone in Smiths Falls.

This summary highlights the feedback we've received from our recent World Café Event held on October 10, 2024. This event was focused on obtaining feedback in terms of five key themes: Community Spaces, Sustainability, Transportation, Downtown Revitalization, and Housing. Continue to the following pages to discover key insights and perspectives shared during our World Café, shaping the future of the community together.

WHAT WE HEARD ENGAGEMENT SUMMARY

Building a Greener Future: Community-Driven Sustainability and Environmental Stewardship in Smiths Falls

Residents of Smiths Falls voiced a range of concerns and aspirations regarding sustainability and environmental stewardship in their community. Key discussions centered on the need for a green waste diversion program and Town-led tree planting initiatives, reflecting a desire for proactive environmental practices. Overall, these discussions reveal a strong community commitment to enhancing environmental practices and policies in Smiths Falls.

1. **Green Waste Diversion Program** – Participants expressed a strong desire for a green waste diversion program, such as a green bin initiative, viewing it as a fundamental service. Some participants had questions about the financial aspects of such a program.
2. **Tree Planting Initiatives** - Many residents believe tree planting should be a Town-led initiative, with some uncertainty about the current tree giveaway program's partnership with Lanark County. Participants expressed pride in the mini-forest initiative at Hyland-Corbett Park and called for more similar initiatives.
3. **Cultural Perspectives on Parking** - The community highlighted a divide between traditional and modern views on parking in Smiths Falls. Respondents suggested creating a grant program to encourage naturalized lawns, arguing that financial incentives are crucial for implementing sustainability policies in a cash-strapped community.
4. **Climate Change Constraints -** Homeowners face challenges related to climate change that impact the quality and condition of homes and infrastructure.
5. **Homeowner Actions Against Climate Change** - Potential actions for homeowners include energy retrofitting and the use of rain barrels to mitigate climate impacts.
6. **Sustainability Policy Areas** - Key areas for sustainability policy development include water and wastewater infrastructure and transportation infrastructure.
7. **Mini Forest Initiative -** One resident praised the mini-forest initiative as an unprecedented example of environmental stewardship in Smiths Falls, highlighting a historical lack of consideration for tree preservation.
8. **Hydro Power Generation -** There is interest in the Town investing in hydro power generation from the Rideau River, with residents recalling its importance during past power outages.
9. **Rideau River Access -** A respondent called for improved policies to enhance access to the Rideau River while maintaining its ecological integrity, criticizing the current passive recreational use.
10. **Climate Lens -** The Town should adopt a climate lens to promote collaborative efforts in addressing the climate crisis. A resident discussed the potential of a biochar pilot program that could become self-sustaining through community partnerships.
11. **Self-Sustaining vs. Community-Oriented Initiatives -** There is a perceived divide between individual-level initiatives, like energy retrofits, and community-oriented

projects, such as community gardens. Residents urged the Town to prioritize policies that foster community participation and collaboration.

12. **River Stewardship -** Concerns were raised about stewardship of the Rideau Canal, with calls for stronger policy language and enforcement to protect the river, emphasizing the municipality's responsibility to ensure its stewardship for the entire community.

Moving Forward: Addressing Transportation Challenges and Opportunities in Smiths Falls

All participants were equally passionate about transportation considerations and concerns in the community. Among the topics discussed, five areas stood out: speeding, sidewalks and trails, transit, traffic, and other mobility-related issues. Residents expressed the need for improvements in road safety, accessible transportation, and public spaces, as well as ideas for enhancing walkability and accommodating emerging trends like micro-mobility.

1. **Speeding** - There was significant discussion around the issue of speeding, with concerns raised about the need for a speed limit reduction policy. Most arterial and collector roads were identified as having speeding issues, with Jasper Avenue, Elmsley/Queen, Cornelia Street, Brackville Road, and Lombard Street specifically mentioned. Elmsley/Queen was noted as the worst area, with no traffic control between Chamber and Old Slys. Residents expressed a strong desire for more traffic calming measures throughout the town.
2. **Sidewalks and Trails** - There was a clear need for improved lighting at crosswalks and along trails, with the canal trail between Old Slys and Beckwith which were specifically mentioned. Positive feedback was given regarding recent sidewalk infill projects on Lombard and Old Slys, with a call to continue addressing the remaining gaps in the sidewalk network. Accessibility concerns were also raised, particularly regarding curb cuts and missing links between municipal sidewalks and businesses. Additionally, residents requested more benches and rest areas along trails to enhance accessibility and comfort for users.
3. **Transit** - Transit was a major topic of discussion, noting that 20% of Smiths Falls residents do not have access to a vehicle. Many conversations centered around the aging population and mobility challenges, including suggestions for services like Handy Dial-A-Ride-Transportation Service (HandyDARTS). Residents also expressed interest in bringing back the free shuttle that used to operate in town, questioning why it was discontinued. Comparisons were made to North Grenville, which has a transit system, with residents asking why Smiths Falls doesn’t have a similar service.
4. **Traffic** - Post-COVID traffic on Beckwith Street has increased, but the street’s redevelopment, including improvements to signals and signal timing, has helped manage the flow. Seasonal traffic, especially on weekends, remains an issue on major routes like Highway 15, Abbott, William, and Cornelia Streets. Summer delays are also common due to boat traffic and the swing bridge. The intersection of Lombard and Abbott was identified as requiring attention to improve traffic conditions.
5. **Other** – The revitalization of Beckwith Street received many positive reviews. However, concerns were raised about parking on sidewalks, particularly on Queen Street, and

parking on the grass at parks, which seems to be an accepted practice in Smiths Falls. Winter maintenance of active transportation facilities is lacking, forcing pedestrians, cyclists, and mobility device users to use the road. There is a need for bike parking on Beckwith Street and interest in installing municipal electric vehicle charging stations. Residents also expressed a desire for programming like a walking or cycling school bus. With the rise of micro-mobility options such as e-bikes and e-scooters, there were questions about how the town is preparing for these changes.

Building Homes and Community: Expanding Housing Options and Connectivity in Smiths Falls

Housing is a key issue as Smiths Falls develops its new Official Plan. With more people moving from larger cities like Ottawa, demand for affordable and diverse housing options is growing. While Smiths Falls is the ‘housing centre’ for Lanark County, challenges like poor housing conditions, high costs, and disconnected neighbourhoods persist. This summary highlights key observations and needs, including the demand for more housing variety, senior housing, and better connectivity to the Rideau Canal. Barriers such as infrastructure challenges and accessibility gaps were noted, alongside aspirations to adopt models like the ‘Vancouver Model’ and create mixed-use neighborhoods where residents can live, work, and age in place.

1. **Observations -** More people from larger areas like Ottawa are moving to smaller communities, including Smiths Falls. However, not all housing is in good condition, with many areas experiencing poor housing quality. While there is recognition that Smiths Falls serves as the ‘housing centre’ for Lanark County, more resources are needed to meet the growing demand. Additionally, rent and housing prices, particularly for single-detached homes, remain high.
2. **Needs -** There is a clear need for a greater variety of housing stock and more affordable options in Smiths Falls, including housing for seniors. Residents expressed a desire to leverage the waterfront to create a more connected community. Additionally, there is an interest in finding a balance between suburban and urban lifestyles. Exploring cost-sharing options for infrastructure development was also identified as a potential avenue to address housing needs.
3. **Barriers -** While there is a desire for innovative housing stock that broadens the range of options, changing climate conditions mean that new development is still challenged to address space for snow removal and stormwater management. Lower-income

neighborhoods lack sufficient retail options which, if provided, could enhance their quality of life. Smiths Falls has seen successful with new suburban development but the “main street lifestyle” of living near to main street and frequenting those shops/services hasn’t fully come to fruition. Furthermore, accessible/ barrier-free is not always a primary consideration in current housing developments.

4. **Aspirations –** Some residents aspire to adopt the ‘Vancouver Model,’ which emphasizes the development of backyard units, lofts, and coach houses to diversify the housing stock in Smiths Falls, potentially including communal parking. There is also a desire for mixed-use developments that feature thoughtful commercial, retail and services on the main floor of buildings enabling residents to live, work, play, and age in place. Utilizing town-owned land for housing and creating a variety of connected neighborhoods were viewed as opportunities. Additionally, the community seeks guidance on the design and implementation of additional residential units (e.g., backyard units, basement apartments, etc.).

Spaces for All: Creating Inclusive, Safe, and Vibrant Community Hubs in Smiths Falls

As Smiths Falls aims to enhance residents' quality of life, key themes have emerged from community discussions, highlighting both challenges and aspirations. These themes address accessibility, community spaces, safety, cultural events, environmental considerations, sports, and retail development. By focusing on these areas, residents seek to create a more inclusive and vibrant community that fosters engagement and meets diverse needs. The following summaries outline the primary concerns and desires expressed by the community, serving as a foundation for future planning and development initiatives in Smiths Falls.

1. **Accessibility and Connectivity** - Access from downtown to the canal is inadequate, and there is a pressing need for more safe crossings and crosswalks throughout the town. Residents have expressed concerns about the lack of active transportation infrastructure, which hampers connectivity between neighborhoods. There is a strong desire for a town-wide walking path, along with increased walking trails, to enhance accessibility and promote pedestrian movement within Smiths Falls.
2. **Community Spaces and Amenities -** The promotion of community spaces does not adequately reflect the diversity of the town, leading to feelings of exclusion among some

residents. Additionally, there is a shortage of park spaces and recreational amenities, with requests for expanding the beach, creating new boat docks, and adding winter activities. Residents are also advocating for more recreational facilities, such as indoor sports centers, a public pool, and community gardens, as well as the establishment of mini forests in vacant lots to enrich the town's green spaces.

3. **Safety and Infrastructure** - Safety is a significant concern, particularly regarding inadequate lighting in areas and poorly lit parking lots, which residents deem dangerous. Unsafe cycling paths further exacerbate these safety issues. Additionally, there is a call for more consistent winter maintenance of public spaces to ensure accessibility year-round. Residents have also highlighted the need for improved wayfinding signage throughout the town to help navigate community amenities more easily.
4. **Cultural and Recreational Events** - There is a strong desire for spaces that can host cultural events, particularly those that engage newcomers and foster community connections. Suggestions include creating outdoor venues such as a covered pavilion for farmers' markets and utilizing stage spaces for various events. Furthermore, residents have expressed interest in developing recreational facilities, such as a roller-skating rink and a healing circle, to promote community wellness and engagement.
5. **Sports and Recreation** - The growing population of Smiths Falls has highlighted the need for improved sports facilities, with residents advocating for amenities such as lawn bowling and ski trails. There is a strong interest in creating a multi-purpose path that connects existing recreational spaces, such as the skate park, tennis courts, and arena, to the railway and museum, facilitating easier access to these areas.
6. **Retail and Economic Development** - There is a clear demand for increased retail options in Smiths Falls to better serve the community's needs. Residents believe that expanding retail offerings will enhance the town's economic vitality and improve access to goods and services, contributing to a more vibrant and connected community.

Strengthening the Heart of Smiths Falls: Building a Thriving and Unified Downtown

As Smiths Falls aims to revitalize its downtown area, a range of key themes has emerged from this tables' discussions that highlight both challenges and opportunities. Residents express a strong desire for incentives and design guidelines to enhance the aesthetic consistency and accessibility of the downtown, as well as a focus on leveraging the waterfront and promoting local businesses. This summary outlines the primary concerns and aspirations of the community, providing valuable insights that will inform future planning and development initiatives aimed at creating a vibrant and interconnected downtown through the Official Plan process.

1. **Revitalization and Incentives -** Residents believe that providing incentives for the revitalization of downtown buildings, along with reduced tax rates for improvement projects, would significantly benefit the area. There is also support for tax credits and incentives for local businesses to encourage their growth and sustainability.

WHAT WE HEARD ENGAGEMENT SUMMARY

2. **Fragmentation and Aesthetic Consistency -** The current state of the downtown area is perceived as fragmented, with only a few appealing streets amid a mix of unattractive facades. Many community members have noted the need for more consistent aesthetics similar to Beckwith on other downtown streets like Main and Russell, as these streets represent the downtown. Establishing design guidelines that prioritize character and create a cohesive look throughout the commercial district is considered vital.
3. **Heritage and Accessibility -** While heritage preservation is important, there is a call for heritage design guidelines that focus more on encouraging appropriate renovations rather than strictly enforcing a heritage district. Residents emphasize the need to balance preserving heritage buildings while ensuring accessibility, as current provisions hinder reconstruction efforts for accessibility improvements.
4. **Streetscape and Placemaking -** There is a strong desire for enhanced streetscape design and placemaking efforts in downtown Smiths Falls, which would include wayfinding signage to help residents and visitors navigate the area. Wider sidewalks and dedicated bike lanes are also recommended to improve pedestrian and cyclist experiences, making the entire downtown more welcoming and accessible to all.
5. **Waterfront and Branding -** The waterfront is seen as an underutilized asset, with calls to leverage its potential to enhance downtown vibrancy. Residents advocate for more branding of Smiths Falls throughout the downtown core to foster a sense of identity and community pride. Additionally, creating interconnected trails that link the downtown with surrounding neighborhoods was shared for promoting active transportation.
6. **Community Events and Density -** The community expresses a desire to incorporate festivals and events that bring people together, further energizing the downtown. Residents are also open to increasing building height and density, provided it is tasteful and aligns with the overall character of the area. Some residents shared examples from downtown Burlington, where buildings feature thoughtful first-floor retail and services that cater to residents living above, serve as a model for what could be achieved in Smiths Falls.
7. **Addressing Commercial Vacancy -** With the current commercial vacancy rate, residents are concerned about how to address this issue effectively. They seek thoughtful commercial development that aligns with the needs of local residents, emphasizing that the downtown should not become saturated with chain businesses. By fostering unique, community-oriented commercial spaces, Smiths Falls can cultivate a vibrant and diverse downtown atmosphere.

Conclusion

Your input will continue to shape the vision and strategic directions for Smiths Falls, ensuring that our Official Plan reflects a shared vision for the future. **Thank you** for your participation and for helping to build a stronger, more vibrant Smiths Falls.

WHAT WE HEARD ENGAGEMENT SUMMARY

Have more to say?

Visit smithsfalls.ca/opupdates to find out more information about the New Official Plan and ways you can get involved. You can also connect with us at: opupdate@smithfalls.ca

SMITHS FALLS

RISE AT THE FALLS

NOTICE OF STUDY COMMENCEMENT
TRANSPORTATION MASTER PLAN

The Study

The Corporation of the Town of Smiths Falls is currently engaged in creating a New Official Plan while **simultaneously creating a new Transportation Master Plan (TMP)**. Dillon Consulting has been retained to work with the Town and Stakeholders to define how the Town will grow and develop in the next 25 years and determine the best investments the Town can make in transportation infrastructure with a continued focus on sustainable transportation options.

The Process

The TMP is being undertaken in accordance with Approach #1 of the Master Planning process outlined in the Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011, 2015, 2023, and 2024), which is an approved process under the Environmental Assessment Act.

Get Involved

Public Consultation is a key component of the development of these two plans. Throughout the process there will be opportunities for residents, indigenous communities, stakeholders, and agencies to provide input and comments that will influence the direction the Town takes.
The next Public Engagement opportunity will be an Open House scheduled for Wednesday September 10, 2025, from 5pm-7pm at Town Hall in Council Chambers at 77 Beckwith Street North, Smiths Falls.

Contact Us

If you would like more information on the project or would like to provide input or comments, please contact the following at any time:

Paul McMunn, C.E.T.
Director of Public Works & Utilities
Town of Smiths Falls
77 Beckwith Street North
Smiths Falls, ON
K7A 2B8
613-283-4124 ext. 1152
pmcmunn@smithsfalls.ca

Jeff Axisa, MA
Consultant Project Manager
Dillon Consulting
12 James Street North, Suite 401
Hamilton, ON
L8R 2J9
905-901-2912 ext. 3440
jaxisa@dillon.ca

Notice first issued July 7, 2025.

Information being collected under the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.


Draft Release!
NEW OFFICIAL PLAN &
TRANSPORTATION MASTER PLAN
Open House
5 PM - 7 PM
September 10, 2025
Council Chambers
Town Hall
Five main themes for the Official Plan:
• Transportation, connections and mobility
• Community spaces and places
• Downtown revitalization
• Climate action & sustainability
• Housing
smithsfalls.ca/opupdates
SMITHS FALLS

TMP – Study Process

TMP – Vision & Goals

The Municipal Class EA Process

The Transportation Master Plan is following the Municipal Class Environmental Assessment Process for Master Plans for Phases 1 and 2:

Phase 1: Identify and describe the problems or opportunities

We are here

Phase 2A: Identify alternative solutions

Phase 2B: Evaluate alternative solutions

Phase 2C: Select preferred alternatives

What is the Goal of the TMP?

Develop a long-range transportation strategy that allows the Town's transportation network to meet its future growth needs while making all modes as convenient and accessible as driving, by expanding the person-capacity of corridors versus automobile capacity of corridors.

Objectives

1. Plan for growth by ensuring the road network can accommodate expected increases in traffic volumes.
2. Create a multi-modal network that emphasizes sustainable travel modes.
3. Improve connectivity within the Town and to key destinations.
4. Develop a prioritized list of infrastructure and capital upgrades.
5. Implement the Plan in a fiscally sustainable, accountable way.

TMP Vision

"Mobility in Smiths Falls will be safe, sustainable, and balanced, where multimodal accessibility enhances quality of life and supports growth, while preserving community character and ensuring fiscal responsibility."

SMITHS FALLS
RISE AT THE FALLS

DILLON CONSULTING

TMP – Planning for Growth: 2021 to 2046

Projected Growth to 2046

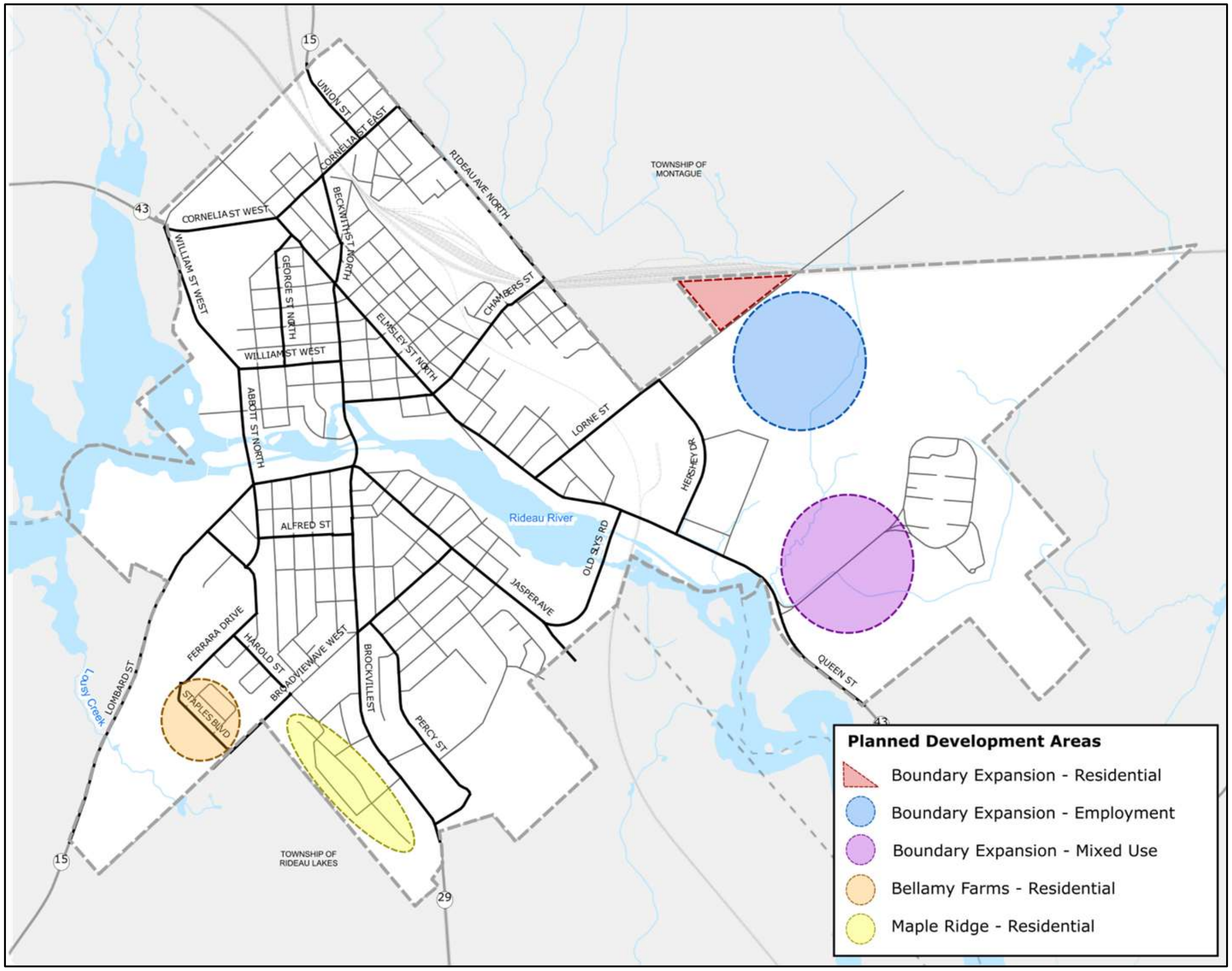
Year	Population (Persons)	Employment (Jobs)
2021	9,500	5,300
2046	13,100	7,100
Growth	3,600	1,800
	38%	34%

Boundary Expansion Lands: 520 residential units, a mix of detached homes, semi-detached homes, townhomes, and apartments. 425 jobs in the health, education, government, professional, industrial, and hospitality sectors.

Bellamy Farms: The development is already under construction. It is estimated that an additional 160 residential units will be constructed.

Maple Ridge: The development is already under construction. It is estimated that an additional 105 residential units will be constructed.

Planned Growth Areas



TMP – Problem Identification

The future road network for Smiths Falls has been reviewed to identify potential problems and opportunities. The identified problems and opportunities were compiled and arranged into four categories:

Road Operations

Arterial road capacities were assessed to determine how they are expected to operate based on the future projected number of cars. Roads were assessed as:

- Under capacity – no delays expected
- Approaching capacity – minor delays may occur
- At or above capacity – longer delays expected

Intersection Level of Service

Intersections were assessed to determine how they are expected to operate based on the future projected number of cars. Intersections are rated using Level of Service (LOS):

- LOS A to D – no or little delay
- LOS E – some delay
- LOS F – significant delay

Active Transportation

Planned active transportation improvements were identified in the Smiths Falls Active Transportation Plan. The feasibility of implementing the proposed facilities has been assessed based on the available Right of Way (ROW) widths and the existing road network configuration.

Connectivity

Future development areas were reviewed to identify if and where new roads will be needed to connect the future development to the existing transportation network.

SMITHS FALLS
RISE AT THE FALLS

DILLON CONSULTING

TMP – 2046 Problems & Opportunities

Road Operations

1. Elmsley St from Cornelia St to Beckwith St
2. Lombard St from the Town boundary to Beckwith St
3. Beckwith St from Chambers St to Lombard St

Intersection Level of Service

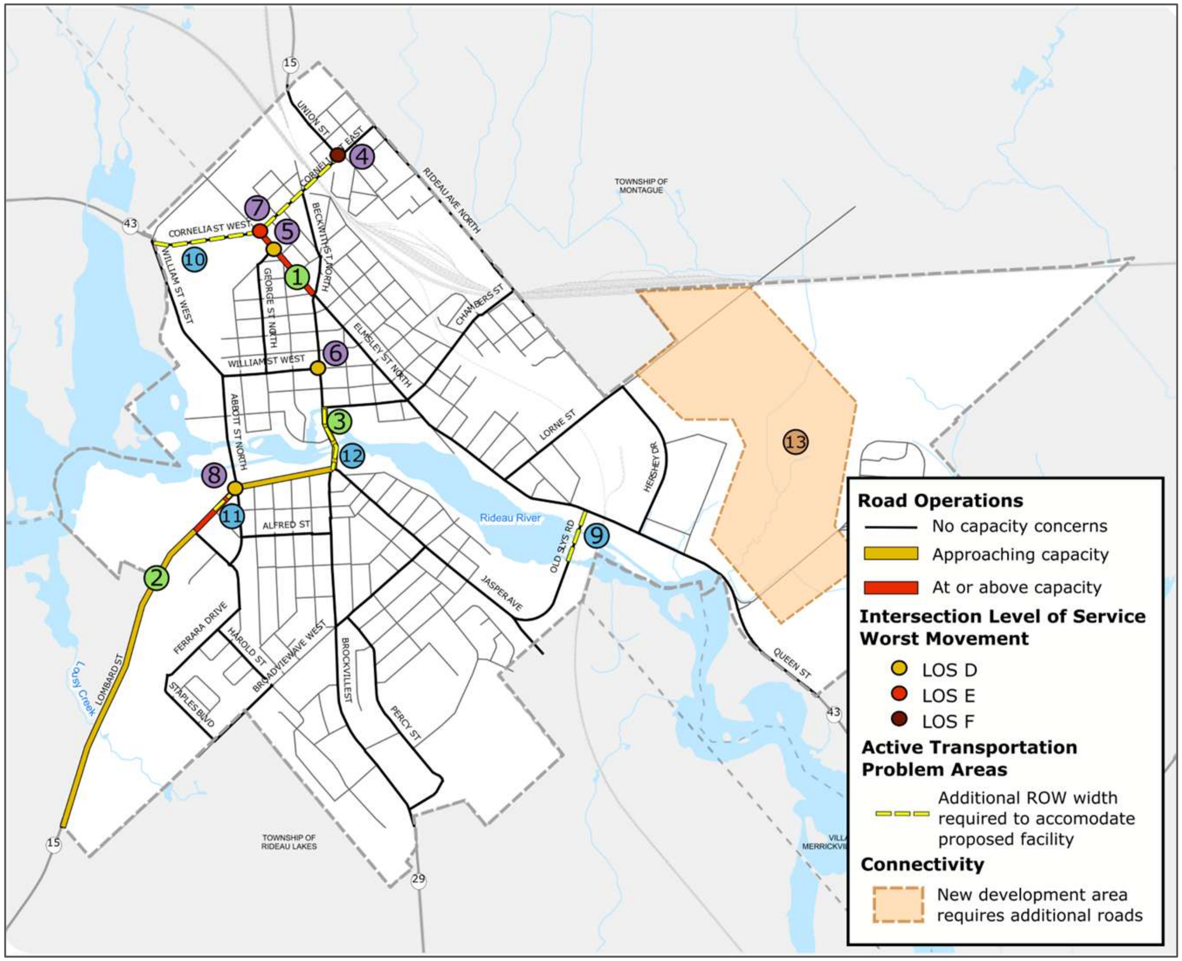
4. Union St & Cornelia St: SB approach - LOS F
5. Elmsley St & Lansdowne St: EB approach - LOS D
6. William St & Beckwith St: EB approach - LOS D
7. Elmsley St & Cornelia St: WB left - LOS E
8. Lombard St & Abbott St: WB approach - LOS D

Active Transportation

9. Old Slys Rd over bridge
10. Cornelia St from William St to Union St
11. Lombard St from Alfred St to Abbott St
12. Beckwith St from Lombard St to Chambers St

Connectivity

13. Boundary Expansion Area: New collector roads



SMITHS FALLS
RISE AT THE FALLS

DILLON CONSULTING

TMP – Next Steps

Following this round of consultation, we will:

- Compile and document your input and feedback received through this round of public engagement.
- Develop and assess alternative transportation solutions.
- Select the preferred alternatives.
- Develop an Implementation Plan that will include a TMP projects capital plan and a Monitoring Plan.
- Prepare the draft Transportation Master Plan for review.
- Release the draft TMP for public consultation.

Stay connected with our team:

Visit www.smithsfalls.ca/en/town-hall/opupdate.aspx to receive study updates.

TMP Project Leads

Paul McMunn
Municipal Project Lead
Town of Smiths Falls
pmcmunn@smithsfalls.ca
613-283-4124 ext. 1152

Jeff Axisa
Consultant Project Lead
Dillon Consulting
jaxisa@dillon.ca
905-901-2912 ext. 3340

NOTICE OF PUBLIC MEETING
DRAFT OF NEW OFFICIAL PLAN AND
DRAFT TRANSPORTATION MASTER PLAN

TAKE NOTICE that, in accordance with Section 17 and 21 of the Planning Act, R.S.O. 1990, as amended, the Town of Smiths Falls will hold a Public Meeting on Tuesday, **August 25, 2026, at 5:00 p.m**. in Council Chambers, Town Hall, 77 Beckwith Street North, Smiths Falls, to consider the draft New Official Plan and to provide an update on and gain input on the draft Transportation Master Plan.

THE PURPOSE AND EFFECT of the New Official Plan is to ensure that the Town's planning policies meet evolving community needs and are aligned with provincial policy, and that it establishes the structure to help manage how and where Smiths Falls will grow for the next 25 years as forecasted in the Land Needs Assessment.

The plan applies to all lands within the Town of Smiths Falls and is built to address 5 key themes: Transportation, Housing, Climate Change & Sustainability, Downtown Revitalization, and Community Spaces & Places. Each theme addresses how to further build Smiths Falls as a thriving, sustainable, and attractive community.

THE DRAFT TRANSPORTATION MASTER PLAN (TMP) examines current transportation challenges. It assesses current and future growth patterns to identify where transportation improvements are needed to maintain the current transportation network. The TMP is being undertaken in accordance with Approach #1 of the Master Planning process outlined in the Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011, 2015, 2023, and 2024), which is an approved process under the Environmental Assessment Act. As the New Official Plan and the New Transportation Master Plan will apply to all lands located within the Town of Smiths Falls, a location map has not been provided.

A COPY of the draft New Official Plan and the draft Transportation Master Plan along with relevant background materials is available for inspection weekdays between 8:30 a.m. and 4:30 p.m. in the Development Services Department at Town Hall, 77 Beckwith Street North, Smiths Falls or on our website at Town Projects | Town of Smiths Falls

IF A PERSON OR PUBLIC BODY would otherwise have an ability to appeal the decision of the Council of the town of Smiths Falls, to the Ontario Land Tribunal but the person or public body does not make oral submissions at a public meeting or make written submissions to The Town of Smiths Falls before the proposed official plan is adopted, the person or public body is not entitled to appeal the decision.

IF A PERSON OR PUBLIC BODY does not make oral submissions at a public meeting or make written submissions to the Town of Smiths Falls before the proposed official plan is adopted, the person or public body may not be added as a party to the hearing of an appeal before the Ontario Land Tribunal unless, in the opinion of the Tribunal, there are reasonable grounds to add the person or public body as a party.

IF YOU WISH TO BE NOTIFIED of the decision of the Town of Smiths Falls on the proposed New Official Plan, you must make a written request to the Town of Smiths Falls, P.O. Box 695, Smiths Falls, ON, K7A 4T6 or by email to kgrenke@smithsfalls.ca. If you would like to attend remotely, please contact the undersigned on or before August 18, 2026, at 4:30 p.m.

DATED at the Town of Smiths Falls, this 29th day of July 2026.

Karl Grenke
Manager of Development Services
77 Beckwith Street North, Smiths Falls, ON, K7A 2B8
Email: kgrenke@smithsfalls.ca
Phone: 613-283-4124 ext. 1116

For more information on the draft New Transportation Master Plan, contact:

Paul McMunn
Director, Public Works & Utilities
Town of Smiths Falls
pmcmunn@smithsfalls.ca
613-283-4124 ext.1152

Jeff Axisa
Consultant Project Manager
Dillon Consulting
jaxisa@dillon.ca
905-901-2912 ext. 3340

Information being collected under the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Appendix B

Synchro Operations Reports: Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	5	201	136	223	260	207	174	103
v/c Ratio	0.01	0.29	0.20	0.50	0.37	0.43	0.25	0.15
Control Delay	8.4	10.6	3.1	15.1	11.4	13.3	3.0	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	10.6	3.1	15.1	11.4	13.3	3.0	6.0
Queue Length 50th (m)	0.2	10.0	0.0	12.4	13.4	11.1	0.0	2.5
Queue Length 95th (m)	1.6	20.8	6.9	27.8	26.5	24.3	7.8	8.9
Internal Link Dist (m)		341.1			493.6	734.8		173.2
Turn Bay Length (m)	15.0		20.0	200.0			45.0	
Base Capacity (vph)	418	700	677	442	700	483	700	676
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.29	0.20	0.50	0.37	0.43	0.25	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	185	125	205	235	5	160	30	160	5	45	45
Future Volume (vph)	5	185	125	205	235	5	160	30	160	5	45	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		1.00	
Satd. Flow (prot)	1664	1752	1489	1664	1747			1681	1489		1635	
Flt Permitted	0.60	1.00	1.00	0.63	1.00			0.69	1.00		0.99	
Satd. Flow (perm)	1045	1752	1489	1107	1747			1209	1489		1618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	201	136	223	255	5	174	33	174	5	49	49
RTOR Reduction (vph)	0	0	82	0	2	0	0	0	104	0	29	0
Lane Group Flow (vph)	5	201	54	223	258	0	0	207	70	0	74	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0		18.0	
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0		18.0	
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40			0.40	0.40		0.40	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Grp Cap (vph)	418	700	595	442	698			483	595		647	
v/s Ratio Prot		0.11			0.15							
v/s Ratio Perm	0.00		0.04	c0.20				c0.17	0.05		0.05	
v/c Ratio	0.01	0.29	0.09	0.50	0.37			0.43	0.12		0.11	
Uniform Delay, d1	8.1	9.2	8.4	10.1	9.5			9.8	8.5		8.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.0	0.3	4.1	1.5			2.8	0.4		0.4	
Delay (s)	8.2	10.2	8.7	14.2	11.0			12.5	8.9		8.8	
Level of Service	A	B	A	B	B			B	A		A	
Approach Delay (s)		9.6			12.5			10.9			8.8	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	239	174	293	309	217	60	109
v/c Ratio	0.33	0.24	0.64	0.41	0.46	0.10	0.17
Control Delay	11.1	2.8	19.4	11.7	15.2	3.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	2.8	19.4	11.7	15.2	3.9	10.5
Queue Length 50th (m)	13.2	0.0	19.2	17.4	13.7	0.0	5.8
Queue Length 95th (m)	25.8	7.8	#44.5	32.7	28.7	5.0	13.5
Internal Link Dist (m)	493.6			562.8	85.3		336.0
Turn Bay Length (m)		30.0				55.0	
Base Capacity (vph)	726	739	459	751	475	617	632
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.24	0.64	0.41	0.46	0.10	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	215	160	270	270	15	160	40	55	20	75	5
Future Volume (vph)	5	215	160	270	270	15	160	40	55	20	75	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.96	1.00		0.99	
Satd. Flow (prot)		1701	1489	1664	1738			1684	1489		1724	
Flt Permitted		0.99	1.00	0.61	1.00			0.70	1.00		0.93	
Satd. Flow (perm)		1691	1489	1069	1738			1220	1489		1615	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	234	174	293	293	16	174	43	60	22	82	5
RTOR Reduction (vph)	0	0	99	0	4	0	0	0	37	0	3	0
Lane Group Flow (vph)	0	239	75	293	305	0	0	217	23	0	106	0
Heavy Vehicles (%)	1%	4%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)		21.5	21.5	21.5	21.5			19.5	19.5		19.5	
Effective Green, g (s)		21.5	21.5	21.5	21.5			19.5	19.5		19.5	
Actuated g/C Ratio		0.43	0.43	0.43	0.43			0.39	0.39		0.39	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Grp Cap (vph)		727	640	459	747			475	580		629	
v/s Ratio Prot					0.18							
v/s Ratio Perm		0.14	0.05	c0.27				c0.18	0.02		0.07	
v/c Ratio		0.33	0.12	0.64	0.41			0.46	0.04		0.17	
Uniform Delay, d1		9.5	8.6	11.2	9.9			11.3	9.5		10.0	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		1.2	0.4	6.7	1.7			3.1	0.1		0.6	
Delay (s)		10.7	8.9	17.8	11.5			14.5	9.6		10.5	
Level of Service		B	A	B	B			B	A		B	
Approach Delay (s)		9.9			14.6			13.4			10.5	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group
Lane Group Flow (vph)
v/c Ratio
Control Delay
Queue Delay
Total Delay
Queue Length 50th (m)
Queue Length 95th (m)
Internal Link Dist (m)
Turn Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)						
Lane Util. Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0
Turn Type	Perm			Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)						
Effective Green, g (s)						
Actuated g/C Ratio						
Clearance Time (s)						
Lane Grp Cap (vph)						
v/s Ratio Prot						
v/s Ratio Perm						
v/c Ratio						
Uniform Delay, d1						
Progression Factor						
Incremental Delay, d2						
Delay (s)						
Level of Service						
Approach Delay (s)		0.0	0.0		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM 2000 Control Delay	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.00		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	150	30	20	130	5	25	15	30	10	10	5
Future Volume (Veh/h)	5	150	30	20	130	5	25	15	30	10	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	163	33	22	141	5	27	16	33	11	11	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		207										
pX, platoon unblocked												
vC, conflicting volume	146			196			388	380	180	418	394	144
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146			196			388	380	180	418	394	144
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			95	97	96	98	98	99
cM capacity (veh/h)	1442			1383			553	544	866	507	534	907

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	201	168	76	27
Volume Left	5	22	27	11
Volume Right	33	5	33	5
cSH	1442	1383	653	565
Volume to Capacity	0.00	0.02	0.12	0.05
Queue Length 95th (m)	0.1	0.4	3.0	1.1
Control Delay (s)	0.2	1.1	11.2	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	1.1	11.2	11.7
Approach LOS			B	B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	20	15	270	435	25
Future Volume (Veh/h)	25	20	15	270	435	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	22	16	293	473	27
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				315	109	
pX, platoon unblocked	0.92	0.92	0.92			
vC, conflicting volume	812	486	500			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	749	395	410			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	96	98			
cM capacity (veh/h)	344	602	1059			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	49	309	500
Volume Left	27	16	0
Volume Right	22	0	27
cSH	426	1059	1700
Volume to Capacity	0.12	0.02	0.29
Queue Length 95th (m)	2.9	0.3	0.0
Control Delay (s)	14.5	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	14.5	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	114	217	119	239	190	326
v/c Ratio	0.27	0.34	0.21	0.38	0.30	0.45
Control Delay	21.8	21.4	9.7	7.0	10.9	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	21.4	9.7	7.0	10.9	3.7
Queue Length 50th (m)	10.1	18.2	5.5	0.1	9.6	0.0
Queue Length 95th (m)	m16.7	m29.7	13.3	13.0	20.3	10.9
Internal Link Dist (m)		159.1	128.4	422.4	291.5	
Turn Bay Length (m)	40.0					40.0
Base Capacity (vph)	429	630	576	631	625	731
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.34	0.21	0.38	0.30	0.45

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	175	25	25	80	5	15	125	80	5	170	300
Future Volume (vph)	105	175	25	25	80	5	15	125	80	5	170	300
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.98			0.99			0.95			1.00	0.85
Flt Protected	0.95	1.00			0.99			1.00			1.00	1.00
Satd. Flow (prot)	1498	1547			1550			1494			1575	1340
Flt Permitted	0.68	1.00			0.91			0.98			0.99	1.00
Satd. Flow (perm)	1073	1547			1434			1465			1565	1340
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	190	27	27	87	5	16	136	87	5	185	326
RTOR Reduction (vph)	0	11	0	0	3	0	0	46	0	0	0	196
Lane Group Flow (vph)	114	206	0	0	116	0	0	193	0	0	190	130
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	18.0	18.0			18.0			18.0			18.0	18.0
Effective Green, g (s)	18.0	18.0			18.0			18.0			18.0	18.0
Actuated g/C Ratio	0.40	0.40			0.40			0.40			0.40	0.40
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Grp Cap (vph)	429	618			573			586			626	536
v/s Ratio Prot		c0.13										
v/s Ratio Perm	0.11				0.08			c0.13			0.12	0.10
v/c Ratio	0.27	0.33			0.20			0.33			0.30	0.24
Uniform Delay, d1	9.1	9.3			8.8			9.3			9.2	9.0
Progression Factor	2.12	2.25			1.00			0.77			1.00	1.00
Incremental Delay, d2	1.3	1.2			0.8			1.5			1.2	1.1
Delay (s)	20.5	22.2			9.6			8.7			10.5	10.0
Level of Service	C	C			A			A			B	B
Approach Delay (s)		21.6			9.6			8.7			10.2	
Approach LOS		C			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	60	15	240	55	20	270
Future Volume (Veh/h)	60	15	240	55	20	270
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	16	261	60	22	293
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	628	291			321	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	628	291			321	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	98			98	
cM capacity (veh/h)	440	751			1245	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	81	321	315
Volume Left	65	0	22
Volume Right	16	60	0
cSH	549	1700	1245
Volume to Capacity	0.15	0.19	0.02
Queue Length 95th (m)	3.9	0.0	0.4
Control Delay (s)	13.7	0.0	0.7
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	0.7
Approach LOS	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	20	15	5	20	20	365	20	15	390	10
Future Volume (Veh/h)	5	5	20	15	5	20	20	365	20	15	390	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	22	16	5	22	22	397	22	16	424	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								178			365	
pX, platoon unblocked	0.86	0.86		0.86	0.86	0.86				0.86		
vC, conflicting volume	927	924	430	932	919	408	435			419		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	835	832	430	841	826	233	435			245		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	96	93	98	97	98			99		
cM capacity (veh/h)	231	255	628	228	257	697	1130			1143		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	32	43	22	419	16	435
Volume Left	5	16	22	0	16	0
Volume Right	22	22	0	22	0	11
cSH	419	355	1130	1700	1143	1700
Volume to Capacity	0.08	0.12	0.02	0.25	0.01	0.26
Queue Length 95th (m)	1.9	3.1	0.5	0.0	0.3	0.0
Control Delay (s)	14.3	16.5	8.2	0.0	8.2	0.0
Lane LOS	B	C	A		A	
Approach Delay (s)	14.3	16.5	0.4		0.3	
Approach LOS	B	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	234	43	413	179	27	391
v/c Ratio	0.39	0.08	0.66	0.28	0.10	0.62
Control Delay	11.7	4.1	17.3	3.3	11.1	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	4.1	17.3	3.3	11.1	17.8
Queue Length 50th (m)	11.8	0.1	24.8	0.0	1.4	25.8
Queue Length 95th (m)	24.4	4.1	#49.3	8.0	m3.1	50.7
Internal Link Dist (m)	389.9		106.6			153.8
Turn Bay Length (m)		25.0		90.0	15.0	
Base Capacity (vph)	599	561	630	643	263	630
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.08	0.66	0.28	0.10	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	215	40	380	165	25	360
Future Volume (vph)	215	40	380	165	25	360
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1498	1340	1577	1340	1498	1577
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1498	1340	1577	1340	659	1577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	43	413	179	27	391
RTOR Reduction (vph)	0	26	0	107	0	0
Lane Group Flow (vph)	234	17	413	72	27	391
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	599	536	630	536	263	630
v/s Ratio Prot	c0.16		c0.26			0.25
v/s Ratio Perm		0.01		0.05	0.04	
v/c Ratio	0.39	0.03	0.66	0.13	0.10	0.62
Uniform Delay, d1	9.6	8.2	11.0	8.6	8.4	10.8
Progression Factor	0.96	1.06	1.00	1.00	1.15	1.16
Incremental Delay, d2	1.9	0.1	5.3	0.5	0.7	4.4
Delay (s)	11.2	8.8	16.2	9.1	10.5	16.9
Level of Service	B	A	B	A	B	B
Approach Delay (s)	10.8		14.1			16.5
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	43	27	136	65	223	38	218
v/c Ratio	0.21	0.07	0.06	0.20	0.15	0.32	0.09	0.31
Control Delay	7.9	2.3	8.8	7.0	8.7	9.4	6.0	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	2.3	8.8	7.0	8.7	9.4	6.0	6.4
Queue Length 50th (m)	6.0	0.0	1.2	4.1	3.0	10.5	1.2	6.1
Queue Length 95th (m)	9.0	1.8	4.5	11.7	8.3	20.7	m3.7	11.8
Internal Link Dist (m)	389.9			169.9		156.7		217.9
Turn Bay Length (m)		25.0	22.0		35.0		22.0	
Base Capacity (vph)	656	621	469	692	436	700	433	699
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.07	0.06	0.20	0.15	0.32	0.09	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	100	40	25	80	45	60	195	10	35	180	20
Future Volume (vph)	25	100	40	25	80	45	60	195	10	35	180	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.98	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735	1489	1664	1657		1664	1739		1664	1725	
Flt Permitted		0.94	1.00	0.67	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)		1641	1489	1174	1657		1090	1739		1085	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	109	43	27	87	49	65	212	11	38	196	22
RTOR Reduction (vph)	0	0	26	0	29	0	0	4	0	0	9	0
Lane Group Flow (vph)	0	136	17	27	107	0	65	219	0	38	209	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		18.0	18.0	18.0	18.0		18.0	18.0		18.0	18.0	
Effective Green, g (s)		18.0	18.0	18.0	18.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio		0.40	0.40	0.40	0.40		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Grp Cap (vph)		656	595	469	662		436	695		434	690	
v/s Ratio Prot					0.06			c0.13			0.12	
v/s Ratio Perm		c0.08	0.01	0.02			0.06			0.04		
v/c Ratio		0.21	0.03	0.06	0.16		0.15	0.31		0.09	0.30	
Uniform Delay, d1		8.8	8.2	8.3	8.7		8.6	9.3		8.4	9.2	
Progression Factor		0.78	0.57	1.00	1.00		0.88	0.87		0.64	0.59	
Incremental Delay, d2		0.7	0.1	0.2	0.5		0.7	1.2		0.4	1.1	
Delay (s)		7.6	4.8	8.5	9.2		8.3	9.3		5.8	6.5	
Level of Service		A	A	A	A		A	A		A	A	
Approach Delay (s)		6.9			9.1			9.1			6.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	16	511	98	136	527	108	174	54
v/c Ratio	0.08	0.73	0.15	0.62	0.75	0.21	0.25	0.09
Control Delay	9.6	19.8	3.2	28.4	20.9	10.3	3.0	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	19.8	3.2	28.4	20.9	10.3	3.0	5.5
Queue Length 50th (m)	0.7	32.0	0.0	8.0	33.0	5.2	0.0	1.0
Queue Length 95th (m)	3.5	#71.0	5.9	#29.1	#74.7	12.8	7.8	5.4
Internal Link Dist (m)		132.2			287.6	205.9		43.2
Turn Bay Length (m)	60.0		80.0					
Base Capacity (vph)	206	700	654	218	700	512	700	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.73	0.15	0.62	0.75	0.21	0.25	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	470	90	125	465	20	95	5	160	15	5	30
Future Volume (vph)	15	470	90	125	465	20	95	5	160	15	5	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85		0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)	1664	1752	1489	1664	1741			1672	1489		1584	
Flt Permitted	0.29	1.00	1.00	0.31	1.00			0.73	1.00		0.93	
Satd. Flow (perm)	516	1752	1489	546	1741			1281	1489		1492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	511	98	136	505	22	103	5	174	16	5	33
RTOR Reduction (vph)	0	0	59	0	4	0	0	0	104	0	20	0
Lane Group Flow (vph)	16	511	39	136	523	0	0	108	70	0	34	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0		18.0	
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0		18.0	
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40			0.40	0.40		0.40	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Grp Cap (vph)	206	700	595	218	696			512	595		596	
v/s Ratio Prot		0.29			c0.30							
v/s Ratio Perm	0.03		0.03	0.25				c0.08	0.05		0.02	
v/c Ratio	0.08	0.73	0.07	0.62	0.75			0.21	0.12		0.06	
Uniform Delay, d1	8.4	11.4	8.3	10.8	11.6			8.8	8.5		8.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.7	6.6	0.2	12.7	7.4			0.9	0.4		0.2	
Delay (s)	9.1	18.0	8.5	23.5	18.9			9.8	8.9		8.5	
Level of Service	A	B	A	C	B			A	A		A	
Approach Delay (s)		16.3			19.9			9.2			8.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	299	434	451	70	201	402
v/c Ratio	0.69	0.47	0.50	0.13	0.43	0.53
Control Delay	21.5	11.1	11.0	13.2	19.5	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	11.1	11.0	13.2	19.5	4.9
Queue Length 50th (m)	22.3	27.3	27.2	4.5	17.0	0.0
Queue Length 95th (m)	#59.2	46.6	47.5	11.8	33.0	15.8
Internal Link Dist (m)		287.6	454.9	43.1	293.3	
Turn Bay Length (m)						35.0
Base Capacity (vph)	434	918	908	554	464	755
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.47	0.50	0.13	0.43	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	395	5	5	345	65	5	50	10	95	90	370
Future Volume (vph)	275	395	5	5	345	65	5	50	10	95	90	370
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	1.00			0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00			1.00			1.00			0.98	1.00
Satd. Flow (prot)	1664	1749			1714			1709			1708	1489
Flt Permitted	0.47	1.00			1.00			0.98			0.82	1.00
Satd. Flow (perm)	827	1749			1708			1682			1429	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	299	429	5	5	375	71	5	54	11	103	98	402
RTOR Reduction (vph)	0	0	0	0	11	0	0	7	0	0	0	271
Lane Group Flow (vph)	299	434	0	0	440	0	0	63	0	0	201	131
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	31.5	31.5			31.5			19.5			19.5	19.5
Effective Green, g (s)	31.5	31.5			31.5			19.5			19.5	19.5
Actuated g/C Ratio	0.52	0.52			0.52			0.32			0.32	0.32
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Grp Cap (vph)	434	918			896			546			464	483
v/s Ratio Prot		0.25										
v/s Ratio Perm	c0.36				0.26			0.04			c0.14	0.09
v/c Ratio	0.69	0.47			0.49			0.11			0.43	0.27
Uniform Delay, d1	10.6	9.0			9.1			14.2			15.9	15.0
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	8.7	1.7			1.9			0.4			2.9	1.4
Delay (s)	19.3	10.7			11.0			14.6			18.8	16.4
Level of Service	B	B			B			B			B	B
Approach Delay (s)		14.2			11.0			14.6			17.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	234	196	114	65	76	239	76	299	239
v/c Ratio	0.55	0.43	0.26	0.14	0.35	0.47	0.29	0.58	0.40
Control Delay	28.2	20.1	22.6	3.4	25.0	23.9	22.8	26.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	20.1	22.6	3.4	25.0	23.9	22.8	26.6	5.2
Queue Length 50th (m)	26.5	16.3	11.9	0.0	7.8	25.5	7.6	33.1	0.0
Queue Length 95th (m)	46.7	33.3	24.0	5.0	18.9	44.4	18.0	56.1	14.2
Internal Link Dist (m)		454.9	181.1			314.6		177.6	
Turn Bay Length (m)	60.0			35.0	40.0		110.0		
Base Capacity (vph)	427	456	444	452	219	513	265	513	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.43	0.26	0.14	0.35	0.47	0.29	0.58	0.40

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	110	70	5	100	60	70	220	0	70	275	220
Future Volume (vph)	215	110	70	5	100	60	70	220	0	70	275	220
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.94			1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1664	1650			1748	1489	1664	1752		1664	1752	1489
Flt Permitted	0.95	1.00			0.99	1.00	0.43	1.00		0.52	1.00	1.00
Satd. Flow (perm)	1664	1650			1730	1489	747	1752		908	1752	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	120	76	5	109	65	76	239	0	76	299	239
RTOR Reduction (vph)	0	33	0	0	0	48	0	0	0	0	0	169
Lane Group Flow (vph)	234	163	0	0	114	17	76	239	0	76	299	70
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	4	4			8			2			6	
Permitted Phases				8		8	2			6		6
Actuated Green, G (s)	18.0	18.0			18.0	18.0	20.5	20.5		20.5	20.5	20.5
Effective Green, g (s)	18.0	18.0			18.0	18.0	20.5	20.5		20.5	20.5	20.5
Actuated g/C Ratio	0.26	0.26			0.26	0.26	0.29	0.29		0.29	0.29	0.29
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Grp Cap (vph)	427	424			444	382	218	513		265	513	436
v/s Ratio Prot	c0.14	0.10						0.14			c0.17	
v/s Ratio Perm					c0.07	0.01	0.10			0.08		0.05
v/c Ratio	0.55	0.39			0.26	0.04	0.35	0.47		0.29	0.58	0.16
Uniform Delay, d1	22.5	21.4			20.7	19.5	19.5	20.3		19.1	21.1	18.4
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.0	2.6			1.4	0.2	4.4	3.0		2.7	4.8	0.8
Delay (s)	27.5	24.1			22.1	19.7	23.8	23.3		21.8	25.9	19.2
Level of Service	C	C			C	B	C	C		C	C	B
Approach Delay (s)		25.9			21.2			23.4			22.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	75	175	5	55	170
Future Volume (Veh/h)	15	75	175	5	55	170
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	82	190	5	60	185
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	498	192			195	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	498	192			195	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	90			96	
cM capacity (veh/h)	511	852			1384	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	98	195	60	185
Volume Left	16	0	60	0
Volume Right	82	5	0	0
cSH	768	1700	1384	1700
Volume to Capacity	0.13	0.11	0.04	0.11
Queue Length 95th (m)	3.3	0.0	1.0	0.0
Control Delay (s)	10.4	0.0	7.7	0.0
Lane LOS	B		A	
Approach Delay (s)	10.4	0.0	1.9	
Approach LOS	B			

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	35	25	315	390	15
Future Volume (Veh/h)	5	35	25	315	390	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	38	27	342	424	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					339	
pX, platoon unblocked	0.91	0.91	0.91			
vC, conflicting volume	828	432	440			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	762	327	336			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	94	98			
cM capacity (veh/h)	333	652	1119			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	43	27	342	440
Volume Left	5	27	0	0
Volume Right	38	0	0	16
cSH	587	1119	1700	1700
Volume to Capacity	0.07	0.02	0.20	0.26
Queue Length 95th (m)	1.8	0.6	0.0	0.0
Control Delay (s)	11.6	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.6	0.6		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	60	49	98	76	82	87
v/c Ratio	0.09	0.08	0.20	0.11	0.12	0.13
Control Delay	8.9	3.7	10.2	9.1	12.3	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	3.7	10.2	9.1	12.3	6.7
Queue Length 50th (m)	2.8	0.0	4.7	3.5	4.9	0.0
Queue Length 95th (m)	7.7	4.2	11.9	9.1	11.1	6.2
Internal Link Dist (m)	279.5			268.5	58.7	
Turn Bay Length (m)	45.0		60.0			40.0
Base Capacity (vph)	665	625	493	700	700	647
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.08	0.20	0.11	0.12	0.13

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	45	90	70	75	80
Future Volume (vph)	55	45	90	70	75	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1664	1489	1664	1752	1752	1489
Flt Permitted	0.95	1.00	0.70	1.00	1.00	1.00
Satd. Flow (perm)	1664	1489	1233	1752	1752	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	49	98	76	82	87
RTOR Reduction (vph)	0	29	0	0	0	52
Lane Group Flow (vph)	60	20	98	76	82	35
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	2			8	4	
Permitted Phases		2	8			4
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	665	595	493	700	700	595
v/s Ratio Prot	c0.04			0.04	0.05	
v/s Ratio Perm		0.01	c0.08			0.02
v/c Ratio	0.09	0.03	0.20	0.11	0.12	0.06
Uniform Delay, d1	8.4	8.2	8.8	8.5	8.5	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.36	2.20
Incremental Delay, d2	0.3	0.1	0.9	0.3	0.3	0.2
Delay (s)	8.7	8.3	9.7	8.8	11.9	18.4
Level of Service	A	A	A	A	B	B
Approach Delay (s)	8.5			9.3	15.3	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	45	10	65	5	10	60
Future Volume (Veh/h)	45	10	65	5	10	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	11	71	5	11	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						293
pX, platoon unblocked						
vC, conflicting volume	160	74			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	160	74			76	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			99	
cM capacity (veh/h)	827	991			1529	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	60	76	11	65
Volume Left	49	0	11	0
Volume Right	11	5	0	0
cSH	853	1700	1529	1700
Volume to Capacity	0.07	0.04	0.01	0.04
Queue Length 95th (m)	1.7	0.0	0.2	0.0
Control Delay (s)	9.5	0.0	7.4	0.0
Lane LOS	A		A	
Approach Delay (s)	9.5	0.0	1.1	
Approach LOS	A			

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	54	70	5	82	218	38	397
v/c Ratio	0.03	0.08	0.11	0.01	0.27	0.31	0.09	0.57
Control Delay	8.5	8.8	9.0	0.0	12.0	10.1	9.1	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	8.8	9.0	0.0	12.0	10.1	9.1	14.1
Queue Length 50th (m)	0.7	2.5	3.2	0.0	4.1	10.2	1.8	22.1
Queue Length 95th (m)	3.2	7.1	8.6	0.0	11.5	21.5	5.8	42.1
Internal Link Dist (m)		254.6	269.3			282.8		449.6
Turn Bay Length (m)	15.0			15.0	50.0		20.0	
Base Capacity (vph)	498	700	666	617	305	699	436	699
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.08	0.11	0.01	0.27	0.31	0.09	0.57

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	50	0	15	50	5	75	180	20	35	340	25
Future Volume (vph)	15	50	0	15	50	5	75	180	20	35	340	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	1752			1732	1489	1664	1725		1664	1734	
Flt Permitted	0.71	1.00			0.95	1.00	0.44	1.00		0.62	1.00	
Satd. Flow (perm)	1246	1752			1666	1489	764	1725		1090	1734	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	54	0	16	54	5	82	196	22	38	370	27
RTOR Reduction (vph)	0	0	0	0	0	3	0	9	0	0	6	0
Lane Group Flow (vph)	16	54	0	0	70	2	82	209	0	38	391	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	18.0	18.0			18.0	18.0	18.0	18.0		18.0	18.0	
Effective Green, g (s)	18.0	18.0			18.0	18.0	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.40	0.40			0.40	0.40	0.40	0.40		0.40	0.40	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Grp Cap (vph)	498	700			666	595	305	690		436	693	
v/s Ratio Prot		0.03						0.12			c0.23	
v/s Ratio Perm	0.01				c0.04	0.00	0.11			0.03		
v/c Ratio	0.03	0.08			0.11	0.00	0.27	0.30		0.09	0.56	
Uniform Delay, d1	8.2	8.4			8.5	8.1	9.1	9.2		8.4	10.5	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			0.3	0.0	2.2	1.1		0.4	3.3	
Delay (s)	8.3	8.6			8.8	8.1	11.2	10.3		8.8	13.8	
Level of Service	A	A			A	A	B	B		A	B	
Approach Delay (s)		8.5			8.7			10.6			13.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	75	20	180	50	25	260
Future Volume (Veh/h)	75	20	180	50	25	260
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	22	196	54	27	283
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	533	196			250	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	533	196			250	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	97			98	
cM capacity (veh/h)	499	848			1321	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	104	196	54	310
Volume Left	82	0	0	27
Volume Right	22	0	54	0
cSH	546	1700	1700	1321
Volume to Capacity	0.19	0.12	0.03	0.02
Queue Length 95th (m)	5.3	0.0	0.0	0.5
Control Delay (s)	13.1	0.0	0.0	0.9
Lane LOS	B			A
Approach Delay (s)	13.1	0.0		0.9
Approach LOS	B			

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

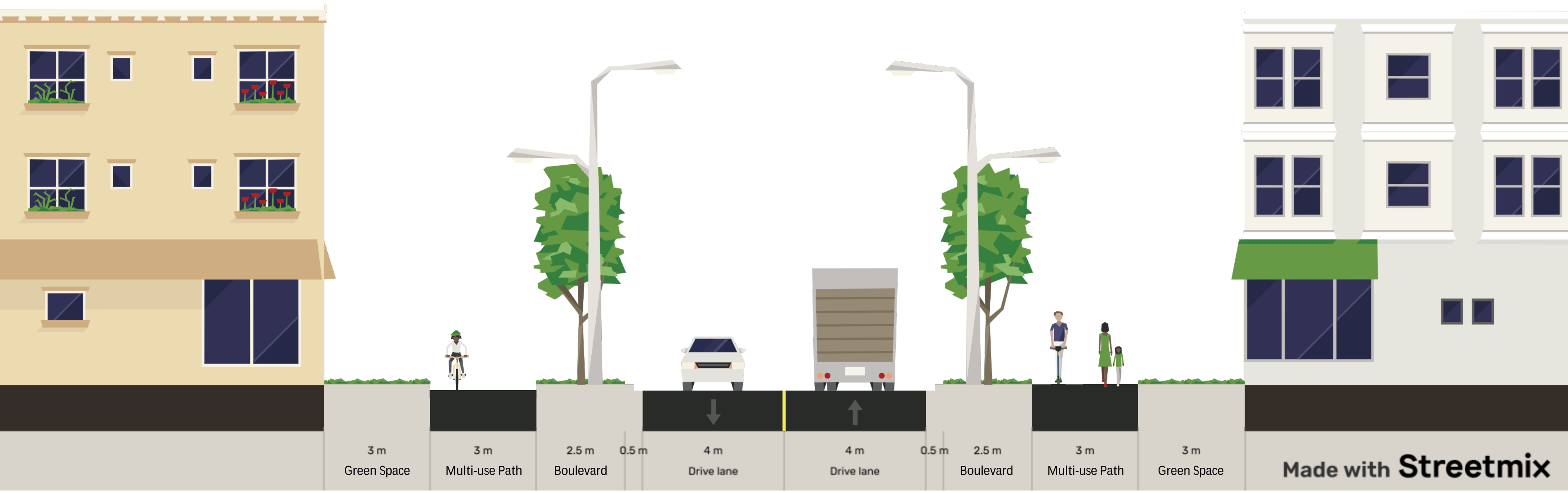
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		10				
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	0	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

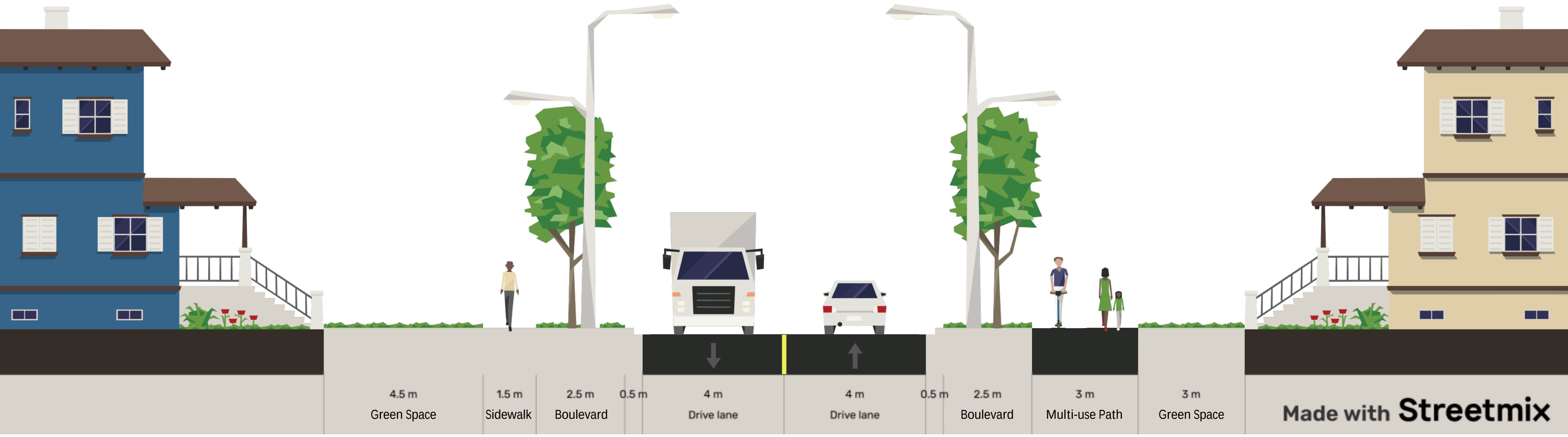
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

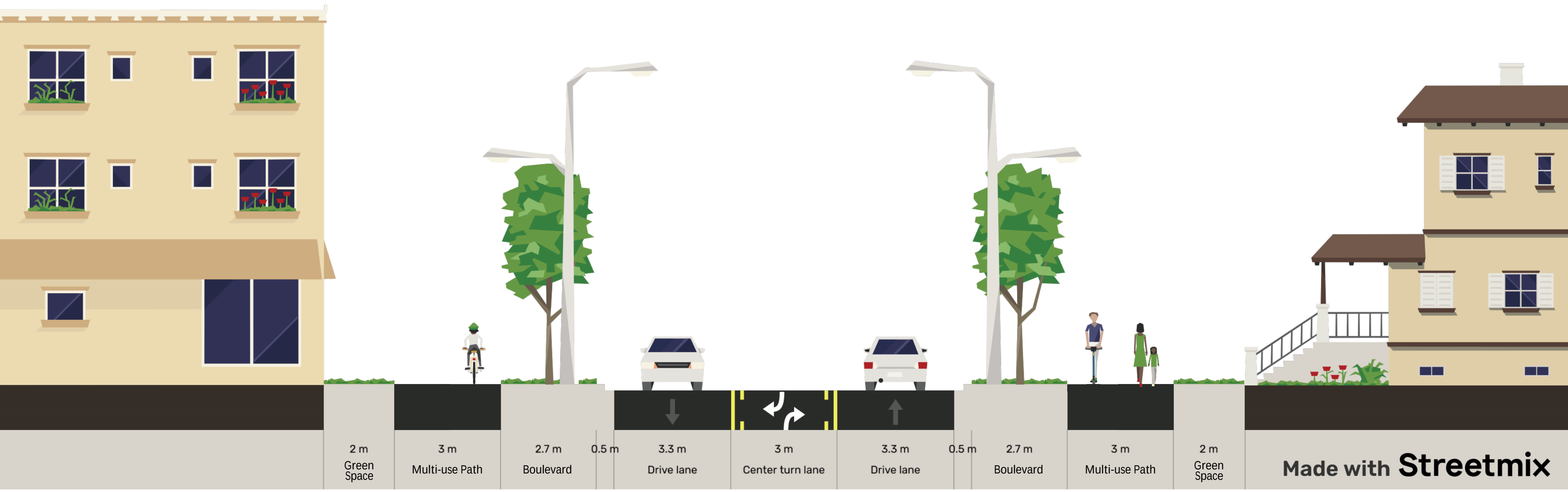
Complete Streets Standard Cross Sections



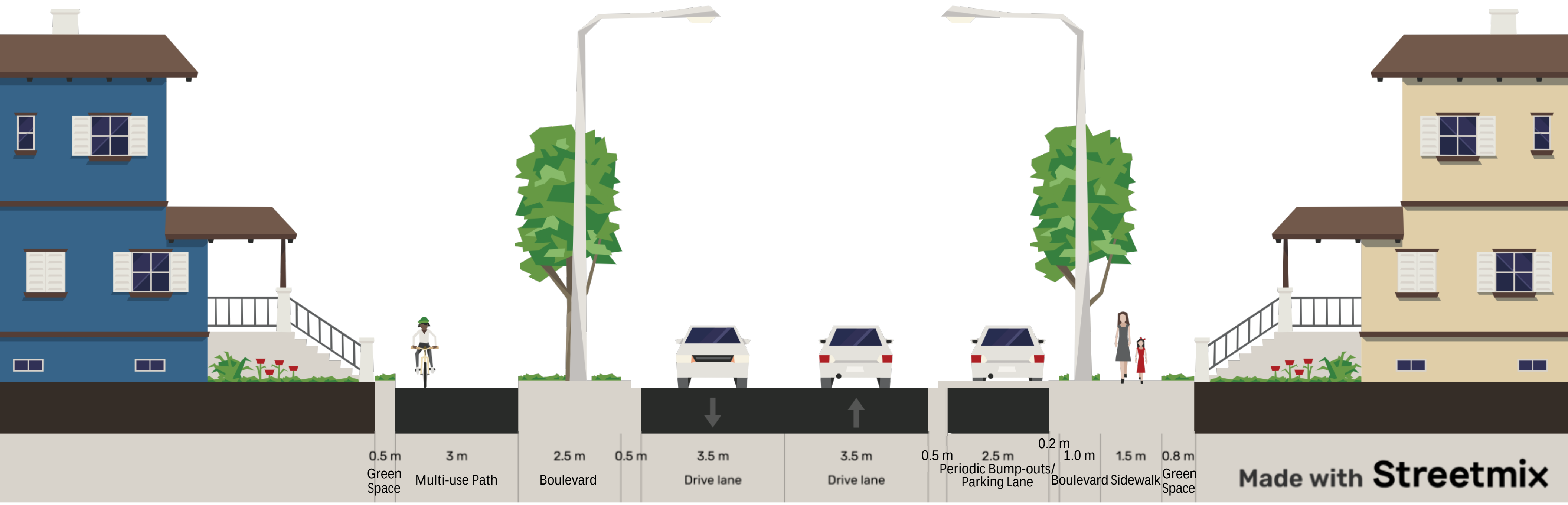
Arterial Street Cross Section (26m ROW) - 2 Lanes, Urban (Commercial)



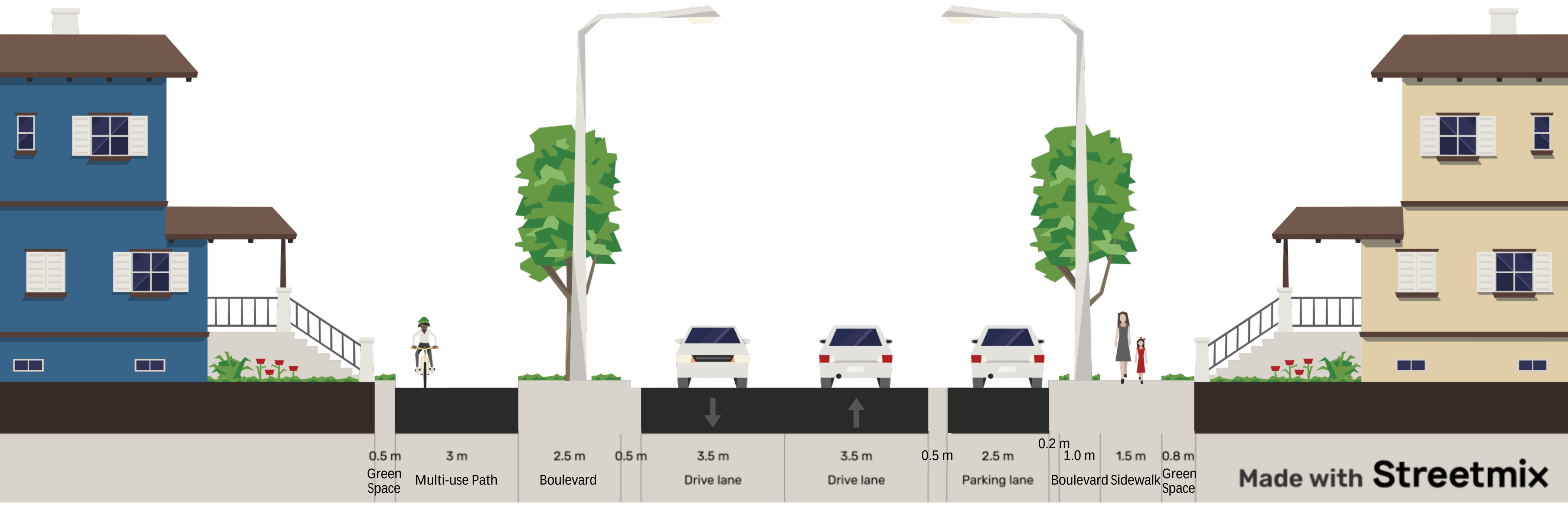
Arterial Street Cross Section (26m ROW) - 2 Lanes, Urban (Residential)



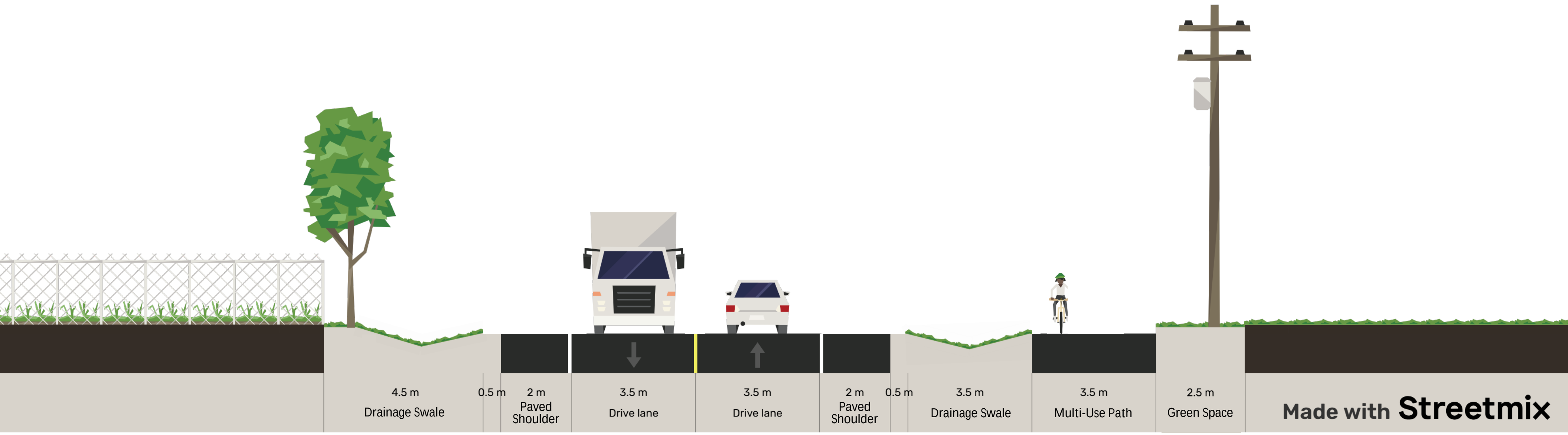
Arterial Street Cross Section (26m ROW) - 3 Lanes, Urban



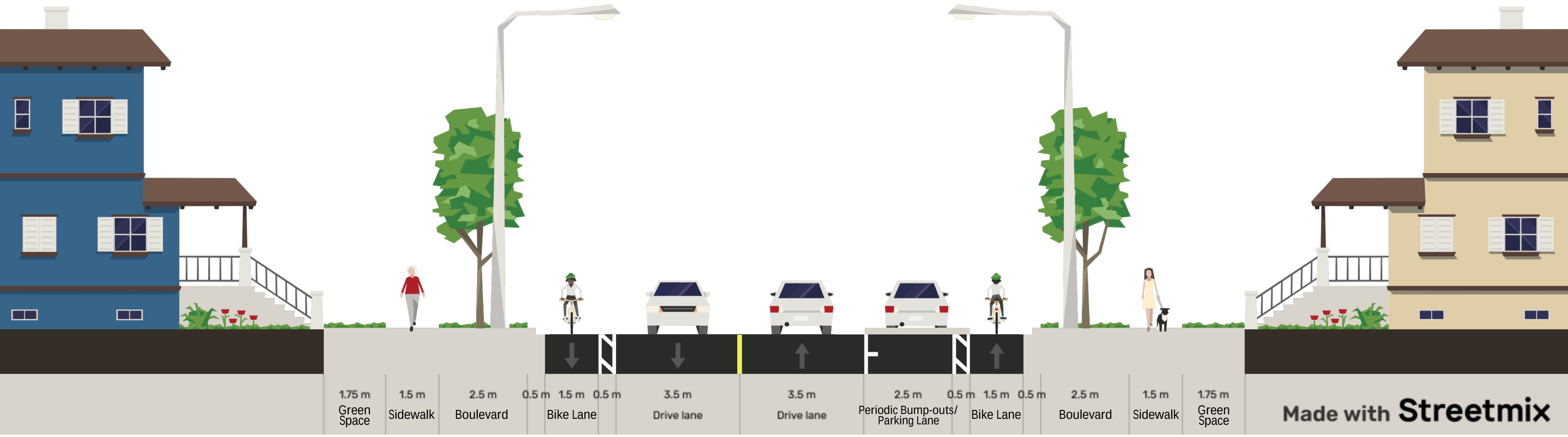
Collector Street Cross Section (20m ROW) - 2 Lanes, Urban



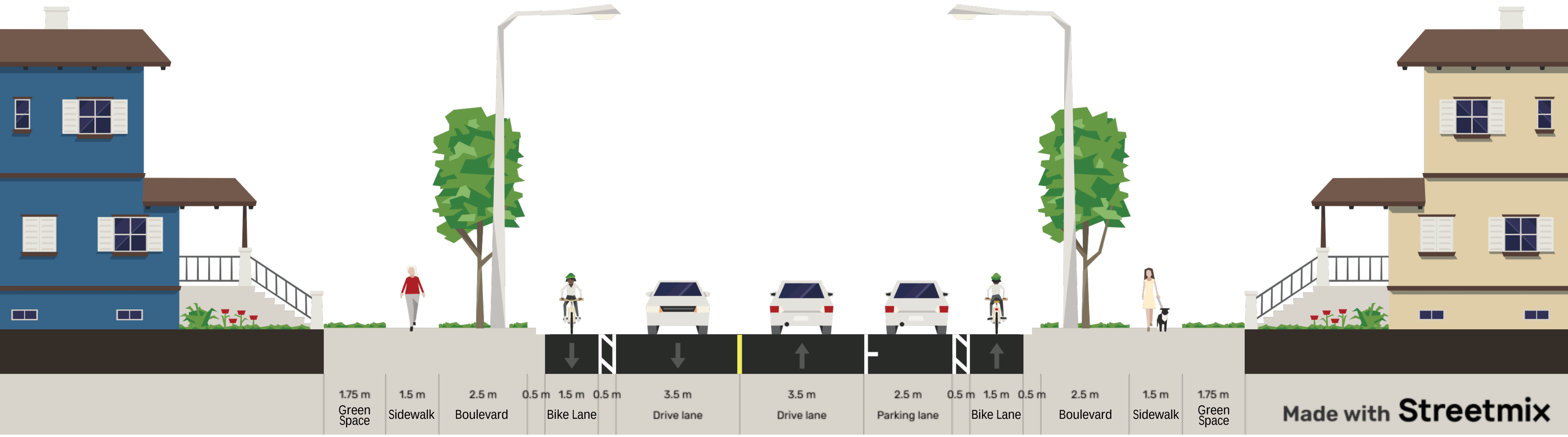
Collector Street Cross Section (20m ROW) - 2 Lanes, Urban



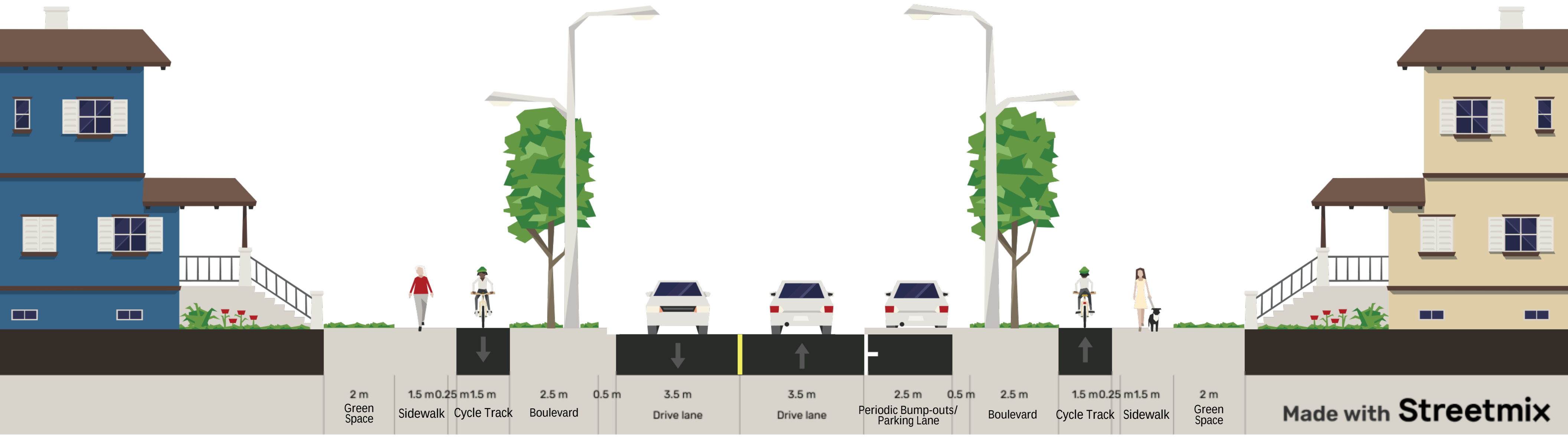
Collector Street Cross Section (26m ROW) - 2 Lanes, Rural (Industrial)



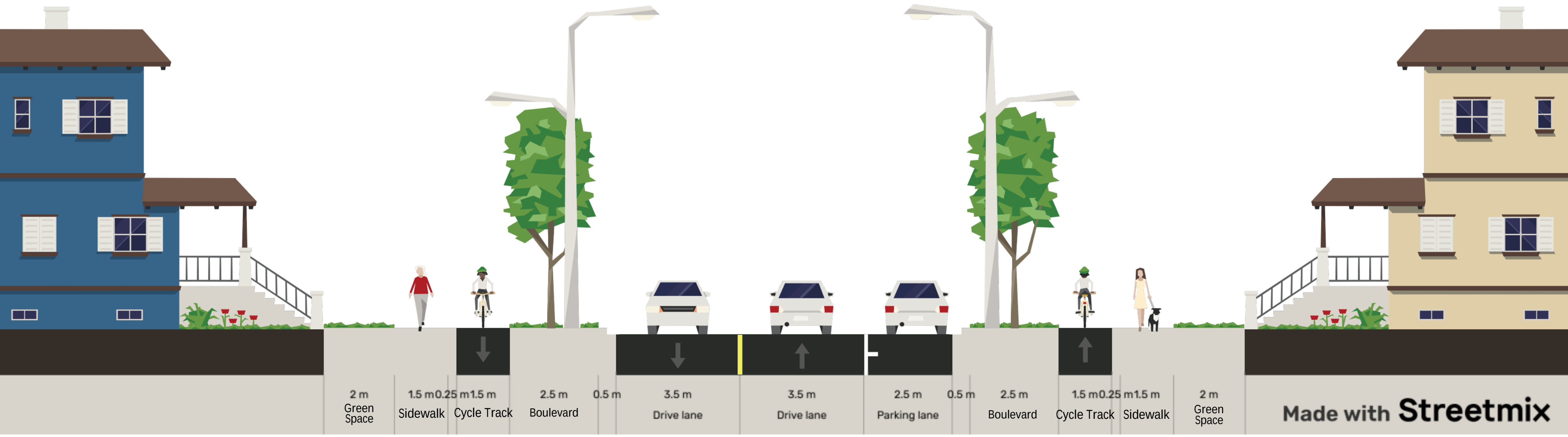
Collector Street Cross Section (26m ROW) - 2 Lanes, Urban (Alt #1)



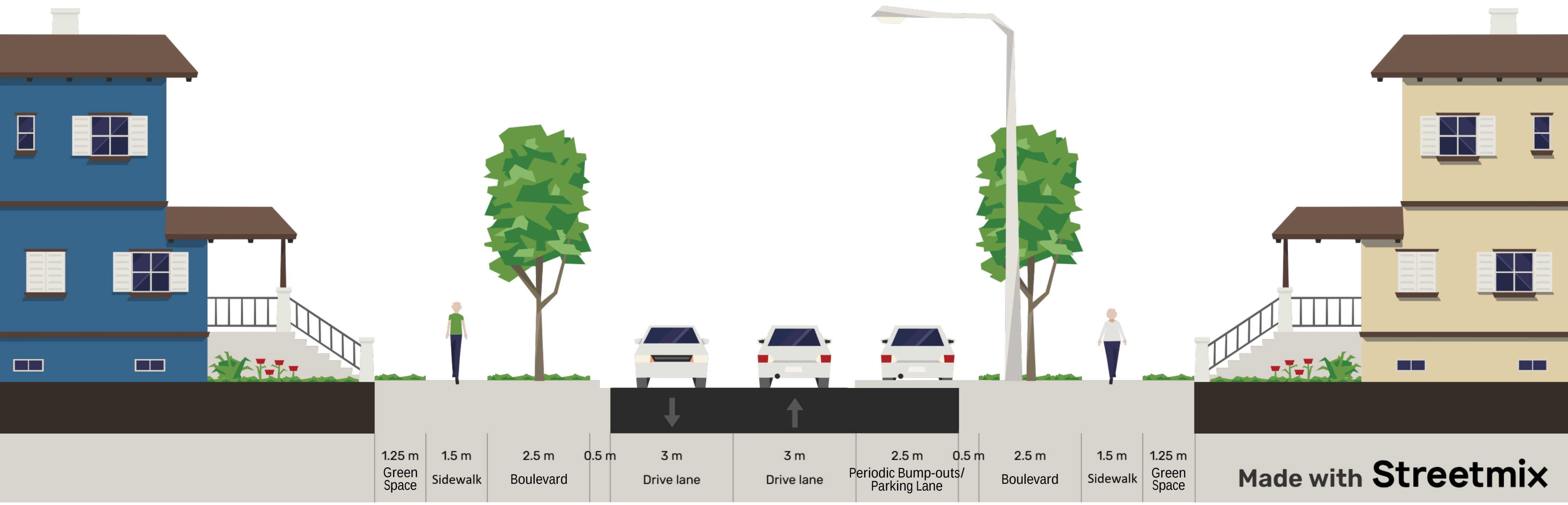
Collector Street Cross Section (26m ROW) - 2 Lanes, Urban (Alt #1)



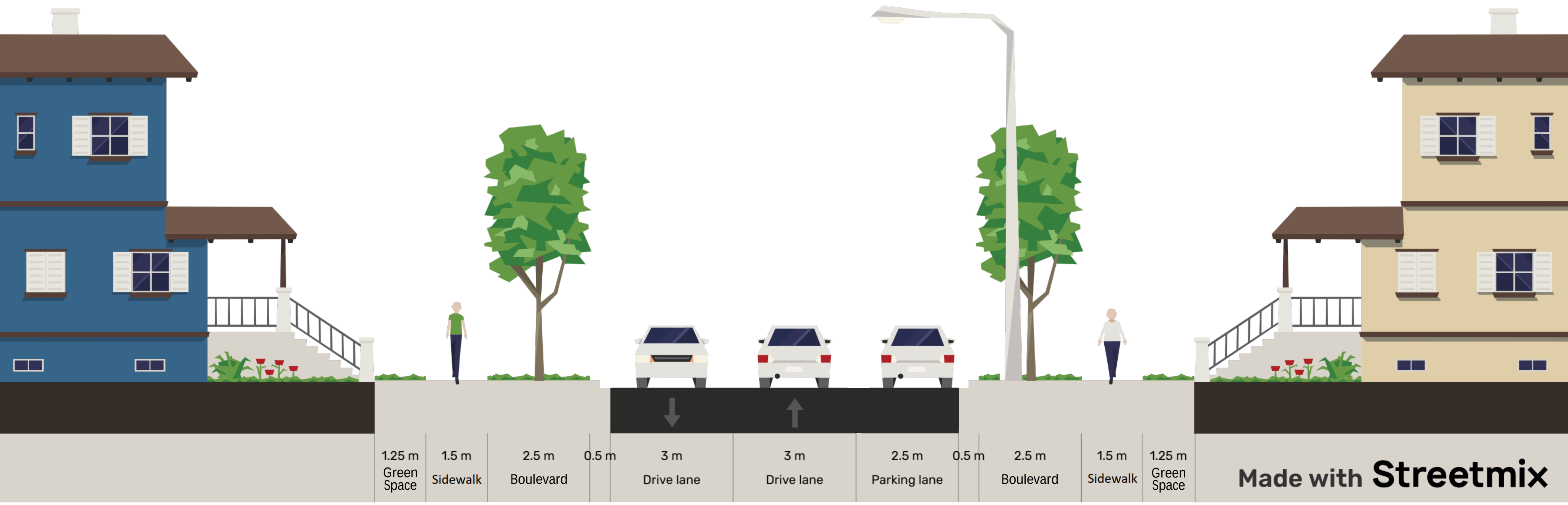
Collector Street Cross Section (26m ROW) - 2 Lanes, Urban (Alt #2)



Collector Street Cross Section (26m ROW) - 2 Lanes, Urban (Alt #2)



Residential Street Cross Section (20m ROW) - 2 Lanes, Urban



Residential Street Cross Section (20m ROW) - 2 Lanes, Urban

Appendix D

Trip Generation, Distribution and Assignment

Trip Generation, Distribution, and Assignment

This technical appendix outlines the methodology and calculations employed to assess the trip generation, distribution, and assignment of vehicle trips resulting from the future development planned for Smiths Falls.

1.0 Planned Development Breakdown

1.1 Employment

According to the Smiths Falls Land Needs Assessment, 1,800 new jobs will be necessary by 2046 to support the projected population growth. Of these, 420 jobs are expected to be located within the new employment lands in the boundary expansion area, while the remaining 1,380 jobs will be distributed throughout the town. The land needs analysis provides the following breakdown of employment by sector:

- Health – 550 jobs
- Education – 100 jobs
- Professional – 100 jobs
- Other Services – 105 jobs
- Transportation – 100 jobs
- Core industrial – 60 jobs
- Accommodation & food – 425 jobs
- Retail – 160 jobs
- Government & public administration – 50
- Art, entertainment, and recreation – 20
- Other services – 100

1.2 Residential

The Smiths Falls Land Needs Assessment projects that 1,618 new residential units will be required by 2046 to accommodate the anticipated population growth. The planned residential units will include 690 single-family and semi-detached homes, 311 townhomes, and 616 apartments.

The following breakdown of residential units has been identified:

- **Already constructed - 480 units**: 175 singles/semis, 92 townhomes, 213 apartments
- **Maple Ridge development - 105 units:** 105 singles/semis
- **Bellamy Farms development - 158 units:** 158 townhomes
- **Boundary Expansion Area - 521 units:** 410 singles/semis, 61 townhomes, 50 apartments
- **Dispersed throughout the Town - 353 units:** 353 apartments

2.0 Trip Generation

Trip generation for the PM peak hour was calculated using land use categories and trip generation rates from the ITE Trip Generation Manual, 11th Edition.

2.1 Employment

For certain employment sectors, a combination of land use categories was applied. The trip generation rates for each employment sector are detailed in **Table D1**. It is important to note that these rates account for trips generated by both customers and employees.

Table D1: ITE Trip Generation Rates, PM Peak Hour – Employment

Land Use	Rate	In %	Out %
Health			
Nursing Home – ITE 620	0.35	33%	67%
Hospital – ITE 610	0.28	30%	70%
Clinic – ITE 630	1.47	39%	61%
Average	*0.70*	*34%*	*66%*
Education			
District School Office - ITE 528	0.72	17%	83%
High School – ITE 525	1.61	53%	47%
Elementary School – ITE 520	1.78	48%	52%
Middle School – ITE 522	1.94	50%	50%
Average	*1.51*	*42%*	*58%*
Professional, Other Services			
Single Tenant Office Building – ITE 715	0.51	15%	85%
Transportation, Core Industrial			
General Light Industrial – ITE 110	0.49	22%	78%
Accommodation and Food			
High Turnover Restaurant - ITE 932	0.84	58%	42%
Hotel - ITE 310	0.93	54%	46%
Average	*0.88*	*56%*	*44%*
Retail			
Shopping Centre – ITE 820	1.28	50%	50%
Shopping Plaza – ITE 821	1.08	53%	47%
Average	*1.18*	*52%*	*49%*
Government and Public Administration			
Government Office Building - ITE 730	0.71	20%	80%
Art, Entertainment, Recreation			
Recreational Community Centre – ITE 495	2.66	44%	56%
Other Population Services			

Land Use	Rate	In %	Out %
Drive in Bank – ITE 912 (10%)	3.08	47%	53%
Automotive parts & service centre – ITE 943 (10%)	1.42	39%	61%
Quick Lubrication – 941 (10%)	2	42%	58%
Single Tenant Office Building – ITE 715 (70%)	0.51	15%	85%
Average	1.01	0.36	0.64

Utilizing these trip generation rates, the total number of trips generated by the 1,840 new jobs was calculated. As shown in **Table D2**, the new employment is expected to generate 627 inbound trips and 914 outbound trips during the PM peak hour.

Table D2: New Employment Trip Generation – PM Peak Hour

Employment Sector	# of Jobs	Trips In	Trips Out	Total Trips
Health	565	135	261	396
Education	114	72	100	172
Professional	100	8	43	51
Other Services	105	8	46	54
Transportation	114	12	44	56
Other Core Industrial	68	7	26	33
Accommodation and food	425	210	165	376
Retail	168	102	96	198
Government and Public Admin	52	7	30	37
Art, Entertainment, Recreation	23	27	34	61
Other Population Servicing	106	38	69	107
Total	**1,840**	**627**	**914**	**1,541**

Of the 420 jobs identified in the land needs analysis as being located in the boundary expansion lands, these have been further divided for this study into the Lorne Employment Lands and the Gallipeau Employment Lands. It is assumed that 25% of these jobs will be situated in the Lorne Employment Lands, while 75% will be in the Gallipeau Employment Lands. As shown in **Table D3**, the Lorne Employment Lands are projected to generate 36 inbound trips and 64 outbound trips during the PM peak hour, whereas the Gallipeau Employment Lands are expected to generate 73 inbound trips and 130 outbound trips

Table D3: Boundary Expansion Lands Employment Trip Generation

Employment Sector	Lorne Employment Lands			Gallipeau Employment Lands		
	# of Jobs	Trips In	Trips Out	# of Jobs	Trips In	Trips Out
Health	85	20	39	0	0	0
Education	17	11	15	0	0	0
Professional	0	0	0	23	2	10

Employment Sector	Lorne Employment Lands			Gallipeau Employment Lands		
	# of Jobs	Trips In	Trips Out	# of Jobs	Trips In	Trips Out
Other Services	0	0	0	24	2	10
Transportation	0	0	0	99	11	38
Other Core Industrial	0	0	0	59	6	23
Accommodation and food	0	0	0	64	32	25
Retail	0	0	0	25	15	14
Government and Public Admin	8	1	4	0	0	0
Art, Entertainment, Recreation	3	4	5	0	0	0
Other Population Servicing	0	0	0	16	6	10
Total	**113**	**36**	**64**	**310**	**73**	**130**

2.2 Residential

The residential trip generation rates are detailed in **Table D4**.

Table D4: ITE Trip Generation Rates, PM Peak Hour – Residential

Land Use	Rate	In %	Out %
Single/ Semi			
Single family detached – ITE 210	0.94	63%	37%
Townhomes			
Single family attached - ITE 215	0.57	59%	41%
Apartment			
Multifamily Housing (Mid-Rise) – ITE 221	0.39	61%	39%

The trip generation volumes by development are provided in **Table D5**. During the PM peak hour, the Maple Ridge development is projected to generate 99 trips, Bellamy Farms is expected to generate 90 trips, the boundary expansion lands will generate 440 trips, and the remaining residential units will generate 138 trips.

Table D5: Residential PM Peak Hour Trip Generation by Development

Unit Type	# of Units	Trips In	Trips Out	Total Trips
Maple Ridge				
Singles/ Semis	105	62	37	99
Bellamy Farms				
Townhomes	158	53	37	90
Boundary Expansion Lands				
Single/ Semi	410	243	143	385
Townhomes	61	21	14	35
Apartment	50	12	8	20
Total	*521*	*275*	*164*	*440*

Unit Type	# of Units	Trips In	Trips Out	Total Trips
Dispersed Throughout Town				
Apartment	353	84	54	138

3.0 Trip Distribution

3.1 Residential Trips

Trips generated by developments with known locations – Maple Ridge, Bellamy Farms, Boundary Expansion Lands, where distributed according to the path they are most likely to take.

Residential trip distribution patterns were informed by Census place of work data, which revealed that 40% of Smiths Falls residents are employed within the town, while the remaining 60% commute to communities outside of Smiths Falls.

For trips traveling to and from destinations outside of Smiths Falls, the Census data guided the directional distribution, with the following assumed routing:

- North – 35%, via Highway 15
- South - 10%, via Highway 29
- East - 35%, via Highway 43
- West – 20%, via Highway 43

Trips traveling to and from destinations within Smiths Falls were distributed across the town based on existing and planned commercial and employment areas.

3.2 Employment Trips

It was assumed that 40% of trips to and from employment areas originate from outside Smiths Falls, while the remaining 60% are from within the town.
To accurately estimate the number of trips generated by the new employment lands, it was essential to first exclude any trips generated by the new residential areas that were already accounted for in the residential distribution. The remaining new employment trips originating within Smiths Falls were distributed using engineering judgment, considering developed areas, density, and logical traffic routes.

3.3 General Development Growth Trips

The planned development includes 353 residential units and 1,394 jobs, though their specific locations within Smiths Falls are currently unknown. A portion of the trips destined to these areas has already been accounted for in the residential and employment distributions mentioned above. For employment, a 34% growth is planned, with the unaccounted employment trips representing 60% of this growth, approximately 20% overall. In terms of population, a 38% growth is forecast, with the unaccounted residential trips comprising 30% of the new residential trips, equating to about 11% of the total population growth.

To be conservative, an overall growth rate of 20% was applied, which translates to an annual growth rate of 0.75%. This rate was applied to all existing traffic volumes.

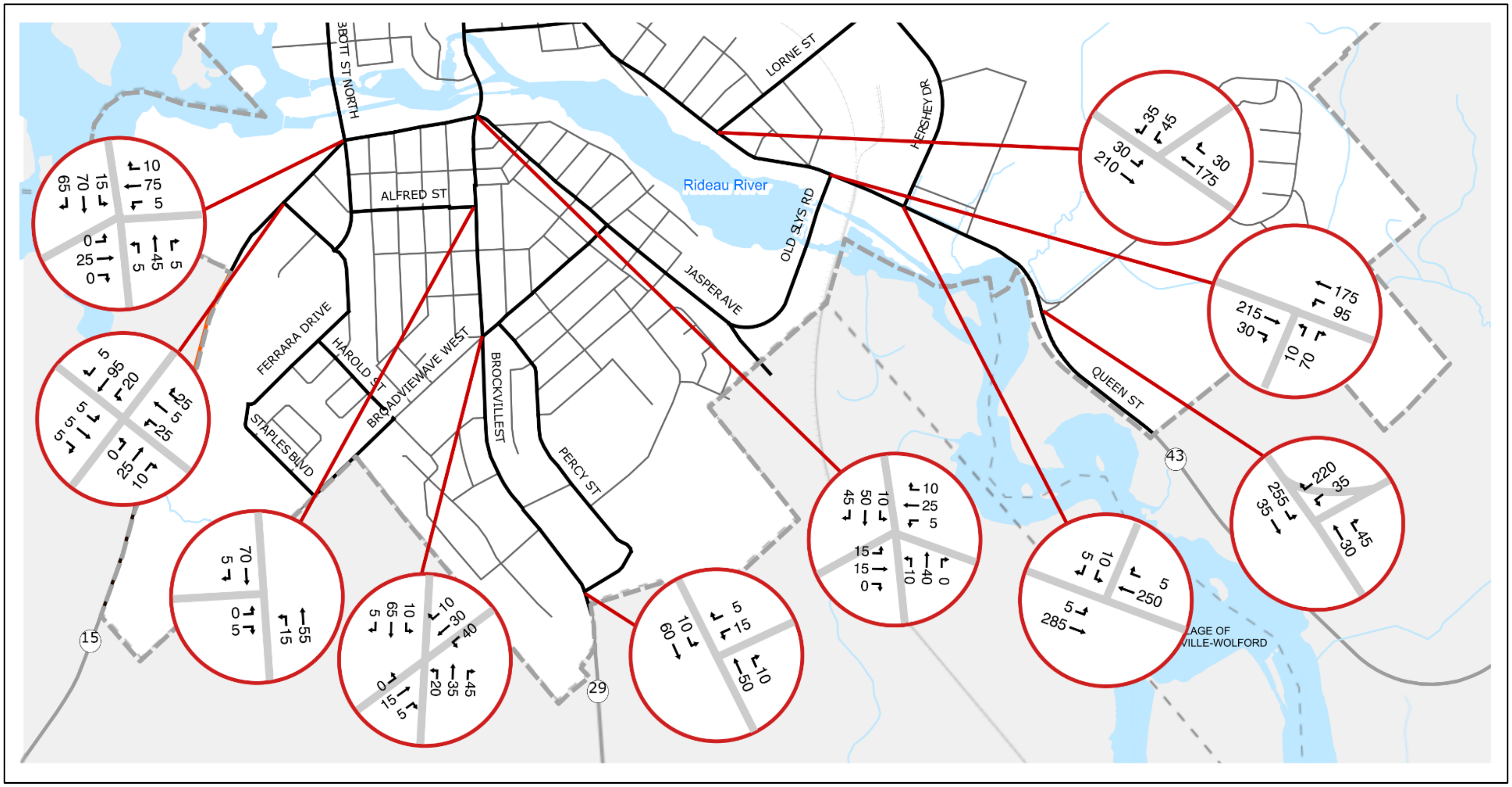
4.0 Trip Assignment

The resulting trip assignment for all new trips generated by the proposed residential and employment lands is illustrated in **Figure D1 and Figure D2**.

Figure D1:

CORNELIA ST WEST
CORNELIA ST EAST
UNION ST
RIDEAU AVE NORTH
TOWNSHIP OF MONTAGUE
BECKWITH ST NORTH
GEORGE ST NORTH
WILLIAM ST WEST
ELMSLEY ST NORTH
CHAMBERS ST
ABBOTT ST NORTH
LORNE ST
HERSHEY DR

Figure D2:



ALFRED ST
FERRARA DRIVE
HAROLD ST
BROADVIEW AVE WEST
STAPLES BLVD
BROCKVILLE ST
PERCY ST
JASPER AVE
Rideau River
OLD SLYS RD
LORNE ST
HERSHEY DR
QUEEN ST
43
15
29

Appendix E

Synchro Operations Reports: Future (2046) Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	5	250	158	326	353	266	245	130
v/c Ratio	0.01	0.30	0.20	0.67	0.43	0.56	0.34	0.20
Control Delay	8.2	10.5	2.6	20.0	11.9	19.2	3.6	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	10.5	2.6	20.0	11.9	19.2	3.6	7.6
Queue Length 50th (m)	0.3	14.5	0.0	23.4	21.8	20.2	0.0	4.1
Queue Length 95th (m)	1.7	26.9	7.4	#52.3	38.8	39.7	11.0	12.9
Internal Link Dist (m)		341.1			493.6	734.8		173.2
Turn Bay Length (m)	15.0		20.0	200.0			45.0	
Base Capacity (vph)	403	820	782	490	819	475	714	648
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.30	0.20	0.67	0.43	0.56	0.34	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	230	145	300	320	5	210	35	225	5	55	60
Future Volume (vph)	5	230	145	300	320	5	210	35	225	5	55	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		1.00	
Satd. Flow (prot)	1681	1769	1504	1681	1766			1697	1504		1647	
Flt Permitted	0.49	1.00	1.00	0.60	1.00			0.72	1.00		0.99	
Satd. Flow (perm)	870	1769	1504	1058	1766			1276	1504		1631	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	250	158	326	348	5	228	38	245	5	60	65
RTOR Reduction (vph)	0	0	85	0	1	0	0	0	154	0	41	0
Lane Group Flow (vph)	5	250	73	326	352	0	0	266	91	0	89	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	25.5	25.5	25.5	25.5	25.5			20.5	20.5		20.5	
Effective Green, g (s)	25.5	25.5	25.5	25.5	25.5			20.5	20.5		20.5	
Actuated g/C Ratio	0.46	0.46	0.46	0.46	0.46			0.37	0.37		0.37	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Grp Cap (vph)	403	820	697	490	818			475	560		607	
v/s Ratio Prot		0.14			0.20							
v/s Ratio Perm	0.01		0.05	c0.31				c0.21	0.06		0.05	
v/c Ratio	0.01	0.30	0.11	0.67	0.43			0.56	0.16		0.15	
Uniform Delay, d1	8.0	9.2	8.3	11.4	9.9			13.7	11.5		11.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.0	0.3	7.0	1.7			4.7	0.6		0.5	
Delay (s)	8.0	10.2	8.6	18.4	11.5			18.4	12.1		12.0	
Level of Service	A	B	A	B	B			B	B		B	
Approach Delay (s)		9.6			14.8			15.4			12.0	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	288	234	429	413	342	120	224
v/c Ratio	0.67	0.42	0.96	0.49	0.83	0.20	0.39
Control Delay	26.9	5.3	49.7	11.9	38.9	4.4	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	5.3	49.7	11.9	38.9	4.4	15.9
Queue Length 50th (m)	26.3	0.0	28.1	26.0	32.0	0.0	15.8
Queue Length 95th (m)	46.9	12.8	#75.1	44.6	#77.3	8.8	33.3
Internal Link Dist (m)	493.6			562.8	85.3		336.0
Turn Bay Length (m)		30.0				55.0	
Base Capacity (vph)	549	643	447	970	413	615	579
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.96	0.43	0.83	0.20	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	250	215	395	365	15	230	85	110	30	145	30
Future Volume (vph)	15	250	215	395	365	15	230	85	110	30	145	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85		0.98	
Flt Protected		1.00	1.00	0.95	1.00			0.96	1.00		0.99	
Satd. Flow (prot)		1765	1504	1681	1759			1707	1504		1722	
Flt Permitted		0.96	1.00	0.34	1.00			0.65	1.00		0.92	
Satd. Flow (perm)		1706	1504	595	1759			1155	1504		1593	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	272	234	429	397	16	250	92	120	33	158	33
RTOR Reduction (vph)	0	0	174	0	3	0	0	0	77	0	10	0
Lane Group Flow (vph)	0	288	60	429	410	0	0	342	43	0	214	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)		14.4	14.4	27.2	27.2			20.2	20.2		20.2	
Effective Green, g (s)		14.4	14.4	27.2	27.2			20.2	20.2		20.2	
Actuated g/C Ratio		0.26	0.26	0.48	0.48			0.36	0.36		0.36	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		435	384	446	848			413	538		570	
v/s Ratio Prot				c0.14	0.23							
v/s Ratio Perm		0.17	0.04	c0.32				c0.30	0.03		0.13	
v/c Ratio		0.66	0.16	0.96	0.48			0.83	0.08		0.37	
Uniform Delay, d1		18.8	16.3	12.4	9.9			16.5	12.0		13.4	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		3.8	0.2	32.8	0.4			17.2	0.3		1.9	
Delay (s)		22.6	16.5	45.2	10.3			33.7	12.2		15.3	
Level of Service		C	B	D	B			C	B		B	
Approach Delay (s)		19.8			28.1			28.1			15.3	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	484	293	321	60	38	696
v/c Ratio	0.80	0.29	0.79	0.15	0.08	0.78
Control Delay	23.1	7.6	39.8	7.3	20.0	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.1	7.6	39.8	7.3	20.0	10.0
Queue Length 50th (m)	33.9	16.0	38.2	0.0	3.7	2.2
Queue Length 95th (m)	#81.0	27.4	#71.0	7.8	10.2	#43.8
Internal Link Dist (m)		562.8	183.1		190.4	
Turn Bay Length (m)				30.0		
Base Capacity (vph)	620	1109	472	445	458	896
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.26	0.68	0.13	0.08	0.78

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	445	270	295	55	35	640
Future Volume (vph)	445	270	295	55	35	640
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1648	1735	1735	1475	1648	1475
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	443	1735	1735	1475	1648	1475
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	484	293	321	60	38	696
RTOR Reduction (vph)	0	0	0	46	0	486
Lane Group Flow (vph)	484	293	321	14	38	210
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	39.2	39.2	15.7	15.7	18.6	18.6
Effective Green, g (s)	39.2	39.2	15.7	15.7	18.6	18.6
Actuated g/C Ratio	0.59	0.59	0.24	0.24	0.28	0.28
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	602	1018	407	346	458	410
v/s Ratio Prot	c0.23	0.17	0.19		0.02	
v/s Ratio Perm	c0.24			0.01		c0.14
v/c Ratio	0.80	0.29	0.79	0.04	0.08	0.51
Uniform Delay, d1	10.9	6.9	24.0	19.7	17.8	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	0.2	9.8	0.0	0.4	4.5
Delay (s)	18.6	7.0	33.8	19.8	18.2	24.8
Level of Service	B	A	C	B	B	C
Approach Delay (s)		14.2	31.6		24.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	165	30	25	165	5	30	15	35	10	15	5
Future Volume (Veh/h)	5	165	30	25	165	5	30	15	35	10	15	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	179	33	27	179	5	33	16	38	11	16	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		207										
pX, platoon unblocked												
vC, conflicting volume	184			212			454	444	196	487	458	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			212			454	444	196	487	458	182
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			93	97	96	98	97	99
cM capacity (veh/h)	1403			1370			495	500	851	452	491	866

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	217	211	87	32
Volume Left	5	27	33	11
Volume Right	33	5	38	5
cSH	1403	1370	607	511
Volume to Capacity	0.00	0.02	0.14	0.06
Queue Length 95th (m)	0.1	0.5	3.8	1.5
Control Delay (s)	0.2	1.1	11.9	12.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	1.1	11.9	12.5
Approach LOS			B	B

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	20	20	445	695	30
Future Volume (Veh/h)	25	20	20	445	695	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	22	22	484	755	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				315	109	
pX, platoon unblocked	0.84	0.84	0.84			
vC, conflicting volume	1300	772	788			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1261	630	650			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	95	97			
cM capacity (veh/h)	154	406	792			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	49	506	788
Volume Left	27	22	0
Volume Right	22	0	33
cSH	214	792	1700
Volume to Capacity	0.23	0.03	0.46
Queue Length 95th (m)	6.5	0.7	0.0
Control Delay (s)	26.7	0.8	0.0
Lane LOS	D	A	
Approach Delay (s)	26.7	0.8	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	125	255	147	435	385	418
v/c Ratio	0.40	0.60	0.40	0.54	0.45	0.45
Control Delay	16.7	18.9	15.7	10.5	9.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	18.9	15.7	10.5	9.8	2.9
Queue Length 50th (m)	7.7	15.0	8.8	16.5	15.7	0.0
Queue Length 95th (m)	17.7	30.5	19.3	48.1	42.0	11.4
Internal Link Dist (m)		159.1	128.4	422.4	291.5	
Turn Bay Length (m)	40.0					40.0
Base Capacity (vph)	463	617	547	805	859	925
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.41	0.27	0.54	0.45	0.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	195	40	30	100	5	40	260	100	5	350	385
Future Volume (vph)	115	195	40	30	100	5	40	260	100	5	350	385
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.97			1.00			0.97			1.00	0.85
Flt Protected	0.95	1.00			0.99			1.00			1.00	1.00
Satd. Flow (prot)	1513	1552			1568			1531			1591	1354
Flt Permitted	0.75	1.00			0.88			0.94			1.00	1.00
Satd. Flow (perm)	1192	1552			1402			1448			1585	1354
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	212	43	33	109	5	43	283	109	5	380	418
RTOR Reduction (vph)	0	17	0	0	3	0	0	21	0	0	0	191
Lane Group Flow (vph)	125	238	0	0	144	0	0	414	0	0	385	227
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	12.3	12.3			12.3			25.2			25.2	25.2
Effective Green, g (s)	12.3	12.3			12.3			25.2			25.2	25.2
Actuated g/C Ratio	0.26	0.26			0.26			0.54			0.54	0.54
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	315	410			370			784			858	733
v/s Ratio Prot		c0.15										
v/s Ratio Perm	0.10				0.10			c0.29			0.24	0.17
v/c Ratio	0.40	0.58			0.39			0.53			0.45	0.31
Uniform Delay, d1	14.1	14.9			14.0			6.8			6.4	5.9
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	0.8	2.1			0.7			2.5			1.7	1.1
Delay (s)	14.9	17.0			14.7			9.4			8.1	7.0
Level of Service	B	B			B			A			A	A
Approach Delay (s)		16.3			14.7			9.4			7.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	75	20	340	70	25	395
Future Volume (Veh/h)	75	20	340	70	25	395
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	22	370	76	27	429
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	891	408			446	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	891	408			446	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	73	97			98	
cM capacity (veh/h)	308	648			1125	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	104	446	456
Volume Left	82	0	27
Volume Right	22	76	0
cSH	390	1700	1125
Volume to Capacity	0.27	0.26	0.02
Queue Length 95th (m)	8.0	0.0	0.6
Control Delay (s)	18.7	0.0	0.7
Lane LOS	C		A
Approach Delay (s)	18.7	0.0	0.7
Approach LOS	C		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	20	25	10	20	25	465	30	20	500	15
Future Volume (Veh/h)	5	10	20	25	10	20	25	465	30	20	500	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	11	22	27	11	22	27	505	33	22	543	16
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								178			365	
pX, platoon unblocked	0.78	0.78		0.78	0.78	0.78				0.78		
vC, conflicting volume	1182	1187	551	1190	1178	522	559			538		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1090	1097	551	1101	1087	241	559			263		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	93	96	79	93	96	97			98		
cM capacity (veh/h)	133	159	538	130	161	624	1022			1021		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	60	27	538	22	559
Volume Left	5	27	27	0	22	0
Volume Right	22	22	0	33	0	16
cSH	257	193	1022	1700	1021	1700
Volume to Capacity	0.15	0.31	0.03	0.32	0.02	0.33
Queue Length 95th (m)	3.9	9.6	0.6	0.0	0.5	0.0
Control Delay (s)	21.4	31.9	8.6	0.0	8.6	0.0
Lane LOS	C	D	A		A	
Approach Delay (s)	21.4	31.9	0.4		0.3	
Approach LOS	C	D				

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	283	54	527	223	33	505
v/c Ratio	0.52	0.10	0.72	0.30	0.14	0.69
Control Delay	16.8	4.5	18.4	2.7	9.6	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	4.5	18.4	2.7	9.6	17.0
Queue Length 50th (m)	19.1	0.0	35.0	0.0	1.6	32.8
Queue Length 95th (m)	37.0	5.1	#69.9	8.4	5.6	#61.6
Internal Link Dist (m)	389.9		106.6			153.8
Turn Bay Length (m)		25.0		90.0	15.0	
Base Capacity (vph)	544	522	732	743	243	732
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.10	0.72	0.30	0.14	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	260	50	485	205	30	465
Future Volume (vph)	260	50	485	205	30	465
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1513	1354	1592	1354	1513	1592
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1513	1354	1592	1354	529	1592
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	54	527	223	33	505
RTOR Reduction (vph)	0	35	0	120	0	0
Lane Group Flow (vph)	283	19	527	103	33	505
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.0	18.0	23.0	23.0	23.0	23.0
Effective Green, g (s)	18.0	18.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio	0.36	0.36	0.46	0.46	0.46	0.46
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	544	487	732	622	243	732
v/s Ratio Prot	c0.19		c0.33			0.32
v/s Ratio Perm		0.01		0.08	0.06	
v/c Ratio	0.52	0.04	0.72	0.16	0.14	0.69
Uniform Delay, d1	12.6	10.4	10.9	7.9	7.8	10.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.2	6.0	0.6	1.2	5.3
Delay (s)	16.1	10.5	16.9	8.5	8.9	16.0
Level of Service	B	B	B	A	A	B
Approach Delay (s)	15.2		14.4			15.5
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	60	33	157	87	446	43	478
v/c Ratio	0.25	0.11	0.09	0.27	0.24	0.50	0.11	0.53
Control Delay	15.2	5.0	13.6	11.0	9.8	11.2	8.0	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	5.0	13.6	11.0	9.8	11.2	8.0	11.7
Queue Length 50th (m)	9.7	0.0	2.2	7.4	4.4	26.3	2.0	28.6
Queue Length 95th (m)	20.5	6.1	7.0	18.5	11.5	45.9	6.1	49.9
Internal Link Dist (m)	389.9			169.9		156.7		217.9
Turn Bay Length (m)		25.0	22.0		35.0		22.0	
Base Capacity (vph)	538	532	388	583	358	898	382	897
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.11	0.09	0.27	0.24	0.50	0.11	0.53

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	100	55	30	95	50	80	400	10	40	415	25
Future Volume (vph)	25	100	55	30	95	50	80	400	10	40	415	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1752	1504	1681	1678		1681	1763		1681	1754	
Flt Permitted		0.93	1.00	0.67	1.00		0.40	1.00		0.43	1.00	
Satd. Flow (perm)		1645	1504	1186	1678		704	1763		753	1754	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	109	60	33	103	54	87	435	11	43	451	27
RTOR Reduction (vph)	0	0	40	0	34	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	136	20	33	123	0	87	445	0	43	474	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		18.0	18.0	18.0	18.0		28.0	28.0		28.0	28.0	
Effective Green, g (s)		18.0	18.0	18.0	18.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio		0.33	0.33	0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Lane Grp Cap (vph)		538	492	388	549		358	897		383	892	
v/s Ratio Prot					0.07			0.25			c0.27	
v/s Ratio Perm		c0.08	0.01	0.03			0.12			0.06		
v/c Ratio		0.25	0.04	0.09	0.22		0.24	0.50		0.11	0.53	
Uniform Delay, d1		13.6	12.6	12.8	13.4		7.6	8.9		7.0	9.1	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1	0.2	0.4	0.9		1.6	2.0		0.6	2.3	
Delay (s)		14.7	12.8	13.2	14.4		9.2	10.8		7.6	11.4	
Level of Service		B	B	B	B		A	B		A	B	
Approach Delay (s)		14.1			14.2			10.5			11.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	16	598	120	174	696	152	223	65
v/c Ratio	0.07	0.62	0.14	0.58	0.73	0.40	0.36	0.14
Control Delay	7.6	13.2	2.1	18.9	16.0	20.3	4.6	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	13.2	2.1	18.9	16.0	20.3	4.6	9.3
Queue Length 50th (m)	0.8	41.1	0.0	11.5	51.7	13.0	0.0	2.1
Queue Length 95th (m)	3.2	69.4	5.6	#32.8	88.7	27.0	12.4	9.2
Internal Link Dist (m)		132.2			287.6	205.9		43.2
Turn Bay Length (m)	60.0		80.0					
Base Capacity (vph)	231	958	869	301	954	379	617	476
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.62	0.14	0.58	0.73	0.40	0.36	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	550	110	160	610	30	130	10	205	20	5	35
Future Volume (vph)	15	550	110	160	610	30	130	10	205	20	5	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85		0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		0.98	
Satd. Flow (prot)	1681	1769	1504	1681	1757			1691	1504		1603	
Flt Permitted	0.24	1.00	1.00	0.31	1.00			0.69	1.00		0.89	
Satd. Flow (perm)	429	1769	1504	557	1757			1229	1504		1458	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	598	120	174	663	33	141	11	223	22	5	38
RTOR Reduction (vph)	0	0	55	0	3	0	0	0	154	0	26	0
Lane Group Flow (vph)	16	598	65	174	693	0	0	152	69	0	39	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	32.5	32.5	32.5	32.5	32.5			18.5	18.5		18.5	
Effective Green, g (s)	32.5	32.5	32.5	32.5	32.5			18.5	18.5		18.5	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54			0.31	0.31		0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Grp Cap (vph)	232	958	814	301	951			378	463		449	
v/s Ratio Prot		0.34			c0.39							
v/s Ratio Perm	0.04		0.04	0.31				c0.12	0.05		0.03	
v/c Ratio	0.07	0.62	0.08	0.58	0.73			0.40	0.15		0.09	
Uniform Delay, d1	6.5	9.5	6.6	9.2	10.4			16.4	15.0		14.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.6	3.1	0.2	7.9	4.9			3.2	0.7		0.4	
Delay (s)	7.1	12.6	6.8	17.0	15.3			19.5	15.7		15.1	
Level of Service	A	B	A	B	B			B	B		B	
Approach Delay (s)		11.5			15.6			17.3			15.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	332	510	603	130	315	511
v/c Ratio	0.78	0.49	0.85	0.25	0.75	0.61
Control Delay	23.7	11.2	34.7	21.7	38.8	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	11.2	34.7	21.7	38.8	12.0
Queue Length 50th (m)	23.2	40.1	79.0	13.9	43.1	29.1
Queue Length 95th (m)	#48.3	62.3	#138.0	27.1	#80.3	59.1
Internal Link Dist (m)		287.6	454.9	43.1	293.3	
Turn Bay Length (m)						35.0
Base Capacity (vph)	425	1050	709	510	420	836
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.49	0.85	0.25	0.75	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	465	5	5	460	90	5	100	15	120	170	470
Future Volume (vph)	305	465	5	5	460	90	5	100	15	120	170	470
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	1.00			0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00			1.00			1.00			0.98	1.00
Satd. Flow (prot)	1681	1767			1730			1737			1734	1504
Flt Permitted	0.25	1.00			1.00			0.99			0.81	1.00
Satd. Flow (perm)	443	1767			1724			1717			1429	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	332	505	5	5	500	98	5	109	16	130	185	511
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	0	125
Lane Group Flow (vph)	332	510	0	0	594	0	0	124	0	0	315	386
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4			8			2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	47.5	47.5			32.5			23.5			23.5	34.0
Effective Green, g (s)	47.5	47.5			32.5			23.5			23.5	34.0
Actuated g/C Ratio	0.59	0.59			0.41			0.29			0.29	0.42
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Grp Cap (vph)	425	1049			700			504			419	723
v/s Ratio Prot	c0.10	0.29										0.07
v/s Ratio Perm	0.36				c0.34			0.07			c0.22	0.19
v/c Ratio	0.78	0.49			0.85			0.25			0.75	0.53
Uniform Delay, d1	12.2	9.3			21.5			21.5			25.6	17.1
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	13.3	1.6			12.2			1.2			11.8	2.8
Delay (s)	25.5	10.9			33.8			22.7			37.4	19.9
Level of Service	C	B			C			C			D	B
Approach Delay (s)		16.6			33.8			22.7			26.6	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	272	234	158	87	98	310	92	386	310
v/c Ratio	0.58	0.33	0.23	0.13	0.31	0.44	0.24	0.55	0.39
Control Delay	16.9	7.7	10.1	3.3	15.8	14.9	11.1	14.0	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	7.7	10.1	3.3	15.8	14.9	11.1	14.0	3.2
Queue Length 50th (m)	15.8	7.6	7.7	0.0	5.3	17.2	4.5	21.9	0.0
Queue Length 95th (m)	34.2	18.5	16.7	5.5	m14.9	35.3	12.0	41.1	10.4
Internal Link Dist (m)		454.9	181.1			314.6		177.6	
Turn Bay Length (m)	60.0			35.0	40.0		110.0		
Base Capacity (vph)	465	715	690	653	317	707	379	707	787
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.33	0.23	0.13	0.31	0.44	0.24	0.55	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	135	80	10	135	80	90	285	0	85	355	285
Future Volume (vph)	250	135	80	10	135	80	90	285	0	85	355	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.94			1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1671			1763	1504	1681	1769		1681	1769	1504
Flt Permitted	0.66	1.00			0.98	1.00	0.45	1.00		0.54	1.00	1.00
Satd. Flow (perm)	1162	1671			1728	1504	793	1769		949	1769	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	147	87	11	147	87	98	310	0	92	386	310
RTOR Reduction (vph)	0	47	0	0	0	52	0	0	0	0	0	186
Lane Group Flow (vph)	272	187	0	0	158	35	98	310	0	92	386	124
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	18.0	18.0			18.0	18.0	18.0	18.0		18.0	18.0	18.0
Effective Green, g (s)	18.0	18.0			18.0	18.0	18.0	18.0		18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40			0.40	0.40	0.40	0.40		0.40	0.40	0.40
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Grp Cap (vph)	464	668			691	601	317	707		379	707	601
v/s Ratio Prot		0.11						0.18			c0.22	
v/s Ratio Perm	c0.23				0.09	0.02	0.12			0.10		0.08
v/c Ratio	0.59	0.28			0.23	0.06	0.31	0.44		0.24	0.55	0.21
Uniform Delay, d1	10.6	9.1			8.9	8.3	9.2	9.8		9.0	10.4	8.8
Progression Factor	1.00	1.00			1.00	1.00	1.32	1.26		1.00	1.00	1.00
Incremental Delay, d2	5.3	1.0			0.8	0.2	2.5	1.9		1.5	3.0	0.8
Delay (s)	15.9	10.2			9.7	8.5	14.7	14.3		10.5	13.4	9.6
Level of Service	B	B			A	A	B	B		B	B	A
Approach Delay (s)		13.3			9.3			14.4			11.6	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	110	370	30	80	400
Future Volume (Veh/h)	55	110	370	30	80	400
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	120	402	33	87	435
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1028	418			435	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1028	418			435	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	81			92	
cM capacity (veh/h)	242	639			1135	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	180	435	87	435
Volume Left	60	0	87	0
Volume Right	120	33	0	0
cSH	413	1700	1135	1700
Volume to Capacity	0.44	0.26	0.08	0.26
Queue Length 95th (m)	16.4	0.0	1.9	0.0
Control Delay (s)	20.3	0.0	8.4	0.0
Lane LOS	C		A	
Approach Delay (s)	20.3	0.0	1.4	
Approach LOS	C			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	40	40	405	505	15
Future Volume (Veh/h)	5	40	40	405	505	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	43	43	440	549	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					339	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	1083	557	565			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1061	507	516			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	92	96			
cM capacity (veh/h)	227	541	1007			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	48	43	440	565
Volume Left	5	43	0	0
Volume Right	43	0	0	16
cSH	473	1007	1700	1700
Volume to Capacity	0.10	0.04	0.26	0.33
Queue Length 95th (m)	2.6	1.0	0.0	0.0
Control Delay (s)	13.5	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.5	0.8		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	71	125	196	272	321	120
v/c Ratio	0.14	0.23	0.38	0.28	0.34	0.14
Control Delay	15.9	4.8	10.7	8.5	8.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	4.8	10.7	8.5	8.9	2.1
Queue Length 50th (m)	5.6	0.0	11.2	14.6	17.8	0.0
Queue Length 95th (m)	13.3	9.4	23.7	26.2	31.1	5.6
Internal Link Dist (m)	279.5			268.5	58.7	
Turn Bay Length (m)	45.0		60.0			40.0
Base Capacity (vph)	518	550	517	958	958	869
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.23	0.38	0.28	0.34	0.14

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	115	180	250	295	110
Future Volume (vph)	65	115	180	250	295	110
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1681	1504	1681	1769	1769	1504
Flt Permitted	0.95	1.00	0.54	1.00	1.00	1.00
Satd. Flow (perm)	1681	1504	956	1769	1769	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	125	196	272	321	120
RTOR Reduction (vph)	0	86	0	0	0	55
Lane Group Flow (vph)	71	39	196	272	321	65
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	2			8	4	
Permitted Phases		2	8			4
Actuated Green, G (s)	18.5	18.5	32.5	32.5	32.5	32.5
Effective Green, g (s)	18.5	18.5	32.5	32.5	32.5	32.5
Actuated g/C Ratio	0.31	0.31	0.54	0.54	0.54	0.54
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	518	463	517	958	958	814
v/s Ratio Prot	c0.04			0.15	0.18	
v/s Ratio Perm		0.03	c0.20			0.04
v/c Ratio	0.14	0.08	0.38	0.28	0.34	0.08
Uniform Delay, d1	15.0	14.7	7.9	7.4	7.7	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.4	2.1	0.7	0.9	0.2
Delay (s)	15.5	15.1	10.0	8.2	8.6	6.8
Level of Service	B	B	B	A	A	A
Approach Delay (s)	15.2			9.0	8.1	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	15	320	5	10	350
Future Volume (Veh/h)	50	15	320	5	10	350
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	16	348	5	11	380
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						293
pX, platoon unblocked						
vC, conflicting volume	752	350			353	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752	350			353	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	98			99	
cM capacity (veh/h)	377	697			1217	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	70	353	11	380
Volume Left	54	0	11	0
Volume Right	16	5	0	0
cSH	421	1700	1217	1700
Volume to Capacity	0.17	0.21	0.01	0.22
Queue Length 95th (m)	4.5	0.0	0.2	0.0
Control Delay (s)	15.2	0.0	8.0	0.0
Lane LOS	C		A	
Approach Delay (s)	15.2	0.0	0.2	
Approach LOS	C			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	71	5	152	11	98	320	49	511
v/c Ratio	0.03	0.10	0.01	0.25	0.02	0.45	0.45	0.13	0.72
Control Delay	8.6	9.0	0.0	10.4	1.3	17.9	11.3	15.6	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.0	0.0	10.4	1.3	17.9	11.3	15.6	24.2
Queue Length 50th (m)	0.7	3.3	0.0	7.5	0.0	5.3	15.2	3.2	36.8
Queue Length 95th (m)	3.2	8.7	0.0	16.6	0.8	16.2	30.8	m7.6	#69.4
Internal Link Dist (m)		254.6		269.3			282.8		449.6
Turn Bay Length (m)	15.0		10.0		15.0	50.0		20.0	
Base Capacity (vph)	467	707	623	612	623	220	706	370	706
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.10	0.01	0.25	0.02	0.45	0.45	0.13	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	65	5	60	80	10	90	235	60	45	440	30
Future Volume (vph)	15	65	5	60	80	10	90	235	60	45	440	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1681	1769	1504		1732	1504	1681	1716		1681	1752	
Flt Permitted	0.66	1.00	1.00		0.87	1.00	0.31	1.00		0.52	1.00	
Satd. Flow (perm)	1169	1769	1504		1533	1504	551	1716		928	1752	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	71	5	65	87	11	98	255	65	49	478	33
RTOR Reduction (vph)	0	0	3	0	0	7	0	20	0	0	5	0
Lane Group Flow (vph)	16	71	2	0	152	4	98	300	0	49	506	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	18.0	18.0	18.0		18.0	18.0	18.0	18.0		18.0	18.0	
Effective Green, g (s)	18.0	18.0	18.0		18.0	18.0	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.40	0.40	0.40		0.40	0.40	0.40	0.40		0.40	0.40	
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lane Grp Cap (vph)	467	707	601		613	601	220	686		371	700	
v/s Ratio Prot		0.04						0.17			c0.29	
v/s Ratio Perm	0.01		0.00		c0.10	0.00	0.18			0.05		
v/c Ratio	0.03	0.10	0.00		0.25	0.01	0.45	0.44		0.13	0.72	
Uniform Delay, d1	8.2	8.4	8.1		9.0	8.1	9.9	9.8		8.6	11.4	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.65	1.47	
Incremental Delay, d2	0.1	0.3	0.0		1.0	0.0	6.4	2.0		0.7	6.0	
Delay (s)	8.3	8.7	8.1		10.0	8.1	16.3	11.8		14.8	22.7	
Level of Service	A	A	A		A	A	B	B		B	C	
Approach Delay (s)		8.6			9.8			12.9			22.0	
Approach LOS		A			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	90	25	250	60	35	350
Future Volume (Veh/h)	90	25	250	60	35	350
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	27	272	65	38	380
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	728	272			337	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728	272			337	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	97			97	
cM capacity (veh/h)	381	772			1234	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	125	272	65	418
Volume Left	98	0	0	38
Volume Right	27	0	65	0
cSH	428	1700	1700	1234
Volume to Capacity	0.29	0.16	0.04	0.03
Queue Length 95th (m)	9.1	0.0	0.0	0.7
Control Delay (s)	16.8	0.0	0.0	1.0
Lane LOS	C			A
Approach Delay (s)	16.8	0.0		1.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	35	220	110	45	255	150
Future Volume (Veh/h)	35	220	110	45	255	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	239	120	49	277	163
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		10				
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	837	120			169	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	120			169	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	74			81	
cM capacity (veh/h)	273	937			1421	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	277	120	49	277	163
Volume Left	38	0	0	277	0
Volume Right	239	0	49	0	0
cSH	1086	1700	1700	1421	1700
Volume to Capacity	0.26	0.07	0.03	0.19	0.10
Queue Length 95th (m)	7.7	0.0	0.0	5.5	0.0
Control Delay (s)	11.5	0.0	0.0	8.1	0.0
Lane LOS	B			A	
Approach Delay (s)	11.5	0.0		5.1	
Approach LOS	B				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	288	234	429	413	342	120	224
v/c Ratio	0.78	0.46	0.84	0.47	0.82	0.12	0.37
Control Delay	44.8	7.1	29.8	13.9	42.0	1.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	7.1	29.8	13.9	42.0	1.4	19.5
Queue Length 50th (m)	40.4	0.0	38.4	35.5	47.4	0.0	23.4
Queue Length 95th (m)	#73.4	16.5	#80.3	56.0	#94.6	4.8	41.4
Internal Link Dist (m)	234.8			562.8	188.4		336.0
Turn Bay Length (m)		30.0				55.0	
Base Capacity (vph)	422	548	546	992	416	1079	609
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.43	0.79	0.42	0.82	0.11	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	250	215	395	365	15	230	85	110	30	145	30
Future Volume (vph)	15	250	215	395	365	15	230	85	110	30	145	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99			1.00	0.85		0.98	
Flt Protected		1.00	1.00	0.95	1.00			0.96	1.00		0.99	
Satd. Flow (prot)		1765	1504	1681	1759			1707	1504		1722	
Flt Permitted		0.96	1.00	0.27	1.00			0.62	1.00		0.92	
Satd. Flow (perm)		1705	1504	473	1759			1103	1504		1594	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	272	234	429	397	16	250	92	120	33	158	33
RTOR Reduction (vph)	0	0	183	0	2	0	0	0	47	0	7	0
Lane Group Flow (vph)	0	288	51	429	411	0	0	342	73	0	217	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		4		3	8			2	3		6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)		16.4	16.4	38.2	38.2			28.7	46.0		28.7	
Effective Green, g (s)		16.4	16.4	38.2	38.2			28.7	46.0		28.7	
Actuated g/C Ratio		0.22	0.22	0.50	0.50			0.38	0.61		0.38	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		368	324	513	885			417	1000		602	
v/s Ratio Prot				c0.19	0.23				0.02			
v/s Ratio Perm		0.17	0.03	c0.23				c0.31	0.03		0.14	
v/c Ratio		0.78	0.16	0.84	0.46			0.82	0.07		0.36	
Uniform Delay, d1		28.1	24.1	14.0	12.2			21.3	6.2		17.0	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		10.4	0.2	11.3	0.4			16.4	0.0		1.7	
Delay (s)		38.4	24.4	25.3	12.6			37.6	6.2		18.7	
Level of Service		D	C	C	B			D	A		B	
Approach Delay (s)		32.1			19.1			29.5			18.7	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	484	293	321	60	38	696
v/c Ratio	0.81	0.29	0.78	0.15	0.08	0.78
Control Delay	23.5	7.6	38.9	7.2	19.9	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.5	7.6	38.9	7.2	19.9	10.3
Queue Length 50th (m)	33.7	16.0	37.9	0.0	3.7	2.7
Queue Length 95th (m)	#81.3	27.4	#69.6	7.7	10.2	#47.2
Internal Link Dist (m)		562.8	79.5		190.4	
Turn Bay Length (m)				30.0		
Base Capacity (vph)	614	1113	484	455	460	893
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.26	0.66	0.13	0.08	0.78

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	445	270	295	55	35	640
Future Volume (vph)	445	270	295	55	35	640
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1648	1735	1735	1475	1648	1475
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	446	1735	1735	1475	1648	1475
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	484	293	321	60	38	696
RTOR Reduction (vph)	0	0	0	46	0	481
Lane Group Flow (vph)	484	293	321	14	38	215
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	38.9	38.9	15.7	15.7	18.6	18.6
Effective Green, g (s)	38.9	38.9	15.7	15.7	18.6	18.6
Actuated g/C Ratio	0.58	0.58	0.24	0.24	0.28	0.28
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	598	1014	409	348	460	412
v/s Ratio Prot	c0.23	0.17	0.19		0.02	
v/s Ratio Perm	c0.25			0.01		c0.15
v/c Ratio	0.81	0.29	0.78	0.04	0.08	0.52
Uniform Delay, d1	10.8	6.9	23.8	19.6	17.7	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.2	9.5	0.0	0.4	4.7
Delay (s)	18.8	7.1	33.3	19.6	18.0	24.9
Level of Service	B	A	C	B	B	C
Approach Delay (s)		14.4	31.2		24.5	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	332	510	598	130	315	511
v/c Ratio	0.74	0.45	0.92	0.29	0.87	0.58
Control Delay	29.3	9.8	48.1	26.9	57.4	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	9.8	48.1	26.9	57.4	11.8
Queue Length 50th (m)	36.1	40.1	95.3	16.8	52.1	34.3
Queue Length 95th (m)	#73.1	60.5	#159.8	31.6	#97.6	63.1
Internal Link Dist (m)		131.8	215.5	43.1	293.3	
Turn Bay Length (m)						35.0
Base Capacity (vph)	449	1129	651	454	362	882
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.45	0.92	0.29	0.87	0.58

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	465	5	0	460	90	5	100	15	120	170	470
Future Volume (vph)	305	465	5	0	460	90	5	100	15	120	170	470
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	1.00			0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00			1.00			1.00			0.98	1.00
Satd. Flow (prot)	1681	1767			1730			1737			1734	1504
Flt Permitted	0.11	1.00			1.00			0.99			0.79	1.00
Satd. Flow (perm)	202	1767			1730			1717			1389	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	332	505	5	0	500	98	5	109	16	130	185	511
RTOR Reduction (vph)	0	0	0	0	8	0	0	6	0	0	0	98
Lane Group Flow (vph)	332	510	0	0	590	0	0	124	0	0	315	413
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4			8			2			6	7
Permitted Phases	4						2			6		6
Actuated Green, G (s)	57.5	57.5			33.5			23.5			23.5	43.0
Effective Green, g (s)	57.5	57.5			33.5			23.5			23.5	43.0
Actuated g/C Ratio	0.64	0.64			0.37			0.26			0.26	0.48
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Grp Cap (vph)	449	1128			643			448			362	793
v/s Ratio Prot	c0.16	0.29			c0.34							0.11
v/s Ratio Perm	0.31							0.07			c0.23	0.16
v/c Ratio	0.74	0.45			0.92			0.28			0.87	0.52
Uniform Delay, d1	21.1	8.2			26.9			26.5			31.8	16.3
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	10.4	1.3			20.3			1.5			23.7	2.4
Delay (s)	31.5	9.6			47.2			28.0			55.5	18.8
Level of Service	C	A			D			C			E	B
Approach Delay (s)		18.2			47.2			28.0			32.8	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix F

Signal Warrant Analysis Worksheets

Traffic Signal Warrant Analysis

MTO Method (Ontario Traffic Manual, Book 12)
Existing Conditions

Main street direction East/West
Main street cross-section 1 lane
Roadway environment Restricted flow
"T" intersection? Yes

Major Street Cornelia St
Minor Street Union St

Summary
Signal Warranted
Based on OTM Book 12
Justification 1

Time Period (Highest 8 hours)	Major Street						Minor Street					
	Cornelia St						Union St					
	Eastbound			Westbound			Northbound			Southbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
8:00	309	110	0	0	151	19	0	0	0	18	0	262
11:00	291	129	0	0	123	22	0	0	0	10	0	264
12:00	277	140	0	0	157	27	0	0	0	20	0	271
13:00	272	138	0	0	158	7	0	0	0	23	0	243
14:00	265	151	0	0	140	29	0	0	0	25	0	272
15:00	318	186	0	0	183	37	0	0	0	32	0	372
16:00	354	243	0	0	229	43	0	0	0	28	0	449
17:00	351	148	0	0	175	32	0	0	0	42	0	369

Justification 1								
	1A			**1B**			**Results**	
	Minimum volume	**Actual volume**	**% Satisfied**	**Minimum volume**	**Actual volume**	**% Satisfied**	**Hourly**	**Total**
8:00	810	869	107%	255	280	110%	Signal Warranted	Signal Warranted
11:00	810	839	104%	255	274	107%	Signal Warranted	
12:00	810	892	110%	255	291	114%	Signal Warranted	
13:00	810	841	104%	255	266	104%	Signal Warranted	
14:00	810	882	109%	255	297	116%	Signal Warranted	
15:00	810	1128	139%	255	404	158%	Signal Warranted	
16:00	810	1346	166%	255	477	187%	Signal Warranted	
17:00	810	1117	138%	255	411	161%	Signal Warranted	

Appendix G

Evaluation of Transportation Improvement Alternative Solutions – Full Analysis Tables

Table 1: Evaluation of Transportation Improvement Alternative Solutions

Strategic Capacity 1: Elmsley Street - Cornelia Street to Beckwith Street

Problem Identification:

Elmsley Street between Cornelia Street & Beckwith Street is forecast to experience significant growth in traffic, partially as a result of the developments planned for the Boundary Expansion area. During the PM peak hour, southbound vehicle trips are anticipated to exceed capacity by 7% (V/C ratio of 1.07). This will result in long queues and delay. The northbound traffic volumes on Elmsley Street are not forecast to exceed capacity, but some sections come very close to reaching capacity.

	Alternative 1: Do Nothing	Alternative 2: Transportation Demand Management	Alternative 3: Transportation System Management	Alternative 4: Infrastructure Enhancement
Description	Maintain existing lane and intersection configuration along the corridor.	Construct the planned cycling facilities (buffered bike lanes) along Elmsley Street. The planned buffered bike lanes can be accommodated within the existing curbs, no Road Construction / Widening or Road Diet Required Implement town wide policies and programs to promote active modes: • Create incentive programs to encourage residents to use alternate modes; • Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.	Elmsley Street between Cornelia Street and Beckwith Street is an attractive road for travel as it connects to Downtown and is one of only two major north south roads in the north end of the Town. With signalized intersections at Cornelia Street and Beckwith Street very little more than can be done from a TSM perspective. The best TSM option is to prohibit peak period, peak direction (AM – northbound and PM – southbound) left turns from Elmsley Street onto local streets where left turn storage is not provided. This would include prohibiting left turns from Elmsley Street, onto Camerson Street and Mylne Street during the PM peak period, and onto Maple Avenue, Cowan Street and Lansdowne Street during the AM peak period. The use of the adjacent corridors (William Street West and Rideau Avenue North) will naturally attract traffic as road operations worsen along Elmsley.	Elmsley Street between Cornelia Street and Beckwith Street currently provides a two-lane cross section. Widening Elmsley Street (to four lanes) would provide the additional road capacity to accommodate the forecasted vehicle volumes. • As Elmsley Street is only forecasted to be over capacity by 7% (V/C ratio of 1.07), there is not a compelling reason to add an additional lane of capacity in each direction. Such a widening would have significant impacts on utilities (i.e. relocation) and private property.
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Town wide TDM policies and providing a cycling facility may reduce the number of vehicles on Elmsley Street.	• Operational improvements may reduce congestion.	• Loss of green space from the road widening. • Construction emissions. • Potential emissions from additional vehicle use.
	Score: 3	Score: 2	Score: 2	Score: 4
Social Environment	• Reduced quality of life for residents. • Reduced economic and/or development activity.	• Positive health impacts from active transportation use. • Separating cycling facilities will improve safety and comfort for cyclists and motorists.	• left turn prohibitions reduce conflict point and thus improve safety. • Some residents may not appreciate the left turn prohibitions.	• Encourages economic activity along the corridor and into downtown Smiths Falls. • Encourages development in the corridor and in downtown Smiths Falls. • Requires property acquisition
	Score: 3	Score: 1	Score: 2	Score: 4
Transportation Environment	• Longer delays and queuing. • Increased safety risk.	• Separating cycling facilities will improve safety and comfort for cyclists and motorists. • Providing a cycling facility may reduce the number of vehicles on Elmsley Street.	• Left turn bans could create issues at other intersections. • Minor operational improvement.	• Addresses capacity concern.
	Score: 4	Score: 2	Score: 3	Score: 1
Cost	• No capital cost.	• Moderate capital cost	• Low capital cost	• High capital cost

	Score: 1	Score: 3	Score: 2	Score: 5
	Total Score: 11	**Total Score: 8 – Preferred**	**Total Score: 9**	**Total Score: 14**

Conclusion:

The preferred alternative for addressing the 2046 capacity issue on Elmsley Street between Cornelia Street and Beckwith Street is:

- Corridor TDM – provide the planned cycling facilities (buffered bike lanes) along Elmsley Street; and
- Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure;

Due to the nature and magnitude of the problem, it is recommended that the top two performing alternatives, as assessed, be implemented to address the corridor problems:

- Corridor TDM – provide the planned cycling facilities (buffered bike lanes) along Elmsley Street;
- Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure; and
- Corridor TSM – prohibit left turns where dedicated left turn lane (with storage) is not provided.

Strategic Capacity 2: Lombard Street - Town Boundary to Brockville Street/ Beckwith Street

Problem Identification:

Lombard Street between the Town Boundary & Beckwith Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach and/or exceed capacity. During the PM peak hour, southbound/ westbound vehicle trips are anticipated to exceed capacity by 4% (V/C ratio of 1.04) between Abbott Street & Ferrara Drive. The rest of the corridor, from the Town Boundary to Ferrara Drive and Abbott Street to Beckwith Street, is expected to be approaching capacity (V/C ratios ranging from 0.85 to 0.97) in the southbound/ westbound direction. This will result in long queues and delay. The northbound/ eastbound traffic volumes on Lombard Street are not forecast to exceed capacity, but some sections are approaching capacity (V/C ratios ranging from 0.80 to 0.91).

	Alternative 1: Do Nothing	Alternative 2: Transportation Demand Management	Alternative 3: Transportation System Management	Alternative 4: Infrastructure Enhancement	Alternative 5: Infrastructure Enhancement
Description	Maintain existing lane and intersection configuration along the corridor.	Construct the planned cycling facilities along Lombard Street: • Conventional Bike Lines - Beckwith Street to Abbott Street • Uni-Directional Cycle Tracks – Abbott Street to Valley Custom Cutting Implement town wide policies and programs to promote active modes: • Create incentive programs to encourage residents to use alternate modes; • Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.	Lombard Street is an Arterial Roadway that is one of the main thoroughfares through Smiths Falls while also providing local access to Smiths Falls big box retailers. As such, Lombard Street serves multiple functions. The following TSM options could be considered: • Access management – review the number and proximity of new access points/ driveways or existing access points if adjacent land uses change. • Traffic signal coordination would maximize the efficiency of peak hour, peak direction flow. • Prohibit left turns where dedicated left turn lane (with storage) is not provided.	Lombard Street currently provides a three-lane cross section over the majority of the road segment. Widening Lombard Street to provide additional travel lanes would create additional capacity to relieve concerns. • As the majority of Lombard Street is only approaching capacity, there is not a compelling reason to add an additional lane of capacity in each direction. Such a widening would have significant impacts on utilities (i.e. relocation) and private property.	Extend Ferrara Drive (as a collector road) to connect to Lombard Street. This will provide a southern connection to Lombard Street. The additional collector road will provide some redundancy in the network and will reduce demand on sections Lombard Street.
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Town wide TDM policies and providing a cycling facility may reduce the number of vehicles on Elmsley Street. • Emissions resulting from cycling facility construction.	• Operational improvements may reduce congestion.	• Loss of green space from the road widening. • Construction emissions. • Potential emissions from additional vehicle use.	• Emissions resulting from road construction. • Removal of green space and plant life. • Emissions reduction as the result of a more direct route to Lombard Street Big Box retail.
	Score: 3	**Score: 3**	**Score: 2**	**Score: 4**	**Score: 3**
Social Environment	• Reduced quality of life for residents. • Reduced economic productivity.	• Positive health impacts from active transportation use. • Separating cycling facilities will improve safety and comfort for cyclists and motorists.	• Access management (consolidation) and left turn prohibitions reduce conflict points and thus improve safety. • Traffic signal coordination could increase travel speeds.	• Encourages economic activity in the corridor • Encourages development on corridor • May requires property acquisition.	• Additional access to Lombard provides more transportation options for residents. • Shorter and faster access to commercial areas on Lombard for many residents.
	Score: 3	**Score: 1**	**Score: 2**	**Score: 3**	**Score: 2**

Transportation Environment	• Longer delays and queuing. • Increased safety risk.	• Separating cycling facilities will improve safety and comfort for cyclists and motorists. • Providing a cycling facility reduces the number of vehicles on Elmsley Street.	• Access management (consolidation) would improve operations. • Left turn bans could create issues at other intersections. • traffic signal coordination would maximize the efficiency of peak hour, peak direction flow.	• Addresses capacity concern.	• Reduced capacity concerns on some segments of Lombard. • Would provide alternate route for drivers to avoid delays. • Additional access to Lombard provides some additional redundancy to the overall transportation network. • Shorter and faster access to commercial areas on Lombard for many residents.
	Score: 4	**Score: 2**	**Score: 3**	**Score: 1**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• Low capital cost	• High capital cost	• Moderate-high capital cost
	Score: 1	**Score: 4**	**Score: 2**	**Score: 5**	**Score: 4**
	Total Score: 11	**Total Score: 10**	**Total Score: 9 – Preferred**	**Total Score: 13**	**Total Score: 10**

Conclusion:

The preferred alternative for addressing the 2046 capacity issue on Lombard Street between the Town Boundary and Beckwith Street is:

- Corridor TSM – Access management, traffic signal coordination and prohibit left turns where left turn storage is not provided.

Due to the nature and magnitude of the problem, it is recommended that the top three performing alternatives, as assessed, be implemented to address the corridor problems:

- Corridor TDM – provide the planned cycling facilities (Uni-Directional Cycle Tracks - Valley Custom Cutting to Abbott Street and Conventional Bike Lines - Abbott Street to Brockville Street/ Beckwith Street) along Lombard Street;
- Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure;
- Corridor TSM – Access management, traffic signal coordination and prohibit left turns where dedicated left turn lane (with storage) is not provided; and
- Infrastructure Enhancement – provide new collector road connecting Ferrara Drive to Lombard Street.

Strategic Capacity 3: Beckwith Street - Chambers Street to Lombard Street

Problem Identification:

Beckwith Street between Chambers Street and Lombard Street is forecast to experience significant growth in traffic, with 2046 traffic volumes expected to approach capacity. During the PM peak hour, southbound vehicle trips are anticipated to approach capacity (V/C ratio of 0.86). This will result in moderate delays at the only fixed crossing of the Rideau River in Smiths Falls. The northbound traffic volumes on Beckwith Street are forecast to operate within capacity.

	Alternative 1: Do Nothing	Alternative 2: Transportation Demand Management	Alternative 3: Transportation System Management	Alternative 4: Infrastructure Enhancement
Description	Maintain existing lane and intersection configuration along the corridor.	Construct the planned cycling facilities (buffered bike lanes) along Beckwith Street, connecting to the recently constructed cycle tracks constructed as part of the Beckwith revitalization project. The planned buffered bike lanes may be accommodated using a road diet to reconfigure the road pavement markings and/or turn lane reductions. Implement town wide policies and programs to promote active modes: • Create incentive programs to encourage residents to use alternate modes; • Work with large employers to provide end user facilities for cyclists (such as showers and bike lockers) and to adjust shift times to allow auto drivers to avoid peak hours.	Beckwith Street is an Arterial Roadway that is the main north/south thoroughfares through Smiths Falls. Beckwith Street between Chambers Street and Lombard Street is a collection of bridges over the Rideau River. With signalized intersections at Chambers Street and Lombard Street there is very little more that can be done from a TSM perspective. The following TSM options should be considered: • Traffic signal coordination at Chambers Street and Lombard Street could maximize the efficiency of peak hour, peak direction flow. • Completely close the intersection of Canal Street and Beckwith Street or eliminate the northbound left from Beckwith Street to Canal Street and leave the intersection as a right-in right-out (RIRO) only.	Beckwith Street between Chambers Street and Lombard Street currently provides a two-lane cross section with very generous left and right turn lanes. Widening Beckwith Street (to four lanes) would provide the additional road capacity to accommodate the forecasted vehicles volumes. • As Beckwith Street is only forecast to approach capacity (V/C ratio of 0.86), there is not a compelling reason to add an additional lane of capacity in each direction. Such a widening would have significant impacts on the existing bridges.
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Town wide TDM policies and providing a cycling facility may reduce the number of vehicles on Elmsley Street.	• Traffic signal coordination and turn restrictions may reduce congestion.	• Loss of green space from the road widening. • Construction emissions. • Potential impacts to the River during construction. • Potential emissions from additional vehicle use.
	Score: 3	**Score: 2**	**Score: 2**	**Score: 4**
Social Environment	• Reduced quality of life for residents. • Reduced economic productivity.	• Positive health impacts from active transportation use. • Separating cycling facilities will improve safety and comfort for cyclists and motorists.	• Turn restrictions reduce conflict points and thus improve safety. • Traffic signal coordination could increase travel speeds.	• Minimal benefit to local economy. • Minimal reductions in travel time. • Requires property acquisition.
	Score: 3	**Score: 1**	**Score: 2**	**Score: 4**
Transportation Environment	• Longer delays and queuing. • Increased safety risk.	• Separating cycling facilities will improve safety and comfort for cyclists and motorists. • Providing a cycling facility may reduce the number of vehicles on Beckwith Street.	• Traffic signal coordination would maximize the efficiency of peak hour, peak direction flow.	• Addresses capacity concern.
	Score: 3	**Score: 2**	**Score: 2**	**Score: 1**
Cost	• No capital cost.	• Moderate capital cost	• Low capital cost	• High capital cost
	Score: 1	**Score: 3**	**Score: 2**	**Score: 5**
	Total Score: 10	**Total Score: 8 – Preferred**	**Total Score: 8 – Preferred**	**Total Score: 14**

Conclusion:

The preferred, and therefore recommended, alternatives for addressing the 2046 capacity issue on Beckwith Street between Chambers Street and Lombard Street are:

- Corridor TDM – provide the planned cycling facilities (buffered bike lanes) along Beckwith Street;
- Town Wide TDM – new and enhanced active transportation policies and programs are needed to supplement the active transportation infrastructure; and
- Corridor TSM – Turn Restrictions at the intersection of Canal Street and Beckwith Street and traffic signal coordination.

Localized Improvement 1: Union Street and Cornelia Street

Problem Identification:

The southbound approach is currently experiencing poor conditions during the PM peak hour; with conditions expected to degrade further by 2046. These conditions result in long delays and queues.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Transportation System Management
Description	Maintain existing intersection control type (two-way stop) and lane configuration.	• Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Maintain the existing lane configuration.	Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Redesign the intersection to convert the channelized right-turn from Cornelia Street to Union Street to a standard right-turn.
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Reduced vehicle emissions due to reduced congestion.	• Reduced vehicle emissions due to reduced congestion.
	Score: 3	**Score: 2**	**Score: 2**
Social Environment	• Reduced quality of life for residents. • Reduced economic productivity. • Intersection is already causing considerable delays and safety concerns.	• Minimal impact on residents • Improved pedestrian safety	• Minimal impact on residents • Improved pedestrian safety • Reduced Crossing Distance
	Score: 4	**Score: 2**	**Score: 1**
Transportation Environment	• Does not address the delays at the southbound approach	• Addresses current and future intersection capacity issues at the intersection. • Traffic signals are justified based on OTM Book 12.	• Addresses current and future intersection capacity issues at the intersection. • Traffic signals are justified based on OTM Book 12.
	Score: 5	**Score: 1**	**Score: 1**
Cost	• No capital cost.	• Moderate capital cost	• Moderate capital cost
	Score: 1	**Score: 3**	**Score: 3**
	Total Score: 13	**Total Score: 8**	**Total Score: 7 – Preferred**

Conclusion:

The preferred, and therefore recommended, alternative for addressing the poor operating conditions at the intersection of Union Street and Cornelia Street is:

- Intersection TSM – Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Add a controlled pedestrian crossing of Union Street. Redesign the intersection to convert the channelized right-turn from Cornelia Street to Union Street to a standard right-turn.

Localized Improvement 2: Elmsley Street and Cornelia Street

Problem Identification:

The westbound left turn movement is anticipated to approach capacity (V/C ratio of 0.96) during the 2046 PM peak hour. These conditions result in long delays and queues.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management
Description	Maintain existing intersection lane configuration and signal timing.	Increase capacity of the westbound left movement by modifying the signal timing phases and times to allow for a simultaneous protected westbound left and northbound right.
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Reduced vehicle emissions due to reduced congestion.
	Score: 3	**Score: 2**
Social Environment	• No change	• No change
	Score: 1	**Score: 1**
Transportation Environment	• Long delays are expected if intersection is not mitigated.	• Brings overall intersection operations within acceptable level of service by increasing the westbound left turn movement's capacity (V/C ratio of 0.84).
	Score: 4	**Score: 1**
Cost	• No capital cost.	• Low capital cost
	Score: 1	**Score: 2**
	Total Score: 9	**Total Score: 6 – Preferred**

Conclusion:

The preferred, and therefore recommended, alternative for addressing the poor operating conditions at the intersection of Elmsley Street and Cornelia Street is:

- Intersection TSM – modify the signal timing phases and times to allow for a simultaneous protected westbound left and northbound right.

Localized Improvement 3: Lombard Street and Abbott Street

Problem Identification:

The current westbound approach provides a single shared left/through/right lane. This approach is anticipated to approach capacity (V/C ratio of 0.85) during the 2046 PM peak hour. These conditions may cause moderate delays and queuing.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Transportation System Management
Description	Maintain existing intersection lane configuration and signal timing.	Prohibit the westbound left from Lombard Street onto Abbott Street during the peak periods. This would increase the capacity of the westbound approach by allowing through and right turning traffic to flow freely.	Construct a westbound left turn lane. This would increase the capacity of the westbound approach by allowing through and right turning traffic to flow freely. • As there are only approximately five vehicles forecast to make the westbound left turn during the PM peak hour, there is not a compelling reason to add a left turn lane
Natural Environment	• Increased vehicle emissions resulting from congestion.	• Reduced vehicle emissions due to reduced congestion.	• Emissions as a result of construction • Loss of green space • Reduced vehicle emissions due to reduced congestion.
	Score: 3	**Score: 2**	**Score: 3**
Social Environment	• Minor delay resulting in longer commute.	• Minor inconvenience for a small number of residents who typically make a westbound left from Lombard street onto Abbott Street	• Minor property acquisition required for the WBL Lane • Inconvenience of construction. • Ultimately reduces commuting time.
	Score: 2	**Score: 3**	**Score: 3**
Transportation Environment	• Moderate delays are expected if intersection is not mitigated.	• Brings intersection operations within acceptable level of service.	• Brings intersection operations within acceptable level of service.
	Score: 3	**Score: 1**	**Score: 1**
Cost	• No capital cost.	• Low capital cost	• Moderate capital cost
	Score: 1	**Score: 2**	**Score: 3**
	Total Score: 9	**Total Score: 8 – Preferred**	**Total Score: 10**

Conclusion:

The preferred, and therefore recommended, alternative for addressing the poor westbound operating conditions at the intersection of Lombard Street and Abbott Street is:

- Intersection TSM – Prohibit westbound left turns from Lombard street onto Abbott Street during the peak periods.

Localized Improvement 4: Elmsley Street and Lansdowne Street

Problem Identification:

The stop controlled eastbound approach provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (26.7 seconds) resulting in a LOS D during the 2046 PM peak hour. A relatively low number volumes (45 vehicles) are expected at the eastbound approach (Lansdowne Street), the problem is a result of the high uncontrolled/ free flow volumes on Elmsley Street.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Transportation System Management
Description	Maintain the existing intersection configuration and control.	Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Maintain the existing lane configuration.	Upgrade the existing two-way stop-controlled intersection to an all-way stop. Maintain the existing lane configuration.
Natural Environment	• Increased vehicle emissions resulting from delays at the eastbound (side street) approach.	• Increased vehicle emissions resulting from north/south delays along Elmsley Street.	• Increased vehicle emissions resulting from north/south delays along Elmsley Street.
	Score: 2	**Score: 3**	**Score: 3**
Social Environment	• Minor delay resulting in longer commute.	• Increased commuting time for north/south travel along Elmsley Street. • Improved safety.	• Increased commuting time for north/south travel along Elmsley Street. • Improved safety.
	Score: 2	**Score: 2**	**Score: 2**
Transportation Environment	• Moderate side street delays are expected if intersection is not mitigated.	• Added north/south delay for most vehicles using the intersection.	• Added north/south delay for most vehicles using the intersection. • Queuing will create conflict with the intersection of Elmsley Street and Cornelia Street which is located 100m to the north.
	Score: 2	**Score: 3**	**Score: 4**
Cost	• No capital cost.	• Moderate capital cost	• Low capital cost
	Score: 1	**Score: 3**	**Score: 2**
	Total Score: 7 – Preferred	**Total Score: 11**	**Total Score: 11**

Conclusion:

The preferred, and therefore recommended, alternative for addressing the poor eastbound operating conditions at the intersection of Elmsley Street and Lansdowne Street is:

- Do Nothing – The existing configuration (two-way stop), with no control on Elmsley Street, causes no delay for the majority of vehicles (1,140). While the delay will be moderate for the eastbound movement, this will impact relatively few vehicles (45). Vehicles can utilize adjacent signalized intersections to avoid delay.

Localized Improvement 5: William Street and Beckwith Street

Problem Identification:

The stop controlled westbound approach provides a single shared left/through/right lane. This approach is anticipated to experience moderate delay (31.9 seconds) resulting in a LOS D during the 2046 PM peak hour. Relatively low volumes (55 vehicles) are expected at the westbound approach (William Street), the problem is a result of the high volumes at the uncontrolled approaches on Beckwith Street.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Transportation System Management
Description	Maintain the existing intersection configuration and control.	Upgrade the existing two-way stop-controlled intersection to a signalized intersection and optimize signal timing. Maintain the existing lane configuration.	Upgrade the existing two-way stop-controlled intersection to an all-way stop. Maintain the existing lane configuration.
Natural Environment	• Increased vehicle emissions resulting from delays at the westbound (side street) approach.	• Increased vehicle emissions resulting from north/south delays along Beckwith Street.	• Increased vehicle emissions resulting from north/south delays along Beckwith Street.
	Score: 2	**Score: 3**	**Score: 3**
Social Environment	• Minor delay resulting in longer commute.	• Increased commuting time for north/south travel along Beckwith Street. • Improved safety.	• Increased commuting time for north/south travel along Beckwith Street. • Improved safety.
	Score: 2	**Score: 2**	**Score: 2**
Transportation Environment	• Moderate side street delays are expected if intersection is not mitigated.	• Added north/south delay for most vehicles using the intersection.	• Added north/south delay for most vehicles using the intersection. • Queuing will create conflicts with the intersections of Beckwith Street and Russell Street, and Beckwith Street and Main Street, both of which are located within 100m.
	Score: 2	**Score: 3**	**Score: 4**
Cost	• No capital cost.	• Moderate capital cost.	• Low capital cost.
	Score: 1	**Score: 3**	**Score: 2**
	Total Score: 7 – Preferred	**Total Score: 11**	**Total Score: 11**

Conclusion:

The preferred, and therefore recommended, alternative for addressing the poor eastbound operating conditions at the intersection of Beckwith Street and William Street is:

- Do nothing – The existing configuration (two-way stop), with no control on Beckwith Street, causes no delay for most vehicles (1,010). While the delay will be moderate for the westbound movement, this will impact relatively few vehicles (55). Vehicles can utilize adjacent signalized intersections to avoid delay.

Localized Improvement 6: Beckwith Street and Montague Street/ Ogden Avenue/ Mylne Street

Problem Identification:

The intersection of Beckwith Street and Montague Street/ Ogden Avenue/ Mylne Street currently operates as a complex five-leg intersection. Stop controls are skewed, with Montague Street, Mylne Street, and Ogden Avenue operating under stop control while Beckwith Street flows freely. The geometry and expansive pavement area create a confusing environment for drivers trying to navigate the right-of-way. Furthermore, the awkward configuration and lengthy crossing distances create an uncomfortable and potentially unsafe environment for pedestrians.

	Alternative 1: Do Nothing	Alternative 2: Infrastructure Enhancement	Alternative 3: Infrastructure Enhancement	Alternative 4: Infrastructure Enhancement
Description	Maintain the existing intersection configuration and control.	Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to a 4-leg mini roundabout with an inscribed circle diameter of up to 24m. This would include the closure of Mylne Street at Beckwith Street creating a dead-end.	Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to a 4-leg all-way stop with Beckwith Street as the south and west legs, Montague as the north leg, and Ogden Avenue as the east leg. This would include the closure of Mylne Street at Beckwith Street creating a dead-end.	Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to two, two-way stop-controlled intersections. Beckwith Street would remain uncontrolled and Montague/ Ogden Street would also be uncontrolled. Additionally, a channelized right turn would be added from Montague Street to Beckwith Street.
Natural Environment	• No impact on the natural environment.	• Possible addition of green space from intersection reconfiguration. • Construction emissions. • Intersection reconfiguration (two-way stop to roundabout) will reduce vehicle delays / emissions.	• Possible addition of green space from intersection reconfiguration. • Construction emissions. • Intersection reconfiguration (two-way stop to all-way stop) will increase vehicle delays / emissions.	• Possible addition of green space from intersection reconfiguration. • Construction emissions. • Intersection reconfiguration (two new two-way stops) may reduce vehicle delays / emissions.
	Score: 1	**Score: 1**	**Score: 2**	**Score: 1**
Social Environment	• Encourages cut-through traffic • Discourages active travel.	• Introduction of first roundabout to Smiths Falls could result in initial confusion. • Eliminates access to Beckwith Street from Mylne Street. • Slows travel speeds on Beckwith Street	• Discourages cut through traffic • Eliminates access to Beckwith Street from Mylne Street. • Slows travel speeds on Beckwith Street	• Encourages cut-through traffic. • Maintains access to Beckwith Street from Mylne Street.
	Score: 3	**Score: 3**	**Score: 2**	**Score: 3**
Transportation Environment	• Does not address the complex and confusing nature of the intersection. • Does not improve safety.	• Provides traffic calming on Beckwith Street • Reduced delay. • Improved operations. • Improved safety.	• Provides traffic calming on Beckwith Street. • Minor increase in delay to north/south travel along Beckwith Street. • Improved operations. • Improved safety.	• Improved operations. • Improved safety.
	Score: 5	**Score: 1**	**Score: 2**	**Score: 2**
Cost	• No capital cost.	• Moderate capital cost.	• Low capital cost.	• Low capital cost.
	Score: 1	**Score: 3**	**Score: 2**	**Score: 2**
	Total Score: 10	**Total Score: 8 - Preferred**	**Total Score: 8 - Preferred**	**Total Score: 8 - Preferred**

Conclusion:

The preferred alternatives for addressing the complex intersection configuration conditions at the intersection of Beckwith Street and Montague Street are:

- Infrastructure Enhancement – Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to a 4-leg mini roundabout. Close Mylne Street at Beckwith Street; and
- Infrastructure Enhancement – Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to a 4-leg all-way stop. Close Mylne Street at Beckwith Street.
- Infrastructure Enhancement – Upgrade and reconfigure the intersection of Beckwith Street and Montague Street/ Ogden Avenue / Mylne Street to two, two-way stop-controlled intersections.

Due to the nature and magnitude of the problem, it is recommended that the Town undertake a detailed Intersection Control Study (ICS) for this location. This study will assess geometric constraints, evaluate Right-of-Way (ROW) impacts, and provide operational modeling to determine whether a mini-roundabout, a realigned all-way stop, or two, two-way stops is the optimal long-term solution.

Connectivity 1: Boundary Expansion Area Lands

Problem Identification:

Population and employment growth is planned for the Boundary Expansion Area lands in east Smiths Falls. New collector roads are required to connect this area to the existing arterial road network.

	Alternative 1: Do Nothing	Alternative 2: Infrastructure Enhancement	Alternative 3: Infrastructure Enhancement	Alternative 4: Infrastructure Enhancement
Description	Maintain the existing collector road network in the Boundary Expansion Area lands.	Upgrade Lorne Street (east of Hershey Drive), and Rideau Regional Road (currently private) to collector roads. These classification upgrades will improve connectivity to the arterial road network. • Reconstruct the corridors to the 20m-26m width for a collector road as defined in the Official Plan. • Widen travel lanes to at least 3.5m and implement active transportation facilities along the corridor.	Upgrade Air Care Drive from a local road to a collector road and extend Walker Road (as a collector road) from Air Care Drive to Lorne Street. This classification upgrade and new collector road will improve connectivity to the arterial road network. • Reconstruct/ construct the corridors to the 20m-26m width for a collector road as defined in the Official Plan. • Widen travel lanes to at least 3.5m and implement active transportation facilities along the corridor.	Construct a new north/south collector road that connects Rideau Regional Road to Lorne Street (via the Walker Road extension). The new collector road will provide north/south capacity within the Boundary Expansion Area lands and will provide options for accessing the arterial road network. • Reconstruct/ construct the corridors to the 20m-26m width for a collector road as defined in the Official Plan. • Widen travel lanes to at least 3.5m and implement active transportation facilities along the corridor.
Natural Environment	• Increased vehicle emissions resulting from congestion on inadequate existing road network.	• Loss of green space from the road widening. • Construction emissions.	• Loss of green space from the road widening and extension. • Construction emissions.	• Loss of green space from the new road. • Construction emissions.
	Score: 4	**Score: 2**	**Score: 3**	**Score: 3**
Social Environment	• Disconnection between new developments and the arterial road network. • Existing local road cross sections will not adequately accommodate the increased traffic volumes and do not provide any Active Transportation infrastructure.	• Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists. • Positive health impacts from active transportation use.	• New road will improve route choice and overall connectivity. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists. • Positive health impacts from active transportation use. • Creates opportunity for future development east of what is already planned.	• New road will improve route choice and overall connectivity. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists. • Positive health impacts from active transportation use. • Creates opportunity for future development east of what is already planned.
	Score: 5	**Score: 2**	**Score: 1**	**Score: 1**
Transportation Environment	• Does not address the planned increase in traffic as the result of planned development.	• Upgraded cross sections will better accommodate increased traffic volumes. • Upgraded cross sections will provide Active transportation infrastructure. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists.	• Upgraded cross sections will better accommodate increased traffic volumes. • Improved network connectivity within development • Additional network redundancy • Upgraded cross sections will provide Active transportation infrastructure. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists.	• Upgraded cross sections will better accommodate increased traffic volumes. • Improved network connectivity within development • Additional network redundancy. • Upgraded cross sections will provide Active transportation infrastructure. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists.
	Score: 5	**Score: 2**	**Score: 1**	**Score: 1**

Cost	• No capital cost.	• Moderate-high capital cost.	• High capital cost.	• High capital cost.
	Score: 1	**Score: 4**	**Score: 5**	**Score: 5**
	Total Score: 15	**Total Score: 10 – Preferred**	**Total Score: 10 – Preferred**	**Total Score: 10 – Preferred**

Conclusion:

The preferred, and therefore recommended, alternatives for providing connectivity to the Boundary Expansion Lands are:

- Infrastructure Enhancement – Upgrade Lorne Street (east of Hershey Drive) and Rideau Regional Road (Queen Street to Rideau Regional Road circle) to collector roads;
- Infrastructure Enhancement – Upgrade Air Care Drive to a collector road and construct the Walker Road extension (Air Care Drive to Lorne Street) as a collector road; and
- Infrastructure Enhancement – Construct a new north/south collector road that connects Rideau Regional Road circle to the Walker Road extension.

Due to the nature of the problem (planned population and employment growth in the Boundary Expansion Area lands), the preferred and recommended alternatives could be implemented collectively or individually depending on the location and magnitude of the planned growth. It is likely that individual infrastructure enhancements would be sequenced based on when the growth opportunity arises.

Connectivity 2: Existing Network Connectivity

Problem Identification:

Increased traffic volumes on Smiths Falls collector and arterial road network will continue to increase as a result of the widespread population and employment growth is planned throughout Smiths Falls. Additional network capacity is required (particularly in the east/west direction south of the river) to maintain connectivity for motorists and active users, and increase network redundancy.

	Alternative 1: Do Nothing	Alternative 2: Infrastructure Enhancement	Alternative 3: Infrastructure Enhancement	Alternative 4: Infrastructure Enhancement
Description	Maintain existing road network including road classifications.	Upgrade Broadview Avenue West (from Harold Street and Brockville Street) from a local road to a collector road. This classification upgrade will eliminate a gap in the collector road network and will improve east/west connectivity to the arterial road network. • Reconstruct the corridors (once the roads have reached the end of its design life) to the minimum 20m width for a collector road as defined in the Official Plan. • Implement active transportation facilities along the corridor.	Upgrade Pearl Street (from Percy Street to Carol Crescent) and Vincent Street from local roads to collector roads. This classification upgrade will improve east/west connectivity in south of Smiths Falls. • Reconstruct the corridors (once the roads have reached the end of its design life) to the minimum 20m width for a collector road as defined in the Official Plan. • Implement active transportation facilities along the corridor.	Extend Ferrara Drive (as a collector road) to connect to Lombard Street. The new collector road will provide an additional connection between the new residential areas in south of Smiths Falls and the retail located on Lombard Street.
Natural Environment	• Increased vehicle emissions resulting from congestion longer travel path.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Loss of green space from the road extension. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 3	Score: 2	Score: 2	Score: 2
Social Environment	• Residents are currently managing with the existing connectivity. • Minor delay resulting in longer commute.	• Upgraded cross sections will reduce travel delays. • Upgraded cross sections will provide Active transportation infrastructure. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists. • Positive health impacts from active transportation use.	• Upgraded cross sections will reduce travel delays. • Upgraded cross sections will provide Active transportation infrastructure. • Active transportation infrastructure will improve safety and comfort for pedestrians, cyclists and motorists. • Positive health impacts from active transportation use.	• Better connection in existing residential area. • Connection would cross trailway, introducing a safety concern for trail users. • Construction would have minimal impact on existing travel patterns. • Better connection to commercial developments.
	Score: 3	Score :2	Score: 2	Score: 2
Transportation Environment	• East/ West Network connectivity and network redundancy concerns for Smiths Falls south of the river.	• Upgraded cross sections will better accommodate increased traffic volumes. • Upgraded cross sections will provide Active transportation infrastructure.	• Does not provide a practical alternative route for most residents. • Upgraded cross sections will better accommodate increased traffic volumes. • Upgraded cross sections will provide Active transportation infrastructure.	• Improved network connectivity within development. • Additional network redundancy. • Will improve operations on Lombard Street by offering an alternative path.
	Score: 4	Score: 2	Score: 3	Score: 1

Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost	• Moderate-high capital cost
	Score: 1	**Score: 4**	**Score: 5**	**Score: 4**
	Total Score: 11	**Total Score: 10**	**Total Score: 12**	**Total Score: 9 - Preferred**

Conclusion:

The preferred alternative for improving connectivity within the existing road network is:

- Infrastructure Enhancement – Extend Ferrara Drive to connect to Lombard Street.

Due to the nature and magnitude of the problem, it is recommended that the top two performing alternatives, as assessed, be implemented to address the corridor problems:

- Infrastructure Enhancement – Upgrade Broadview Avenue West (from Harold Street and Brockville Street) to a collector road when reconstruction is required; and
- Infrastructure Enhancement – Extend Ferrara Drive to connect to Lombard Street.

Active Transportation 1: Old Slys Road - Rideau River Crossing to Queen Street

Problem Identification:

The existing ROW on Old Slys Road between Rideau River crossing and Queen Street (15.24m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks / minimum (2m) boulevard width.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement active transportation facilities on this segment of Old Slys Road.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. • Narrowing the drive lanes from 3.5m to 3.0m and implementing 1.5m bike lanes (rather than the proposed 2.0m cycle tracks), 1.0m boulevards (per side) and 1.5m sidewalks (per side), will maximize the use of the existing ROW. • Where ROW width narrows over the two bridges, the proposed bike lanes will transition to shared facilities. • Bridge widenings should be considered at the time the bridges are scheduled for reconstruction.	Acquire additional lands to increase the ROW width so that the proposed cycle tracks can be implemented without compromise. Widen the Rideau River bridge to increase the ROW width to accommodate the proposed cycle tracks over the entire segment.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Potential reduction in green space and plant life. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 3**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Safety concerns exist regarding the shared facilities on the bridges.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires property acquisition.
	Score: 3	**Score: 2**	**Score: 4**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility (includes a shared facility) • Reduction in auto mode share. • Would compromise on various cross section elements. • Will not promote active transportation as well as a consistent facility type.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 3**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11 - Preferred	**Total Score: 11 - Preferred**	**Total Score: 13**

Conclusion:

The preferred alternatives for implementing active transportation facilities on Old Slys Road between Rideau River Crossing and Queen Street are:

- Do Nothing – Do not implement active transportation facilities on this segment of Old Slys Road; and
- Corridor TSM – Narrow travel lanes to implement bike lanes. Where ROW width narrows over the bridges, implement shared facilities. Explore bridge widening as an opportunity when bridge reconstruction is required.

Due to the nature and magnitude of the problem, it is recommended that the following alternatives be implemented to address the corridor problems:

- Corridor TSM – Narrow travel lanes to implement bike lanes. Where ROW width narrows over the bridges, implement shared facilities. Explore bridge widening as an opportunity when bridge reconstruction is required.

Active Transportation 2: Cornelia Street - Beckwith Street to Union Street

Problem Identification:

The existing ROW on Cornelia Street between Beckwith Street and Union Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement active transportation facilities on this segment of Cornelia Street.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. By implementing a 3.0m multi-use path (rather than the proposed cycle tracks), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.	Acquire additional land to widen the ROW, allowing for the full implementation of the proposed facilities. It should be noted that his segment of Cornelia Street passes under a CP rail corridor, this increasing the ROW may not be possible.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 3**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires significant property acquisition and coordination with CP Rail.
	Score: 3	**Score: 2**	**Score: 5**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Possible reduction in auto mode share. • Would compromise on various cross section elements. • Will not promote cycling as well as a protected, bike only facility type.	• Addition of preferred Active Transportation facility • Possible reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 3**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11 - Preferred	**Total Score: 11 - Preferred**	**Total Score: 14**

Conclusion:

The preferred alternatives for implementing active transportation facilities on Cornelia Street between Beckwith Street and Union Street are:

- Do Nothing – Do not implement active transportation facilities on this segment of Cornelia Street.
- Corridor TSM – Implement a multi-use path on this segment instead of cycle tracks to reduce required ROW width.

Due to the nature and magnitude of the problem, it is recommended that the following alternatives be implemented to address the corridor problems:

- Corridor TSM – Implement a multi-use path on this segment instead of cycle tracks to reduce required ROW width.

Active Transportation 3: Lombard Street - Alfred Street to Abbott Street

Problem Identification:

The existing ROW on Lombard Street between Alfred Street and Abbott Street (18.29m) does not provide sufficient width to accommodate the existing road network elements and the proposed cycle tracks.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. By implementing a 3.0m multi-use path (rather than the proposed cycle tracks), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.	Acquire additional lands to increase the ROW width so that the proposed cycle tracks can be implemented without compromise.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction in vehicle emissions due to added AT facility.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 2**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Inconsistent cycling facilities proposed along Lombard Street. • Difficult transition for cyclists at Alfred Street where the proposed cycling facility type will change form two, one-way cycle tracks to a single multi-use path.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires minor property acquisition.
	Score: 3	**Score: 3**	**Score: 3**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements. • Will not promote active transportation as well as a consistent facility type.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 3**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11 - Preferred	**Total Score: 12**	**Total Score: 11 - Preferred**

Conclusion:

The preferred alternatives for implementing active transportation facilities on Lombard Street between Alfred Street and Abbott Street are:

- Do Nothing – Do not implement proposed active transportation facilities.
- Infrastructure Enhancement – Acquire additional lands to increase the right-of-way width and implement the proposed cycle tracks.

Due to the nature and magnitude of the problem, it is recommended that the following alternatives be implemented to address the corridor problems:

- Infrastructure Enhancement – Acquire additional lands to increase the right-of-way width and implement the proposed cycle tracks.

Active Transportation 4: Lombard Street - Abbott Street to Brockville Street

Problem Identification:

The existing ROW on Lombard Street between Abbott Street and Brockville Street (15.24m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes / minimum (2m) boulevard width.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. Narrowing the drive lanes to from 4.0m to 3.5m and implementing 1.5m bike lanes, 1.0m boulevards (per side) and 1.5m sidewalks (per side), will maximize the use of the existing ROW.	Acquire additional lands to increase the ROW width so that the proposed bike lanes can be implemented without compromise.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 3**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires significant property acquisition.
	Score: 3	**Score: 2**	**Score: 5**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 2**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11	**Total Score: 10 – Preferred**	**Total Score: 14**

Conclusion:

The preferred, and therefore recommended, alternative for implementing active transportation facilities on Lombard Street between Abbott Street and Brockville Street is:

- Corridor TSM – Narrow travel lanes on this segment to create space for the proposed bike lanes.

Active Transportation 5: Cornelia Street - William Street to Elmsley Street

Problem Identification:

The existing ROW on Cornelia Street between William Street and Elmsley Street (15.24m) does not provide sufficient width to accommodate the existing road network elements (at intersections where existing left turn lanes are provided) and the proposed bike lanes.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. By implementing a 3.0m multi-use path (rather than the proposed 1.5m bike lanes), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.	Acquire additional lands to increase the ROW width so that the proposed bike lanes can be implemented without compromise.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 2**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires property acquisition.
	Score: 3	**Score: 2**	**Score: 4**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 2**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11	**Total Score: 10 - Preferred**	**Total Score: 12**

Conclusion:

The preferred, and therefore recommended, alternative for implementing active transportation facilities on Cornelia Street between William Street and Elmsley Street is:

- Corridor TSM – Implement a multi-use path on this segment instead of bike lanes to reduce required ROW width.

Active Transportation 6: Cornelia Street - Beckwith Street to Elmsley Street

Problem Identification:

The existing ROW on Cornelia Street between Beckwith Street and Elmsley Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed bike lanes.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	Cornelia Street between Beckwith Street and Elmsley Street has a ROW width of 20.11m. A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. By implementing a 3.0m multi-use path (rather than the proposed bike lanes), the existing sidewalk space can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.	Acquire additional lands to increase the ROW width so that the proposed bike lanes can be implemented without compromise.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 2**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires property acquisition.
	Score: 3	**Score: 2**	**Score: 4**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 2**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 11	**Total Score: 10 - Preferred**	**Total Score: 12**

Conclusion:

The preferred, and therefore recommended, alternative for implementing active transportation facilities Cornelia Street between Beckwith Street and Elmsley Street is:

- Corridor TSM – Implement a multi-use path on this segment instead of bike lanes to reduce required ROW width.

Active Transportation 7: Brockville Street - Town Boundary to Lombard Street

Problem Identification:

The existing ROW on Brockville Street between the town boundary and Lombard Street (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. By implementing a 3.0m multi-use path (rather than the proposed 2.0m buffered bike lanes), one of the existing sidewalks can be repurposed to create a shared facility for pedestrians and cyclists, thus maximizing the use of the existing ROW.	Acquire additional lands where turn lanes are located to increase the ROW width so that the proposed buffered bike lanes can be implemented without compromise.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Reduction vehicle emissions due to added AT facility.	• Construction emissions. • Reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 2**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists. • Main north/south AT spine route.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires minor property acquisition.
	Score: 4	**Score: 2**	**Score: 3**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements. • Will not promote cycling as well as a protected, bike only facility type.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 3**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 12	**Total Score: 11 – Preferred**	**Total Score: 11 – Preferred**

Conclusion:

The preferred alternatives for implementing active transportation facilities on Brockville Street between Town Boundary and Lombard Street are:

- Corridor TSM – Implement a multi-use path on this segment instead of buffered bike lanes to reduce required ROW width; and
- Infrastructure Enhancement – Acquire additional lands where turn lanes are located to increase the ROW width so that the proposed buffered bike lanes can be implemented without compromise.

Due to the nature and magnitude of the problem, it is recommended that the following alternatives be implemented to address the corridor problems:

- Corridor TSM – Implement a multi-use path on this segment instead of buffered bike lanes to reduce required ROW width.

Active Transportation 8: Beckwith Street - Lombard Street to Chambers Street

Problem Identification:

The existing ROW on Beckwith Street between Lombard Street and Confederation Drive (20.11m) does not provide sufficient width to accommodate the existing road network elements and the proposed buffered bike lanes.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. Eliminating an existing drive/turn lane and implementing 1.5m bike lanes (rather than the proposed buffered bike lanes), will maximize the use of the existing curb-to-curb space. Bridge widenings should be considered at the time the bridges are scheduled for reconstruction.	Widen the Beckwith Street bridge to increase the ROW width to accommodate the proposed buffered bike lanes over the entire segment.
Natural Environment	• Additional emissions from those choosing to drive who may have chosen active modes.	• Potential reduction vehicle emissions due to added AT facility. • Potential increase in vehicle emissions due to added congestion as the result of eliminating an existing drive/turn lane.	• Loss of green space from the road widening. • Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 3**	**Score: 3**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists. • Main north/south AT spine route.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires property acquisition.
	Score: 4	**Score: 2**	**Score: 4**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements. • Eliminating an existing drive/turn lane will impact auto negatively.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities. • Would not compromise vehicle operations.
	Score: 5	**Score: 3**	**Score: 1**
Cost	• No capital cost.	• Low capital cost	• High capital cost
	Score: 1	**Score: 2**	**Score: 5**
	Total Score: 12	**Total Score: 10 – Preferred**	**Total Score: 13**

Conclusion:

The preferred alternative for implementing active transportation facilities on Beckwith Street between Lombard Street and Chambers Street is:

- Corridor TSM – Eliminate an existing drive/turn lane and implement bike lanes on this segment instead of buffered bike lanes to maximize the use of the existing curb-to-curb space.

Active Transportation 9: Elmsley Street/Queen Street - Cornelia Street to Old Slys Road

Problem Identification:

The existing ROW on Elmsley Street/Queen Street between Cornelia Street and Old Slys Road (20.11m) does not provide sufficient width to accommodate the existing road network elements (at intersections where existing left turn lanes are provided) and the proposed buffered bike lanes.

	Alternative 1: Do Nothing	Alternative 2: Transportation System Management	Alternative 3: Infrastructure Enhancement
Description	Do not implement proposed active transportation facilities.	A compromise on the presence and/or width of certain cross section elements is required to accommodate a cycling facility. Eliminating the existing on street parking and narrowing the drive lanes to 3.5m will maximize the use of the existing ROW, creating space for 1.0m boulevards (per side), 1.5m sidewalks (per side), and 2m buffered bike lanes (per side).	Acquire additional lands to increase the ROW width so that the proposed buffered bike lanes can be implemented without compromise.
Natural Environment	Additional emissions from those choosing to drive who may have chosen active modes.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.	• Construction emissions. • Potential reduction vehicle emissions due to added AT facility.
	Score: 2	**Score: 2**	**Score: 2**
Social Environment	• Discourages active travel. • Increased safety risks for pedestrians and cyclists. • Main north/south AT spine route.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Eliminating on-street parking will impact existing residents.	• Shows that the town prioritizes active transportation. • Safe and continuous active transportation facility. • Requires minor property acquisition.
	Score: 4	**Score: 3**	**Score: 3**
Transportation Environment	• Does not address the insufficient ROW width to implement an AT facility • No reduction in the auto mode share.	• Addition of Active Transportation facility • Reduction in auto mode share. • Would compromise on various cross section elements.	• Addition of preferred Active Transportation facility • Reduction in auto mode share • Would provide the ideal cross section and facilities.
	Score: 5	**Score: 2**	**Score: 1**
Cost	• No capital cost.	• Moderate-high capital cost	• High capital cost
	Score: 1	**Score: 4**	**Score: 5**
	Total Score: 12	**Total Score: 11 - Preferred**	**Total Score: 11 - Preferred**

Conclusion:

The preferred alternative for implementing active transportation facilities on Elmsley Street/Queen Street between Cornelia Street and Old Slys Road are:

- Corridor TSM – Narrow travel lanes on this segment to create space for the proposed buffered bike lanes.; and
- Infrastructure Enhancement – Acquire additional lands to increase the ROW width so that the proposed buffered bike lanes can be implemented without compromise.

Due to the nature and magnitude of the problem, it is recommended that the following alternatives be implemented to address the corridor problems:

- Corridor TSM – Narrow travel lanes on this segment to create space for the proposed buffered bike lanes